BERHAMPUR UNIVERSITY

BHANJA BIHAR: BERHAMPUR – 7 (ODISHA)

No. 5928 (98)/Acd-I Date: 31.7.2016

From:

The Registrar
Berhampur University

To

The Principals of All Affiliated
Three-year Degree Course Colleges under Berhampur University

Sub: **Introduction of Choice-Based Credit System (CBCS) at the UG level (Three-year Degree Course) from the session 2016-17.**

Ref: **This Office Memo No. 4817(96)/Acd-I dated 8.6.2016 communicating the Proceedings of the Academic Council.**

Madam/Sir

With reference to the above, it is to inform you that the Academic Council of Berhampur University in its meeting held on 31.5.2016 has decided to implement the Choice-Based Credit System at the Under-Graduate level (Three-year Degree Course) in Arts, Science and Commerce from the academic session 2016-17 basing on the letter No.4910/HE dated 27.02.2016 of the Government in the Department of Higher Education, Odisha. The syllabi of all the subjects are available in the official website of the Department of Higher Education, Odisha www.dheorissa.in. Needless to mention here that under the CBCS pattern, semester system of examinations will be conducted by the University for the students those who are admitted into the first year TDC course during the academic session 2016-17.

Hence, you are hereby requested to download the syllabi of the subjects taught in your college and the students be taught under CBCS pattern until the university releases the consolidated syllabus for Three Year Degree Course in Arts, Science and Commerce.

Yours faithfully,

REGISTRAR

Memo No. 5929 (6)/Acd-I Date: 31.7.2016

Copy to the Controller of Examinations//Director, BPCC, Berhampur University for information and necessary action.

Copy to the S.O., Exam. Gen. (UG)// Exam. Conf. (UG) Unit //Exam. Conf. Question Setting Unit/ Exam. Cert. Unit, Berhampur University for information and necessary action.

Copy to the Secretary to Vice-Chancellor, Berhampur University for kind information of the Vice-Chancellor.

Copy to the Web Administrator, Berhampur University with a request to upload the same in the University Website.

REGISTRAR

P.T.O

Memo No. 5930 (8) /Acd-I Date: 31-7-2018

Copy to the Principal Secretary to Government, Department of Higher Education, Odisha Bhubaneswar for favour information and necessary action.

Copy to the Principal Secretary to Chancellor, Chancellor's Secretariat, Raj Bhavan, Odisha Bhubaneswar for favour information.

Copy to the Director of Higher Education, Odisha, Bhubaneswar for favour information and necessary action.

Copy to the Regional Director of Education, Berhampur for information and necessary action. He is requested to circulate the same among all the +3 Degree Colleges enlisted under SAMS as well as Model Degree Colleges under the jurisdiction of the RDE, Berhampur.

Copy to the Registrars of all State Universities for information.

REGISTRAR

ଦକ୍ଷତାବର୍ଦ୍ଧକ ବାଧତାମୂଳକ ପାଠ୍ୟକ୍ରମ

Ability Enhancement Compulsory Course (AECC)

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ

(2019-20)

MIL (Communications) – Odia

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ **(2nd Semester)** କଳା, ବିଜ୍ଞାନ ଓ ବାଣିଜ୍ୟ ସାଧାରଣ **(Pass)** / ସମ୍ମାନ **(Hons)** ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

ମୋଟ୍ କ୍ରେଡିଟ୍ସ-୪, ମୋଟ ଶ୍ରେଣୀ ପାଠଦାନ ନିର୍ଘଣ୍ଟ -୪୦, ଗୋଟିଏ ଶ୍ରେଣୀ ପାଠଦାନର (ପିରିୟଡ୍) ସମୟ ଅବଧି -୪୫ ମିନିଟ୍, ପାଠ୍ୟକ୍ରମ – ୨, ପୂର୍ଣ୍ଣସଂଖ୍ୟା – ୧୦୦

(Credits – 4) Total Classes - 40, One Period - 45 Minutes, Course - II, Full Marks - 100

ପାଠ୍ୟକ୍ରମର ଭୂମିକା :

ଏହି ପାଠ୍ୟଖସଡ଼ାଟି ପସନ୍ଦ ଓ ଆସ୍ଥାଭତ୍ତିକ (CBCS / ସିବିସିଏସ୍) ପାଠ୍ୟ ପ୍ରଣାଳୀ ଅନୁସାରେ ପ୍ରସ୍ତୁତ ହୋଇଛି । ବିଭିନ୍ନ ସ୍ତରରେ ଆବଶ୍ୟକ ଅନୁସାରେ ସମସାମୟିକ ପରିସ୍ଥିତିକୁ ନେଇ ଭାବବିନିମୟ ଓ ପାରସ୍ପରିକ ଯୋଗାଯୋଗ ସ୍ଥାପନ କିପରି ଓଡ଼ିଆ ଭାଷାରେ ସହଜରେ, ସରଳରେ ହୋଇପାରିବ – ଏ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟର ପ୍ରାୟୋଗିକ ଜ୍ଞାନର ବିକାଶ ନିମିତ୍ତ +୩ ସ୍ତରୀୟ ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ଏହି ପାଠ୍ୟକ୍ରମର ଖସଡ଼ାଟି ସାହାଯ୍ୟ କରିବ । ସେଥିପାଇଁ ପ୍ରଚଳିତ ଭାଷାର ବୈୟାକରଣିକ, ବ୍ୟାବହାରିକ ଓ ପ୍ରାୟୋଗିକ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଏଥିରେ ସଂଯୋଗ ପ୍ରକ୍ରିୟାର ଅନୁବିଧି, ଯୋଗାଯୋଗର ତଥ୍ୟ ଓ ତତ୍ତ୍ୱ ପ୍ରତି ଗୁରୁତ୍ୱ ଦିଆଯାଇଛି । ସରକାରୀ କାର୍ଯ୍ୟାଳୟରେ ଓଡ଼ିଆ ଭାଷାର ବ୍ୟବହାରରେ ଏହା ଦକ୍ଷତା ବୃଦ୍ଧି କରିବ । ଓଡ଼ିଆ ଭାଷାର ପ୍ରୟୋଗରେ ସେମାନେ ଶୁଦ୍ଧ ଓ ପରିଚ୍ଛନ୍ନ ଭାବରେ ଯେକୌଣସି ପ୍ରକାର ଜ୍ଞାନର ସୂଚନା ତଥ୍ୟ ଓ ସିଦ୍ଧାନ୍ତକୁ ମୌଖିକ ଓ ଲିଖିତ ସ୍ତରରେ ସହଜରେ ପ୍ରକାଶ କରିପାରିବେ ଏବଂ ସେମାନଙ୍କ ମାତୃଭାଷା ପ୍ରୟୋଗର ବିକାଶ ଘଟିପାରିବ ।

ମୂଲ୍ୟ ବିଭାଜନ ପଦ୍ଧତି : (ସବୁଥିରୁ ବିକଳ୍ପ ପଡ଼ିବ)

କ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍) ରୁ ବିକଳ୍ପସହ ଦୁଇଟି ଲେଖାଏଁ ମୋଟ ୮ଟି ୧୫ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘପ୍ରଶ୍ନ ପଡିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ ।(୧୫ x ୪ = ୬୦)

ଖ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକରୁ ୧୨ଟି ଅତିସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (୧୦ x ୨ = ୨୦)

ଗ) ମହାବିଦ୍ୟାଳୟସ୍ତରୀୟ ଅନ୍ତଃ ପରୀକ୍ଷା (୨୦)

ମୋଟ ମୂଲ୍ୟାଙ୍କ - ୧୦୦

ସବିଶେଷ ପାଠ୍ୟ

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ **(AECC)**

ପାଠ୍ୟ-୧ / **Course – 1: ଯୋଗାଯୋଗ ଅନୁବିଧି, ରୀତି ଓ ମାଧ୍ୟମ**

୧ମ ଏକକ : ଯୋଗାଯୋଗର ପରିଭାଷା, ଅନୁବିଧି, ପରିସର ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ସାକ୍ଷାତକାର, ଭାଷଣ କଳା

୩ୟ ଏକକ : ସମ୍ବାଦର ପରିଭାଷା, ପରିସର ଓ ସମ୍ବାଦ ପ୍ରସ୍ତୁତି

୪ର୍ଥ ଏକକ : ଓଡ଼ିଆ ଭାଷାର ବର୍ଣ୍ଣମାଳା, ବର୍ଣ୍ଣାଶୁଦ୍ଧିର ନିରାକରଣ । (ବନାନ ତ୍ରୁଟି - ସାଦୃଶ୍ୟଜନିତ ଅଶୁଦ୍ଧି, ଲିଙ୍ଗଗତ ଅଶୁଦ୍ଧି, ସନ୍ଧିଗତ ଅଶୁଦ୍ଧି, ସମାସଗତ ଅଶୁଦ୍ଧି, ବଚନ ଓ ବିଭକ୍ତିଗତ ଅଶୁଦ୍ଧି, ବାକ୍ୟ ବିଧିଜନିତ ଅଶୁଦ୍ଧି, ସମାର୍ଥବୋଧକ ଶବ୍ଦାଶୁଦ୍ଧି, ପ୍ରତ୍ୟୟ ଜନିତ ଅଶୁଦ୍ଧି, ଶବ୍ଦ ସଂଯୋଗାତ୍ମକ ଓ ସ୍ୱରସଙ୍ଗତି ଜନିତ ଅଶୁଦ୍ଧି)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ (ପାଠ୍ୟ-୧ / **Course – 1**)

୧. ଯୋଗାଯୋଗ ମୂଳକ ମାତୃଭାଷା (ଓଡ଼ିଆ) ସାମଲ ବିରଞ୍ଚି ନାରାୟଣ, ସତ୍ୟନାରାୟଣ ବୁକ ଷ୍ଟୋର, କଟକ ।

୨. ସଂଯୋଗ ଅନୁବିଧି, ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ

୩. ଭାଷଣ କଳା ଓ ଅନ୍ୟାନ୍ୟ ପ୍ରସଙ୍ଗ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର,କଟକ

୪. ପ୍ରାୟୋଗିକ ଓଡ଼ିଆ ଭାଷା – ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୧. ସମ୍ବାଦ ଓ ସାମ୍ବାଦିକତା – ଚନ୍ଦ୍ରଶେଖର ମହାପାତ୍ର, ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୧. ନିର୍ଭୁଲ ଲେଖାର ମୂଳସୂତ୍ର, ନୀଳାନ୍ଦିଭୂଷଣ ହରିଚନ୍ଦନ, ପି.ସି.ଆର ପବ୍ଲିକେସନ, ଭୁବନେଶ୍ୱର

୨. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିଉ ଷ୍ଟୁଡେଣ୍ଟସ୍ ଷ୍ଟୋର, କଟକ

Speed post/Local

BERHAMPUR UNIVERSITY,
BHANJA BIHAR, BERHAMPUR -760007(GANJAM) ODISHA.

No. 7475 /Acad-I/BU/2021 Date 28/10/2021

ED - 36

NOTIFICATION

It is for information of all concerned that basing on the recommendation of the Board of Studies in Environment Studies & Disaster Management held on 08.10.2021, the Vice-Chancellor has been pleased to approve the Syllabus for Environment Studies & Disaster Management under AECCI semester-1 for Under Graduate Courses Arts, Science and Commerce to be effective from the Academic Session 2021-22 onwards. The same syllabus shall be available in the Berhampur University website.

By order

REGISTRAR

Memo.No. 7476 (160) /Acad-I/BU/2021 Date 28/10/2021

Copy to

1. The Member Secretary, Odisha State Higher Education Council, A-11, Pustak Bhawan (2nd Floor) Sukavihar, Bhubaneswar, for information and necessary action.
2. The Principal, All the Affiliated College, Under Berhampur University, for information and necessary action.
3. The Controller of Examinations, Berhampur University for information and necessary action. (Encl. as above)
4. The Section Officer, Question Setting Unit, Berhampur University for information and necessary action.
5. The Section Officer, Examination General / Confidential U.G. Section, Berhampur University for information and necessary action.
6. The Web Administrator, Berhampur University, with a request to upload the same Syllabus in the University website.

REGISTRAR

ENVIRONMENTAL STUDIES
&
DISASTER MANAGEMENT
(AECC I)
SEMESTER-1
FOR UNDER-GRADUATE COURSES ARTS, SCIENCE AND COMMERCE (2021-22)

Course Objectives:

The following objectives have been framed for the proposed curriculum to: -

1. Find out solutions for a sustainable Earth for future generation
2. Make the stakeholders aware of their rights, responsibilities, consequences of their conduct towards nature and build resilience
3. Develop a sense of equitable use of resources and their preservation for the future generation
4. Sensitize the stakeholders on Disaster and Pandemic preparedness

Learning Outcome:

On successful completion of the course students will be able to:

1. Identify the historical origins of destructive attitudes and practices toward the natural environment;
2. Know the compatibility of human and environmental/ecological values
3. Know the natural resources available on earth and how to conserve and manage them
4. Understand the disasters and pandemic they are facing and empower the new generation to face the new challenges

Pedagogy/ Teaching Transaction

1. Classroom teaching
2. Self- Study
3. E-Learning
4. Guest Lectures
5. Case Study Analysis and Discussion
6. Field Trip/Visit
7. Seminars
8. Audio, Video, Film Based Discussion/Analysis
9. Group Exercises
10. Group Discussions

08/10/21

08/10/2021

8.10.2021

Model Syllabus

ENVIRONMENTAL STUDIES
&
DISASTER MANAGEMENT

(AECC I)

SEMESTER-1

FOR UNDER-GRADUATE COURSES ARTS, SCIENCE AND COMMERCE (2021-22)

FULL MARK-100 (Credit-4)

Unit-I (Environment)

(13 periodsx45 min)

The Environment: The Atmosphere, Lithosphere, Hydrosphere, Biosphere (01 period)

Ecosystem: Energy flow in the ecosystem (01 period)

Biogeochemical Cycle: Water Cycle, Carbon Cycle, Nitrogen Cycle (02 periods)

Pollution: Water Pollution, Air Pollution, Soil Pollution, Radiation Pollution, Industrial Pollution, Light Pollution, Sound Pollution (05 periods)

Environmental Laws (Water Act 1974, Air Act 1981, The Wildlife Protection Act 1972, The Environment Protection Act 1986), The Forest Conservation Act 1980 (04 periods)

Unit-II (Climate Change & Sustainable Development) (13 periodsx45 min)

Population Ecology: Individuals, Species, Population, Community (01 period)

Human Population Growth, Population Control Methods (01 period)

Urbanization and its effect on society (01 period)

28/10/21
(M. Jana)

05/10/2021

8.10.21

8.10.21

Climate Change: Causes, effect, Global Warming, Carbon footprint and environmental protection (05 periods)

Steps taken towards sustainable development: Ban of single-use plastics, Automobile Scrapping Policy, Promotion of Electrical Vehicles (03 periods)

Brief idea on Sustainable Development Goals (SDGs), Agenda 21 of Rio Earth Summit (02 periods)

Unit-III (Disaster Management) **(13 periods x 45 min)**

Disaster Management: Types of disasters (Natural and Man-made) and their causes and effect) (02 periods)

Vulnerability Assessment and Risk Analysis: Vulnerability to various disasters (Flood, Cyclone, Earthquake, Heat waves and Lightning) (02 periods)

Institutional Framework: Institutional arrangements for disaster management (National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), District Disaster Management Authority (DDMA), National Disaster Response Force (NDRF) and Odisha Disaster Rapid Action Force (ODRAF) (02 periods)

Preparedness Measures: Disaster Management Cycle, Early Warning System, Pre-Disaster and Post-Disaster Preparedness, Strengthening of SDMA and DDMA, Community Preparedness, Stakeholder participation, Corporate Social Responsibility (CSR) (05 periods)

Survival Skills: Survival skills adopted during and after disaster (Flood,

Unit-IV (Public Health Management) (13 periods x 45min)

Brief idea on Epidemics and Pandemics (01 period)

Non-communicable diseases with special reference to Cardiovascular diseases, Cancer, Diabetes, Hypertension and Obesity and their prevention (02 periods)

Communicable diseases with special reference to Covid-19, Flu, Hepatitis, AIDS and Tuberculosis and their transmission (02 periods)

Dynamics of Disease Transmission: Mode of transmission (Direct/Indirect), Events after infection: Immunity (Active vrs Passive, Innate vrs Acquired, Herd Immunity), Incubation Period (02 periods)

Prevention of Epidemics/Pandemics Diseases: Preventing Measures (Quarantine, Sanitization, Personal Protective measures such as Hand washing and use of protective devices, Vaccination); Control Measures (Surveillance, Isolation, Contact Tracing) (03 Periods)

Life Style management (Diet, Physical Exercise, Yoga and sleeping habit) (02 periods)

Role of Different Sectors in Managing Health Disaster: Role of Government (Centre and State), Community, Civil Society, Student mass, NGOs (01 period)

8.10.21

08/10/2021

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08/10/2021

Books Recommended:

1. Asthana DK and Asthana M: A Text Book of Environmental Studies, S. Chand, New Delhi
2. Bharucha E: A Text Book of Environmental Studies, New Delhi: UGC
3. Dash MC and Mishra PC: Man and Environment, McMillan, London
4. Disaster Management and Mitigation Plan,2013 of Dept. of Health & Family Welfare, Govt. of Odisha*
5. Mishra DD: *Fundamental Concepts in Environmental Studies*, S. Chand, New Delhi
6. National Policy on Disaster Management,2009*
7. National Disaster Management Plan,2019*
8. Odum EP: *Fundamentals of Ecology*, Natraj Publications
9. State Disaster Management Plan, 2019 of Government of Odisha*
10. Standard Operating Procedure (SOP) issued by Govt. of India and Govt. Of Odisha on Public Health Managements in the websites: www.mohfw.gov.in and health.odisha.gov.in*
11. The Disaster Management Act, 2005 of Government of India*

[Note: Star (*) marked References, published by the State as well as Central Government are available in the open sources]

08/10/2021 (M-Jena)

08/10/2021

8.10.21

8/10/21

Final 27/10

Library

SUGGESTED CURRICULUM FOR THE PROPOSED COURSE

Ethics and Values

(Consisting of six modules of 1 credit each: 15 lectures per credit)

ODISHA STATE HIGHER EDUCATION COUNCIL
A-11, 2nd Floor, PUSTAK BHAVAN
SUKA BIHAR, BHOI NAGAR-751022
BHUBANESWAR, ODISHA

OBJECTIVES/LEARNING GOALS OF THE COURSE

- Development of a good human being and a responsible citizen.
- Developing a sense of right and wrong leading to ethically correct behavior.
- Inculcating a positive attitude and a healthy work culture.

SEMESTER-I

Unit-1

Title: - Issues Relating to Women

Total no. of Periods-15 **Full mark-25** **Credit point -1**

1.0 Aims of the Unit:

- *The module aims to generate a sensitivity among the students towards women*
- *Enable them to value the contributions of women, from family to the larger society*
- *To generate among them a distinct urge to respect women*
- *To appreciate that women should have equal status and equal entitlements as member of the society*

Learning Objectives:

After going through the contents of the module and the classroom transactions on the contents, the students are expected to

- Have changes in their perceptions and practices towards women
- Develop proper attitude towards women and value their work and contribution
- Come forward to challenge unethical treatments against women
- End gender based hierarchy and hegemony, remove the feeling that women are counter to men and bring about a complementarity among the hitherto existing gender binary
- Allow women to realize their self worth and contribute their best for betterment of the society
- Pioneer in creating a gender equal society where the well being, happiness and security of the women will be well protected ; contributing towards a better and happier society

	Teaching Hours
1.1 Introduction: General introduction on Ethics and Values, Gender equality as an essential precursor to social progress, the present scenario, Desirable gender related values.	1-2-3
1.2 Women and Family Pre-natal sex selection, Gendered practices in the family, Gender based division of labour in the family, Marriage and women, Marriage and women's consent, Child marriage, Practice of dowry, Women and family violence.	4-5-6-7
1.3 Women and Work Women's work: The Invisible hands, Exploitation of women at work, Gender Stereotyping at work, Glass ceiling, Women and pay gap, Sexual Harassment of women at work, Working women and role conflict.	8-9-10-11
1.4 Women, Community and Society Violence against women in public spaces, Gender sensitive language and communication, Gendered language, Sexist Language, Gender neutral language, Women and property Rights, Women's property Rights in Indian Laws. The functionality of Women's Property Rights	12-13-14-15

SEMESTER-II

Unit-2

Title: - Values and Good Citizenship

Total no. of Periods-15 **Full mark-25** **Credit point -1**

2.0 Aim of the Unit:

- Introducing the Salient features of Indian Constitution to students and to inculcate the sense of patriotism in them
- Encouraging them to Volunteer for social work
- Instilling appropriate work ethics in them

Learning Objectives:

- Understanding Basic Values of Indian Constitution
- Inculcating Volunteerism for Social change
- Helping students to become good human being and citizen

	Teaching Hours
2.1 Indian Constitution Salient Values of Preamble: Sovereign, Socialist, Secular, Democratic, Republic, Justice, Liberty, Equality and Fraternity.	1-2-3
2.2 Patriotism Patriotic Value and ingredients of nation building, Concept of Good citizenship, Emotional connection with the country, Duties of citizens and Qualities of good citizens	4-5-6-7
2.3 Volunteerism Concept and facets of Volunteerism and Leadership, Building a better society through Volunteerism, Blood Donation, Social Work, Helping the Aged, Environmental Protection	8-9-10-11
2.4 Work Ethics Punctuality, Cleanliness, Law abidingness, Rational Thinking and Scientific Temper	12-13-14-15

SEMESTER-III

Unit-3

Title: - Issues of Drug, Tobacco and Alcohol Addiction

Total no. of Periods-15 **Full mark-25** **Credit point -1**

3.0 Aims of the Unit:

- Creating awareness about health and Societal hazards of drugs, tobacco and alcohol addiction
- Sensitizing students about professional support system for treatment and rehabilitation

Learning Objectives:

- The students become aware of the grave danger of consuming alcohol, tobacco and drugs
- Students would encourage their friends to remain away from tobacco ,alcohol , drugs and seek professional help when needed

	Teaching Hours
3.1 Extent of the Problem Extent of Drug and Tobacco addiction and alcoholism in India, Myths associated with them, Health hazards associated with them and how they have become silent killers	1-2-3-4
3.2 Socio- economic impact Socio- economic impact of Drug and Tobacco addiction and alcoholism: Loss of physical and mental strength, Loss of character, Loss of family ties and relationship, Loss of earning and livelihood potentials, Loss of societal respect and dignity etc	5-6-7-8
3.3 Laws to Address this Problem Silent features of social legislation such as NDPS Act, 1985 and COTPA Act , 2003 , Mechanism and Government Schemes for prevention , de-addiction and rehabilitation	9-10-11-12
3.4 Role of Stake - holders Provision of Tobacco free campus and role of students, Role of students in their family and immediate surroundings, Role of NGOs and other agencies	13-14-15

SEMESTER-IV
Unit-4

Title: - Ethical Values for Student Life

Total no. of Periods-15 **Full mark-25** **Credit point -1**

4.0 Aims of the Unit:

- To familiarize the students with core values of Academics and Goals of Education
- To create an awareness about Unethical practices in the academics

Learning Objectives:

- The students will learn to behave ethically in the campus
- Exhibit respectful treatment to others in an organizational context
- Contribute to develop a positive social environment through active participation and cooperation with others

	Teaching Hours
4.1 Meaning and Objective of Education: Knowledge is power and quest for knowledge is the real meaning of education, not quest for Degree and qualifications; Real education builds character: Difference between Academic Qualification and Ability, Academic failure could be failure within the classroom, but not outside (i.e. Failed in exam, passed in life!)	**1-2-3**
4.2 Challenges for Ethical Practices in Institutions of Higher Education: Ragging, Suicide and Need for Educational Counseling, Violence vs. Peaceful Protest, Conflict resolution, Plagiarism and Violation of Intellectual property Rights, Cheating in Examination and other Fraudulent Practices	**4-5-6-7**
4.3 Inter personal Relation and Community Life in HEI: Green Preacher and conservation of Energy, Community Life in Campus including Hostels, Local Common area, Inter personal relations (Students-Teacher, Students-Student and Man-Woman, Positive Friendship).	**8-9-10-11**
4.4 Ethical Leadership in Academic Institution: Concept and Traits of Leadership to provide solution, everyone has Leadership Role (not limited to position), Concept of Ethical leadership, Scope of Leadership in college and Universities for Students, Teachers and Administrators, Importance of co-curricular and extra – curricular activities.	**12-13-14-15**

SEMESTER-V

Unit-5

Title: -Vulnerable Sections of Society: Understanding their Issues

Total no. of Periods-15 **Full mark-25** **Credit point -1**

5.0 Aims of the Unit:

To create an awareness amongst students about the need for ensuring dignity and equality for the vulnerable sections of the society.

Learning Objectives:

- Students would be able to appreciate values and ethics relating to vulnerable sections of the society.
- Students would learn to practice equality, diversity and social justice.
- Students would become more empathetic and compassionate towards vulnerable sections of the society.

	Teaching Hours
5.1 Issues Relating to Children: Nutrition and health, Child Exploitation: Child labour, trafficking, Sexual exploitation	1-2-3-4
5.2 Issues Relating to Elderly Persons: Abuse of Elders, Financial Insecurity, Loneliness and Social Insecurity, Health Care Issues, Needs for a Happy and Dignified Ageing	5-6-7-8
5.3 Issues Relating to Persons with disability: Rights of PWD, affirmative action, Prevention of discrimination, providing equal opportunity, various scheme for empowering PWD and social justice for PWD	9-10-11-12
5.4 Issues Relating to Third Gender: Understanding the Third Gender, Social justice for them, Removal of discrimination, Affirmative action and Acceptance of diversity of gender.	13-14-15

SEMESTER-VI

Unit-6

Title: - Environmental &Techno Ethics

Total no. of Periods-15 **Full mark-25** **Credit point -1**

Aims of the Unit:

- To develop awareness and sensitize students about the importance of environment for a sustainable earth and to bring Green Technology into action
- To focus their attention towards cleanliness, preservation of biodiversity and practice of conservation of natural resources
- To make them understand the judicious use of modern technology strictly on need basis
- To use science and technology for preservation of environment and its sustainable development but not for destruction.

Learning Objectives:

- Develop an understanding of environmental ethics and work towards sustainable development
- Commitment to Green Technology for sustainable future
- Understand ethical issues relating to use of digital medium

	Teaching Hours
6.1 Environmental Ethics: Types of Ecological Values, Environmental Values & Valuing Nature, Equitable use of Resources, Role of Individual in the conservation of resources for future generation, Bio-Ethics-Genetic manipulation in plants and animals for benefit of society and cruelty against animal.	1-2-3
6.2 Promotion of Green Technology: **Goal of Green Technology:** Reduce recycling, **Renew** (removal of chemicals), **Refuse** and **Responsibility.** **Green Technology in relation to:** -Energy and Construction.	4-5-6-7
6.3 Ethics and Technology with reference to Science, gadget, machine etc. and interaction with each other; **Agricultural, Industrial, Digital, Globalized Age etc**	8-9-10-11
6.4 Judicious Use of Technology: Judicious use of Mobile Phones, Electrical machines, Plastics, Television, Computers and their harmful effects **Ethics and Use of Digital Technology:** Cyber ethics- Crimes and Ethical hacking, **Ethics of social media:** WhatsApp, Facebook, Twitter and others.	12-13-14-15

Guideline for the Newly Introduced "Ethics and Values" Compulsory Course

The new course "Ethics and Values" has been designed to be taught among the +3 under graduate degree course from the session 2021-2022 under AECC (i.e. Ability Enhancement Compulsory Course) which is as follows:

- Course Name — Ethics and Values
- Total No. of Units - — 6 Units (One unit per Semester)
- No. of credit to be awarded- — 1 credit per semester (total 6 credits)
- No. of lectures per unit per semester- — 15 classes of 45mintues duration
- Marks - — 25 marks per unit per semester
  Grand total 150marks for six semesters
- Total No. of subunits per unit- — 4 subunits
- Course material available on- — e-Books will be available on OSHEC website and e-Lectures on www.viputkal.odisha.gov.in
- Teaching assignment - — Classes can be assigned to teachers of any subject by the Principal.
- Question Paper Setter &Evaluator of Answer paper - — Board of Studies (BOS) of State Public University and Autonomous colleges (Govt. /Govt. aided) Odisha will prepare the panel of question Paper Setter and Evaluator of Answer paper. Question setter may be instructed to prepare question papers as per CBCS model regulation 2018-19. Further, question setter will have to mandatorily supply the Scheme of Valuation along with question paper for evaluation.

Implementation:

All State Public Universities of Odisha (i.e. coming under HED) will implement the course "Ethics and Values" under AECC from the session 2021-2022.

Ability Enhancement Courses in CBCS in Odisha:

Ability Enhancement Compulsory Courses (AECC)

1. Environmental Studies and Disaster Management- 4 credits
2. English/Hindi/MIL communication - 4 credits
3. Ethics and Values (EV) - 6 credits (1 credit per Unit/Semester)

B.A. / B. Com. / B. Sc. (Honors and Pass) Course

Course	Credit
Semester I	
AECC-I	04
AECC-(EV-I)	01
Semester II	
AECC-II	04
AECC-(EV-II)	01
Semester III	
AECC-(EV-III)	01
Semester IV	
AECC-(EV-IV)	01
Semester V	
AECC-(EV-V)	01
Semester VI	
AECC-(EV-VI)	01

Examination Question Pattern

- Duration of examination of each semester -1 hour
- There will be no mid-term examination (for 'Ethics and Value' Course)
- The question paper will be in bilingual format
- The question paper shall be divided into 3 parts

Part-I will carry 5 numbers of questions each carrying one mark [5 X 1]
Part-II will carry 5 numbers of questions each carrying two marks (within 50 words) [5 X 2]
Part-III will carry 2 numbers of questions each carrying five marks [2 X 5]
(Within 250 words)

The SGPA and CGPA will be calculated accordingly for awarding grades to the students.

SKILL ENHANCEMENT COURSES (SEC)

As per the CBCS regulation, the student registered under Honours course in any subject has to opt for two SEC courses and a student registered under Pass stream has to opt for four SEC courses. In this context, Some options are provided here. Syllabus of individual subjects also have listed additional skill based papers at the end. In addition, the combined board and Project OHEPEE has also formulated two skill papers in great detail keeping requirements of spoken English and quantitative as well as logical thinking abilities in mind. These two Special SEC papers are available as separate Model Syllabi.

Optional for SEC paper

Total Marks- 100

Skill Enhancement Courses (SEC Option-I)

ENGLISH COMMUNICATION

Introduction: This paper intends to build up the four primary skills in students in the academic as well as in the wider domains of use like public offices. The books recommended only provide guidelines for what to teach, and the list is in no way exhaustive. Teachers must be free and resourceful enough to collect teaching materials on their own, and even use newspaper clippings as teaching materials.

This is an activity-based, goal-oriented, functional course in English Communication, which aims to make the students able and efficient communicators by helping them to be self-reflexive about English. This course has a pre-defined context of being supportive and complementary to the core courses in various disciplines. Therefore, unlike most other courses in English Communication on offer, it does not seek to build facile fluency that passes off as communicative competence. Rather, it intends to equip the students with the relevant skills of presentation and expression needed in the academic as well as in the professional domains of communicative use. While reading skills exercises are meant to promote the acquisition of analytical and comprehension skills, writing skills exercises are centered on sentence construction, paragraph development and précis writing. Teachers must be free and flexible enough in relation to teaching materials, using newspaper clippings, non-conventional and multi-media resources in the classroom. There is ample scope to build the speaking and listening skills of students in the way the course is planned with an emphasis on interactive learning and articulation.

UNIT 1: Introduction

(i) What is communication?
(ii) Types of communication (Horizontal, Vertical, Interpersonal, Grapevine),
(iii) Uses of Communication, Inter-cultural communication, Communication today:
(iv) Distinct features of Indianisation, alternative texts of language learning, global English and English in the print and electronic media in India.

UNIT 2: The Four Skills and Prospect of new material in language learning

(i) Listening-Passive and active, Speaking effective, intelligibility and clarity
(ii) Methods and techniques of reading such as skimming, scanning and searching for information; Reading to understand the literal, metaphorical and suggested meaning of a passage,
(iii) Identifying the tone (admiring, accusatory, ironical, sympathetic, evasive, indecisive, ambiguous, neutral etc.) of the writer and view-points.
(iv) Cohesive and Coherent writing

UNIT 3: Grammatical and Composition Skills

(i) Doing exercises like filling in the blanks, correcting errors, choosing correct forms out of alternative choices, joining clauses, rewriting sentences as directed, and replacing indicated sections with single words / opposites / synonyms, choosing to use correct punctuation marks, getting to understand and use formal and informal styles, learning to understand the usages of officialese, sexism, racism, jargon.
(ii) Learning to understand information structure of the sentence such as topic-focus relationship; strategies of thematization, postponement, emphasis, structural compression (deletion of redundant parts, nominalization, cleft and pseudo-cleft sentences, elliptical structures etc.), Logical Connectors between sentences, Methods of developing a paragraph, structure of an essay and methods of developing an essay

UNIT 4: Exercises in Written Communication

(i) Précis writing
(ii) Note-taking skills
(iii) Writing reports
(iv) Guidelines and essentials of official correspondence for making enquiries, complaints and replies
(v) Making representations; writing letters of application for jobs; writing CV, writing letters to the editor and social appeals in the form of letters/pamphlets.

Reference Books:

- *Ways of Reading: Advanced reading Skills for Students of English Literature*. Martin Montgomery et al. London: Routledge, 2007.

- *Applying Communication Theory for Professional Life: A Practical Introduction*. Dainton and Zelley, http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGhlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563
- *Literature and the art of Communication*, Cambridge University Press.
- *Vistas and Visions*. Orient Black Swan (writing and grammar exercises at the end of lessons are recommended) From *Remapping An Anthology for Degree Classes*, ('Writing Skills'), Orient Black Swan.
- *Indian English through Newspapers (*Chapter 4,5 and 6), Concept, New Delhi,2008.
- *Contemporary Communicative English,* S Chand
- Technical Communication: A Reader Centred Approach. P.V. Anderson. Wadsworth, Cengage.

SEC- II (Quantitative and Logical Thinking)

QUANTITATIVE APTITUDE & DATA INTERPRETATION

Unit-1: Whole numbers, Integers, Rational and irrational numbers, Fractions, Square roots and Cube roots, Surds and Indices, Problems on Numbers, Divisibility, Steps of Long Division Method for Finding Square Roots

Unit -2: Basic concepts, Different formulae of Percentage, Profit and Loss, Discount, Simple interest, Ratio and Proportion, Mixture.

Unit-3: Time and Work, Pipes and Cisterns, Basic concepts of Time, Distance and Speed; relationship among them.

Unit-4: Concept of Angles, Different Polygons like triangles, rectangle, square, right angled triangle, Pythagorean Theorem, Perimeter and Area of Triangles, Rectangles, Circles.

Unit -5: Raw and Grouped Data, Bar Graphs, Pie charts. Mean, Median and Mode, Events and Sample Space, Probability

LOGICAL REASONING

Unit-1: Analogy basing on kinds of relationships, Simple Analogy, Pattern and Series of Numbers, Letters, Figures. Coding-Decoding of Numbers, Letters, Symbols (Figures), Blood relations.

UNIT-2 Logical Statements-Two premise argument, More than two premise argument using connectives.

UNIT -3: Venn Diagrams, Mirror Images, Problems on Cubes and Dices.

STATE MODEL SYLLABUS FOR UNDERGRADUATE COURSE IN COMMERCE

(Bachelor of Commerce Examination)

Under Choice Based Credit System

U.G. Commerce Common Syllabus, Odisha

Paper	Subject	Paper Code	Full Marks	End-term Marks	Mid-term Marks	Credit Points
	Semester I					
1.1	Environmental Science	AECC -1	100	80	20	4
1.2	Financial Accounting	CORE-1	100	80	20	6
1.3	Business Law	CORE-2	100	80	20	6
1.4	Micro Economics	GE-1	100	80	20	6
	Total		**400**			**22**
	Semester II					
2.1	Communicative English/MIL	AECC-2	100	80	20	4
2.2	Cost Accounting	CORE-3	100	80	20	6
2.3	Corporate Law	CORE-4	100	80	20	6
2.4	Macro & Indian Economy	GE-2	100	80	20	6
	Total		**400**			**22**
	Semester III					
3.1	Corporate Accounting	CORE-5	100	80	20	6
3.2	Income-tax Law and Practice	CORE-6	100	80	20	6
3.3	Management Principles and Application	CORE-7	100	80	20	6
3.4	Business Statistics	GE-3	100	80	20	6
3.5	E-Commerce	SEC-1	100	80	20	4
	Total		**500**			**28**
	Semester IV					
4.1	GST and Indirect Taxes	CORE-8	100	80	20	6
4.2	Fundamentals of Data Management (End Term Exam = 60, Practical = 25, Mid-term = 15	CORE-9	100	60+25	15	6
4.3	Management Accounting	CORE-10	100	80	20	6
4.4	Principles of Marketing	GE-4	100	80	20	6
4.5	Entrepreneurship Development and Business Ethics	SEC-2	100	80	20	4
	Total		**500**			**28**
	Semester V					
5.1	Computerized Accounting& E-filling of Tax Returns (End Term Exam = 60, Practical = 25, Mid-term = 15	CORE-11	100	60+25	15	6
5.2	Fundamentals of Financial Management	CORE-12	100	80	20	6
5.3	Elective I (Any *one* of the following)	DSE-1	100	80	20	6
	A. Financial					

	Accounting and Finance	Markets, Institutions &Services					
	B. Banking and Insurance	Indian Banking and Insurance System					
	C. Management	Human Resource Management					
5.4	Elective II (Any *one* of the following)		DSE-2	100	80	20	6
	A. Accounting and Finance	Financial Statement Analysis and Reporting					
	B. Banking and Insurance	Merchant Banking and Financial Services					
	C. Management	International Business					
	Total			**400**			**24**
	Semester VI						
6.1	Auditing and Corporate Governance		CORE-13	100	80	20	6
6.2	Business Mathematics		CORE-14	100	80	20	6
6.3	Elective III (Any *one* of the following)		DSE-3	100	80	20	6
	A. Accounting and Finance	Fundamentals of Corporate Tax Planning					
	B. Banking and Insurance	Fundamentals of Investment					
	C. Management	Consumer Affairs and Customer Care					
6.4	Business Research Methods and Project work	End Term Exam = 50 Project = 30 Viva-voce = 20	DSE-4	100	50 30 Project 20 Viva-voce		6
	Total			**400**			**24**
	Grand Total			**2600**			**148**

COMMERCE

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for non commerce students– 4 papers.
(Universities can exercise option of prescribing 2 GE in which case from the list of GEs given in the syllabus GE1 and GE2 only are to be taken.
Marks per paper - Midterm: 20 marks, End term : 80 marks, Total – 100 marks for papers without practical; For papers with Practicals the mark distribution would be 60+25+15
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

(CORE – 1)

FINANCIAL ACCOUNTING

Objectives: The objective of this paper is to help students to acquire conceptual knowledge of financial accounting and to impart skills for recording various kinds of business transactions.

Unit - I. (a) Basics of Accounting

i. Accounting as the language of business and an information system, the users of financial accounting information and their needs. Qualitative characteristics of accounting information, Functions, advantages and limitations of accounting. Branches of accounting. Bases of accounting: cash basis and accrual basis.
ii. The nature of financial accounting principles – Basic concepts and conventions: entity, money measurement, going concern, cost, realization, accruals, periodicity, consistency, prudence (conservatism), materiality and full disclosures and Accounting Equation.

(b)Accounting Process

From recording of business transactions to the preparation of trial balance including adjustments: journal, sub-division of journal, ledger accounts, trial balance.

Unit – II: Reporting Standards &Business Income

1. Concepts of AS, Ind AS (Indian Accounting Standards), IFRS (International Financial Reporting Standards) & XBRL (extensible Business Reporting Language)
2. Measurement of business income-Net income: the accounting period, the continuity doctrine and matching concept. Objectives of measurement and revenue recognition.
3. Depreciation Accounting: The accounting concept of depreciation. Factors in the measurement of depreciation. Methods of computing depreciation: straight line method and diminishing balance method; Disposal of depreciable assets-change of method. Salient features of Accounting Standard 6 (AS- 6) issued by ICAI

Unit – III: Final Accounts

Capital and revenue expenditures and receipts, Preparation of financial statements of Sole Trade and Partnership Business with adjustments

Accounting for Partnership Firm: Accounting of Admission of partner, Retirement and Death of partner and Dissolution of the Partnership Firm Including Insolvency of partners

Unit – IV:

i. Hire Purchase and Instalment Systems and Accounting for Branch & Department
ii. Concepts of operating and financial lease (theory only)
iii. Departmental Accounting and Branch Accounting including foreign branch (Theory and Problem)
iv. Hire purchase and Instalment System

Learning Outcomes: The course structure of this paper would equip the students to get in-depth knowledge of financial accounting along with its practical application thereby giving an opportunity to gain easy access to this competitive business world.

Text Books Recommended

1. Financial Accounting I and Financial Accounting II: Mukherjee, Oxford University Press
2. Jain, S.P. and K.L. Narang. Financial Accounting, Kalyani Publishers, New Delhi

Suggested Readings:

1. Financial Accounting, R.K. Mittal , M.R. Bansal, V.K, Global Publication.
2. Bal Ranjan Kumar, Financial Accounting – S. Chand
3. Text Book of Financial Accounting-Anil Kumar and Mariappa- Himalaya Publishing House
4. Financial Accounting - P. C. Tulsiani, Pearson Publication
5. Anthony, R.N. Hawkins, and Merchant, Accounting: Text and Cases. McGraw-Hill Education.
6. Bansal.K.M- Financial Accounting – Taxman Publication
7. Horngren, Introduction to Financial Accounting, Pearson Education.
8. Maheshwari, S.N. and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi.
9. Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi
10. N.Godwin and D. Sanyal, Financial ACCT, Cengage Learning

(CORE – 2)

BUSINESS LAW

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case laws.

Unit I: The Indian Contract Act, 1872

1. Contract – meaning, characteristics and kinds, Essentials of a valid contract
2. Offer and acceptance (Definition, Rules, Communication and Revocation of offer and acceptance)
3. Consideration (Definition, Elements, Types, Rules), "No Consideration No Contract" and its exceptions; Capacity to Parties (Definition and Types)
4. Consent, Free consent, Coercion, Undue Influence, Fraud, Misrepresentation, Mistake
5. Legality of objects and Consideration
6. Void and Voidable agreements – Definition, Types and Distinction
   Discharge of a contract – Modes of discharge, Breach and Remedies against breach of contract
7. Specific Contracts - Contingent contracts, Quasi, Contract of Indemnity, Guarantee, Bailment, Pledges

Unit II: The Sale of Goods Act, 1930

1. Contract of sale, meaning and difference between sale and agreement to sell
2. Conditions and warranties
3. Transfer of ownership in goods including sale by a non-owner
4. Unpaid seller – meaning, rights of an unpaid seller against the goods and the buyer

Consumers Protection Act, 1986 and Right to Information Act

a. Objectives and features of Consumers Protection Act
b. Definitions – Complainant, Complaint, Consumer, Consumer Dispute, Defect, Deficiency, District Forum, Person
c. Unfair trade practices
   Consumer Protection Council (Central, State and District – their constitutions and objectives

Unit III: Partnership Laws

A. The Partnership Act, 1932
a. Definition – Partner, Partnership
b. Nature and Characteristics of Partnership
c. Types of Partners
d. Registration of a Partnership Firms and consequences of non-registration
e. Rights and Duties of Partners
f. Dissolution of firms – meaning and grounds
B. The Limited Liability Partnership Act, 2008
a. Definition
b. Salient Features of LLP
c. Advantages and disadvantages of LLP
d. Differences between: LLP and Partnership, LLP and Company

e. Incorporation of LLP

Unit IV: The Negotiable Instruments Act 1881

a. Definition, Features, Types, Parties of Negotiable Instruments: Promissory Note, bill of exchange, Cheque (Definition and Types)
b. Endorsement: Meaning and Types of Endorsement
c. Holder and Holder in Due Course, Privileges of Holder in Due Course.
d. Dishonour of Negotiable Instruments: Modes, Consequences, Notice of Dishonour; Noting and Protesting
e. Discharge of Negotiable Instruments: Meaning and Modes

Learning Outcomes: The students would be able to deal with the legal aspect of different business situations.

Text Books Recommended

1. Business Law, Garg K.C., Saareen,Sharma, Kalyani Publishers
2. Kumar, R. Legal Aspects of Business, Cengage Learning

Suggested Readings:

1. Arora Sushma – Business Law – Taxmann Publication
2. A Book of Business Laws-Jena B and Mohapatra-Himalaya Publishing House
3. Business Law, Ashok Sharma, V.K. Global Publication.
4. Business Laws: Das & Roy, Oxford University Press
5. Business Law- S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Business Law - Tejpal Singh, Pearson Publication
7. Kuchhal, M.C. and Vivek Kuchhal, Business Law, Vikas Publishing House, New Delhi.
8. Tulsian, P.C, Business Law, S.Chand
9. Maheshwari & Maheshwari, Business Law, National Publishing House, New Delhi.

(Core-3)

COST ACCOUNTING

Objective: To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment.

CONTENTS:

Unit- 1:

Introduction to Cost Accounting: Meaning, concept, scope, objectives, principles, importance and limitations of cost accounting; Implementation of costing system; Methods & Techniques of costing; Cost concepts and Cost Sheet, Job costing and Batch Costing.

Unit – II:

Accounting for Material: Concept and technique of accounting for material; Methods of pricing of materials issues – FIFO, LIFO and Average; Treatment of material losses; Techniques of material control – level setting, Economic Ordering Quantity, ABC Analysis, VED Analysis, Perpetual inventory system, & Just-In-Time.

Unit – III:

Accounting for Labour:

Accounting for labour cost, control procedure, labour turnover, idle time, overtime, Methods of wage payment and the Incentive schemes- Halsey, Rowan, Taylor's Differential piece wage plan.

Accounting for Overheads:

Classification, Allocation & Apportionment of production overheads; Re-apportionment of Service department overheads; Absorption of overheads, methods of absorption – actual and predetermined rates, blanket and multiple rates, choice of an overhead absorption rate; Administration, selling and distribution overheads; Under absorption and over absorption of overheads.

Unit – IV:

Methods of Costing: Contract costing: Features and procedure of contract costing, uncompleted contract profit determination, Escalation clause, cost plus contracts.Process costing: Meaning and characteristics of Process costing, Procedure for process costing, treatment of process losses and wastages.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

1. Cost Accounting-Arora MN A- Himalaya Publishing House
2. Nigam, B.M. Lall and I.C. Jain. Cost Accounting: Principles and Practice. Prentice Hall of India, New Delhi.

Suggested Reading:

1. Jain, S.P. and K.L. Narang. Cost Accounting: Principles and Methods. Kalyani Publishers, Jalandhar.
2. Cost accounting, S.P. Gupta/ A Sharma- V.K. Global Publishing Pvt. Ltd.
3. Cost & Management Accounting I: Mitra, Oxford University Press.
4. Cost & Management Accouning, Taxmann Publications
5. Colin Drury, Management and Cost Accounting, Cengage Learning
6. Lal, Jawahar. Cost Accounting. Tata McGraw Hill Publishing Co., New Delhi.

7. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
8. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
9. Cost Accounts - Datar and Rajan, Pearson Publication

(Core-4)

CORPORATE LAWS

Objectives: The objective of the course is to impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.

Contents:

Unit – I: INTRODUCTION TO COMPANY

Meaning and Definition – Features –, High Lights of Companies Act 2013 - Body Corporate ,Kinds of Companies (Concept, Definition and Features) – One Person Company, Private Company, Public Company, Company limited by Guarantee, Company limited by Shares, Holding Company, Subsidiary Company, Government Company, Associate Company, Small Company, Foreign Company, Listed Company, Dormant company

FORMATION OF A COMPANY

Steps in formation of a Company, Promotion Stage, Meaning of Promoter, Position of Promoter & Functions of Promoter, Incorporation Stage – Meaning, Contents, Forms of Memorandum of Association & Articles of Association and its alteration, Distinction between Memorandum of Association and Articles of Association, Certificate of Incorporation, Subscription Stage – Meaning & contents of Prospectus, Types, Mis-statement in prospectus and its consequences.

Unit - II: COMPANY ADMINISTRATION

Director (Concept and Definition), DIN, Qualification, Disqualification, Appointment, Position, Rights, Duties, Power, Resignation, Liabilities, Removal and Resignation of director, Key Managerial Personnel (Definition, Appointment and Qualifications) – Managing Director, Whole time Directors, the Companies Secretary, Chief Financial Officer, Resident Director, Independent Director, Women director.

Unit - III: SHARE CAPITAL & DEBENTURE

Share and Share Capital - Types and Definition, Allotment and Forfeiture, Calls on Shares, ESOP, Buyback, Sweat Equity, Bonus, Right, Capital Reduction, Share Certificate, Demat System, Transfer and Transmission, Redemption of Preference Shares, Debenture – Definition, Types, Rules Regarding Issue of Debenture, Rules regarding Dividend and distribution of dividend.

Unit - IV: CORPORATE MEETINGS

Corporate Meetings - Shareholder and Board, Types of Meetings – Annual General Meeting Extraordinary General meeting, Minutes of Proceedings of General Meeting, Meeting of BOD and other meetings (Section 118), Requisite of Valid Meeting- Notice, Agenda, Chairman, Quorum, Proxy, Resolutions, Minutes, Postal Ballot, E- voting, Video Conferencing,

Learning Outcomes: Students would acquire knowledge about the legal framework and the ways and means to deal with the legal aspect of different situations of corporate sector.

Text Books Recommended

1. Corporate Laws-Maheswari, Maheswari- Himalaya Publishing House
2. Corporate Law, Ashok Sharma, V.K. Global Publishing Pvt. Ltd., New Delhi

Suggested Readings:

1. **A** Compendium of Companies Act 2013, along with Rules, by Taxmann Publications.
2. Corporate Law, Gupta,Garg,Dhingra, Kalyani Publication
3. Company Law: Roy & Das, Oxford University Press.
4. Kumar, R., Legal Aspects of Business, Cengage Learning
5. Corporate Law– S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Arora &Banshal, Corporate Law – Vikash Publication
7. Gogna, P.P.S – Company Law, S. Chand
8. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers).
9. GK Kapoor& Sanjay Dhamija, Company Law, Bharat Law House.

(Core-5)

CORPORATE ACCOUNTING

Objectives: To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.

Contents:

Unit – I

Meaning of Company; Maintenance of Books of Accounts; Statutory Books; Annual Return Company – Issue of Shares – issue, forfeiture, reissue, issue other than cash consideration and issue to the promoters; Pro-rata issue of shares. Issue of Right and Bonus Share – Rules,

Accounting for debentures: Issue of debenture, Underwriting of shares and debentures: Determination of Underwriters Liability – with marked, unmarked & firm underwriting; Accounting of Employee Stock Option Plan – meaning; rules; Vesting Period; Exercise Period, Accounting for ESOP and Accounting of ESPS.

Unit – II: Redemption of Preference shares & Debentures

Buy Back of Securities: meaning, rules and accounting.

Redemption of Preference Shares – Rules and Accounting (with and without Bonus Shares) ; Redemption of Debenture – Important Provisions, Redemption of debenture Accounting for Redemption: by conversion, by lot, by purchase in the open market (cum and ex-interest), held as Investment and Use of Sinking Fund

Unit – III: Company's Final Accounts

Introduction to Schedule III of Companies Act 2013; Treatment of Tax; transfer to reserve, Dividend and applicable tax (out of current profit, out of past reserve); Preparation of Statement of Profit & Loss and Balance Sheet. (tax on net profit without recognizing deferred tax)

Valuation of Goodwill & Shares

Goodwill – valuation using different methods, i.e., Average Profit, Super Profit, Capitalization and Annuity.
Shares – Valuation using different methods: Asset approach, Earnings approach, Dividend Yield, Earnings-Price, Cum-div and Ex-div, Majority and Minority view and Fair Value

Unit – IV: Liquidation

Meaning of liquidation, modes of winding up, consequences of winding up, statement of affairs, liquidator's final statement of account, list 'B' contributories

Learning Outcomes: This paper can provide conceptual clarity about the techniques to prepare financial statements of companies along with accounting treatment of various situations viz. floating of shares, amalgamation and liquidation of companies.

Text Books Recommended

1. Jain, S.P. and K.L. Narang. Corporate Accounting. Kalyani Publishers, New Delhi.
2. Maheshwari, S.N. and S. K. Maheshwari. Corporate Accounting. Vikas Publishing House, New Delhi.

Suggested Readings:

1. Sehgal, Ashok and Deepak Sehgal. Corporate Accounting. Taxman Publication, New Delhi.
2. Corporate Accounting, R.K. Mittal? S. Ahuja- V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Corporate Accounting – Anil Kumar, Mariappa- Himalaya Publishing House
4. Tulsian, P.C, Corporate Accounting, S. Chand
5. Monga, J.R. Fudamentals of Corporate Accounting. Mayur Paper Backs, New Delhi.
6. Gupta, Nirmal. Corporate Accounting. SahityaBhawan, Agra.
7. Bhushan Kumar Goyal, Fundamentals of Corporate Accounting, International Book House

(Core-6)

INCOME TAX LAW AND PRACTICE

Objective: To provide basic knowledge and equip students with the application of principles and provisions of Income Tax Act 1961.

Contents:

Unit I :

a) **Basic Concepts and Definitions under IT Act**: Assessee, Previous year, Assessment year, Person, Income, Sources of income, Heads of income, Gross total income, Total income, Maximum marginal rate of tax, Tax Evasion, Tax avoidance and Tax planning
b) Residential Status and Incidence of Tax, Residential status of all persons except company
c) Incomes which do not form part of Total Income Except section 10AA.
d) Agricultural Income Definition, determination of agricultural and non-agricultural Income, assessment of tax liability when there is both agricultural and non-agricultural income

Unit II:

Heads of Income and Provisions governing Heads of Income

a) Income from Salary
b) Income from House property

Unit III:Heads of Income and Provisions governing Heads of Income

a) Profits and Gains of Business and Profession Special emphasis on sec. 32, 32AC, 32AD, 35, 35D, 36(i)(ib), (ii), (iii), (iv), (vii), 37, 37(2B), 40A(2), 40A(3), 43B, (Excluding presumptive taxation)
b) Capital Gains
Meaning and types of capital assets, basic concept of transfer, cost of acquisition, cost of improvement and indexation, computation of STCG and LTCG, exemptions u/s 54, 54B, 54EC and 54F, capital gain on transfer of bonus shares, right entitlement and right shares, taxability of STCG and LTCG.
c) Income from Other Sources
Basis of charge excluding deemed dividend

Unit IV:

a) **Income of other Persons** included in Assessee's Total Income Remuneration of spouse, income from assets transferred to spouse and Son's wife, income of minor.
b) Set off and Carry Forward of Losses
Mode of set off and carry forward, inter source and inter head set off, carry forward and set off of losses u/s 71B, 72, 73, 74, 74A.
c) Deductions from Gross Total Income
Basic concepts, deductions u/s 80C, 80CCC, 80CCD, 80CCE, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGC, 80TTA, 80U

d) Rebate u/s 87A

Computation of Total Income and Tax Payable

a) Rate of tax applicable to individual assessee
b) Computation of tax liability of an individual
c) Provision for Filing of Return Date of filing of return, relevant forms of return, different types of returns, return by whom to be signed, PAN, TAN
d) Assessment of Return Self assessment u/s140A, Summary assessment u/s 143(1), Scrutiny assessment u/s 143(3) and Best judgement assessment u/s 144.
e) Advance Tax Who is liable to pay, due dates and computation of advance tax (excluding corporate assessees)
f) Interest & Fees Section 234A, 234B, 234C, 234F
g) TDS Provisions regarding TDS from salary, interest on securities, horse racing, lottery.

Learning Outcomes: This paper would provide the understanding of various provisions of Income Tax Act as well as equip the students to make practical applications of the provisions for taxation purpose.

Text Books Recommended

1. Gour and Narang, Income tax: Law and practice, kalyani Publishers
2. Dr. Vinod Kumar Singhania, e-filing of Income Tax Returns and Computation ofTax,
3. Taxmann Publication Pvt. Ltd, New Delhi. Latest version.

Suggested readings:

1. Income tax Law and practice, Makta Jain/ Rakesh Jain, V.K. Global Pub. Pvt. Ltd., New Delhi
2. Income Tax Law and Pratcice-Saha, Dash- Himalaya Publishing House.
3. Pagare, Dinkar. Law and Practice of Income Tax. Sultan Chand and Sons, New Delhi.
4. Lal, B.B. Income Tax Law and Practice. Konark Publications, New Delhi.

(Core-7)

MANAGEMENT PRINCIPLES &APPLICATIONS

Objective:

The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices.

Unit-I: Introduction:

Management-definition, importance, functions, nature-as profession, science and art, universality of management; levels of management; managerial tasks and skills

Different Schools of Thoughts: Classical School-contributions of Taylor and Henri Fayol; Neo-classical school-Human Relations approach and Behavioural Science Approach; Modern School; System approach and Contingency approach

Unit-II: Planning:

Concept, importance, steps, types, premises, barriers to effective planning and remedial measures; strategic planning-concept forecasting –concept, techniques.

Organizing:

Concept, importance, principles, different organization models-line and staff; Functional; Departmentation-need, basis, principles, Delegation of Authority-elements, steps barriers; Centralization and Decentralization of Authority; Span of Management; concept and determining factors

Unit-III: Directing and Staffing:

Directing: concepts, importance of directing, Leadership: Concept, importance, types, leadership traits, Tannenbaum & Schmidt's Model and Blake & Mouton's Model.

Staffing: concepts, importance

Unit- IV: Motivation, Co-ordination and Control:

Motivation: Concept, importance, importance of need theory, and contributions of McGregor, Maslow, Herzberg.

Coordination: concepts, importance, principles and implementation techniques. Control: concepts, importance and tools of control.

Learning Outcomes: Students would be able to make use of different management principles in the course of decision making in different forms of business organizations.

Text Books Recommended

1. Pany Tushar K , Management Principles and Application, Kalyani
2. Prasad, L.M. Principles and Practice of Management, Sulatan Chand

Suggested Readings:

1. Sharma gupta , Management: Principles and application , Kalyani Publishers
2. R. K . Singhal, Management Principle and application, V.K. Global Pub. Pvt. Ltd, New Delhi.
3. Management Principles and Applications-Jhunjhunwala J Mohanty- Himalaya Publishing House
4. Principles of Management: Mitra, Oxford University Press.
5. Griffin, R.W. – Management :Principles& Practices, Cengage Learning
6. Gupta R.N - Principles & Practice of Management – S. Chand
7. A K Jha, Management Principles and Application - Vrinda Publications (P) Ltd.

8. Chandan J.S – Management Concepts of Strategy – Vikash Publication
9. B.P. Singh and A.K.Singh, Essentials of Management, Excel Books
10. TN Chhabra, Management Concepts and Practice, DhanpatRai& Co. (Pvt. Ltd.), New Delhi
11. Peter F Drucker, Practice of Management, Mercury Books, London

(Core-8)

GST & INDIRECT TAX

OBJECTIVE:

The objective is to equip students with the principles and provisions of Goods and Services Tax (GST), which is, implemented from 2017 under the notion of One Nation, One Tax and One Market and to acquaint students with basic provisions of GST Law and basic working knowledge.

Unit I- INTRODUCTION TO GOODS AND SERVICES TAX (GST)

Introduction to GST : Introduction, Constitutional provisions regarding Taxation In India, Pre-GST Indirect Taxation Structure in India, What is GST, Need for GST in India, Overview and Genesis of GST IN INDIA, GST objectives, **Scope of GST**, Salient features of GST, GST and Centre-State Financial Relations, The Constitution (122nd Amendment) Bill, Constitutional Amendments required for introduction of GST Indirect Taxes subsumed Post-GST : Principles for subsuming taxes under Goods & Services Tax (GST) in India, Indirect Taxes and Levies subsumed in GST, Events that have led to the introduction of GST, **DUAL GST : Benefits of Dual GST**, Structure Of Dual Model of GST , Key Features of Dual Model of GST, Benefits of implementing GST, CENTRAL GST – STATE / UNION TERRITORY GST – INTEGRATED GST and GST Cess, Pre-GST Regime Vs. GST Regime, Indirect Taxes

Unit II- GST ACTS: (Structure & Terminology)

Salient features of CGST Act, SGST Act (Odisha State), IGST Act, Meaning and Definition of various terms used under GST

(Coverage- Provisions and Illustration)

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX: (CGST & SGST)- **Meaning and Scope of 'Supply' under GST Law**, Taxable Person, Time of supply, Place of supply and Value of supply. Computation of Taxable Value and Tax Liability, Composition scheme; INPUT TAX CREDIT; PROCEDURE RELATING TO LEVY, COLLECTION AND EXEMPTION OF IGST; PAYMENT OF TAX, TCS, TDS; PRACTICAL PROBLEMS.

(Coverage- Provisions and Illustration)

Unit III- REGISTRATION, RETURNS AND ASSESSEMENT

REGISTRATION - Persons liable for registration, Persons not liable for registration, Types: Compulsory registration, Voluntary registration, Deemed registration - Procedure for registration, Special provisions for Casual taxable persons and Non-resident taxable persons; CLASSIFICATION OF GOODS & SERVICES- HSN, SAC; TAX INVOICE AND OTHER SUCH INSTRUMENTS IN GST - Debit Note, Credit Note, Vouchers, Invoice; ACCOUNTS AND RECORDS; RETURN- Process of Return Filing, Furnishing details of outward supplies and inward supplies, First return, Claim of input tax credit, Matching reversal and reclaim of input tax credit, Annual return and Final return; REFUND; **OFFENCES AND PENALTIES**; ASSESSMENT; AUDIT; APPEALS AND REVISION.

Unit IV- GST Council AND REGULATORY FRAMEWORK

GST COUNCIL: Structure, Powers and Functions. Provisions for amendments; ROLE OF CBEC; Division of Administrative Powers; GST AND TECHNOLOGY- GST Network, GST ECO SYSTEM, GSP, ASP; NATIONAL ANTI-PROFITEERING AUTHORITY IN GST; COMPLIANCE RATING.

Text Books Recommended

1. Swain AK & Agrawal – GST: Concepts and Applications, Himalayan Publishing House.
2. GST Manual:Taxman's Publication Ltd., New Delhi.

Suggested Books:

1. GST and Indirect Taxes,Sanjeet Sharma, V.K. Global Pub. Pvt. Ltd, New Delhi.
2. Mishra, Padhi and Bera – Text Books on GST & Practice, Vikash Publishing House Pvt. Ltd. New Delhi.

(Core-9)

FUNDAMENTALS OF DATA MANAGEMENT

Unit I: Word Processing

Working with word document- Editing text, Find and Replace text, Formatting, Spell check, Autocorrect, Auto text; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Macros, Drop cap; Tables: Inserting, Filling and formatting a Table, Inserting Pictures and Video; Mail Merge- including linking with Database, Printing documents. Creating Business Documents using the above facilities

Preparing Presentations

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation, Hyperlink and Slideshow. Creating Business Presentations using above facilities

Unit II: Spreadsheet and its Business Applications

Managing worksheets- Formatting, Entering data, Editing, and Printing a worksheet; handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs, Pivot Table

Spreadsheet Functions: Mathematical [SUMIF, SQRT, SUBTOTAL, SUMPRODUCT etc.], Statistical [AVERAGE, STDEV, VAR, CORRELATION, REGRESSION etc.], Financial [PMT, RATE, PV, FV, NPER, IRR, NPV, Data Table Etc.] Logical [AND, OR, IF etc.], Date and Time, lookup and reference, Database and Text functions.

Creating Spreadsheet in the area of : Loan and Lease statement; Ratio Analysis; Payroll Statements; Capital Budgeting; Depreciation Accounting; Graphical Representation of Data; Frequency Distribution and its Statistical Parameters; Correlation and Regression

Unit III: Database Management System

Creation of Tables, Multiple Table Handling-Defining Relationship [Foreign Key], Simple and Conditional Queries, Types of Queries [Update, Delete, Append], Forms, Reports, Introduction to SQL through Basic Commands.

Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, managing the data records of Employees, Suppliers and Customers

Unit IV: Website Designing

Introduction to HTML; Tags and Attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets.

Text Books Recommended

1. Coronel and Rob, Database Principles, Cengage Learning
2. Fundamentals of Data Management –Saha RG- Himalaya Publishing House

Suggested Readings

1. Thareja, IT & Application, Oxford
2. Aurora, Computer Fundamentals, Vikash
3. Sinha & Sinha, Fundamentals of Computers, BPB Publications
4. Dhar, P., Fundamental of IT and Its Application in Business, APH

Practical Aspects:

- **Preparation of Project report and business letters using Ms Excel and its various features**
- **Preparing PPT using Ms PowerPoint for presentations**
- **Using Ms Excel for various data analysis, Graphical Representation of Data, and pivot tables and their analysis**
- **Maintenance of accounting data records and its management by applying DBMS**
- **Practical application of various web designing tools**

(Core-10)

MANAGEMENT ACCOUNTING

Objective: To acquaint the students with basic concepts of management accounting, and basic understanding of tools and techniques used for managerial decision making.

CONTENTS: `

Unit – I:

Management Accounting: Meaning, nature, scope, and importance of management accounting; Role of management accounting; management accounting vs. financial accounting; Role of management accounting in modern business; Tools and techniques of management accounting.

Unit – II: Ratio Analysis & Cash flow statement

Ratio Analysis:

Meaning and utility of ratios; significance of Ratio analysis; Classification of Ratios – Profitability ratios, Efficiency Ratios, Liquidity Ratios, Solvency Ratios; Advantages and limitations of Ratio Analysis.

Cash flow Statements:

Cash Flow Statements: Meaning and utility of Cash flow statements; Preparation of Cash flow statements – Indirect method; Limitations of Cash flow statements; Cash flow statements vs. Funds flow statements. (Reference to Revised AS-3 and Ind AS-7)

Unit – III:

Absorption & Marginal Costing: P/V Ratio, Break-even analysis, Margin of safety, angle of incidence; Marginal and differential costing as a tool for decision making – make or buy, change of product mix, exploring new markets, shut down decisions.

Unit – IV:

Budgeting & Standard Costing: Concept of budget and budgetary control; objectives, merits and limitations of budgetary system; Master budget, Functional budget, Fixed and Flexible budgets; Zero based budgeting. Standard Costing & Variance Analysis: Meaning of standard cost and standard costing, Advantages and disadvantages of standard costing and variance analysis: Material, Labour, & Overhead.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

1. Management Accounting, S swain/ S.P. Gupta/ A Sharma, V.K. Global Pub. Pvt. Ltd.,
2. Horngreen, Charles T., Gary L. Sundem. Introduction to Management Accounting.
3. Prentice Hall.

Suggested Reading:

1. Jain & Narang, Management Accounting, Kalyani Publications
2. Management Accounting-M Wilson- Cost Accounting-Jena B,Bal S and Das A-Himalaya Publishing House
3. Narasimhan M.S. , Management Accounting, Cengage Learning
4. Cost & Management Accouning, Taxmann Publications
5. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
6. Maheshwari, S.N. and S.N. Mittal. Cost Accounting: Theory and Problems. Shri Mahabir Book Depot, New Delhi.
7. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
8. Khan, M.Y. and P.K. Jain. Management Accounting. Tata McGraw Hill, Publishing

(Core-11)

COMPUTERIZED ACCOUNTING & E-FILING OF TAX RETURNS

Unit – I: Computerized Accounting Package: Using Generic Software

a. Company creation, ledger creation, order processing, accounting voucher, inventory voucher, memorandum voucher, invoicing, multiple godown handling, Transfer of materials across go downs, Bank Reconciliation

b. Cost Centre, Cost Category, Bill of Material (BoM), Budget and Controls

c. Payroll Accounting

d. TDS, GST

.e. Back up & Restore, Export and Import data

Unit II: Designing Computerized Accounting System

(a) Introduction to DBMS Package – Table, Query, Form and Report

(b) Designing Computerized Accounting System using DBMS Package
Creating a voucher entry Form, Preparing ledgers, trial balance, profit & loss a/c, and Balance Sheet with Form wizard and Report

(c) Designing Payroll System for Accounting using Form, Query, and Report

Unit-III: E-filing of Tax return

(a) Preparation and submission online form 10E [Relief u/s 89(1)] (a) Preparation and submission of the Income Tax Return (ITR) offline/online for individual Taxpayer [e-filing without using DSC and with using DSC, EVC]

(b) View form 26AS, Upload return, View e-file returns, e-verification

(c) Use of e-tax calculator (including interest calculation u/s 234A, 234B, 234C)

(d) E-Pay tax (Challan No./ITNS 280, ITNS 281)

(e) Preparation and submission online form 10E[Relief u/s 89(1)]

Text Books Recommended

1. Software: Singhania, V.K., E-Filing of Income Tax Returns and Computations of Tax, Taxmann

2. Book of Computerized Accoounting and E Filling of Tax Returns-Mohanty R, Dash ALN- Cost Accounting-Jena B,Bal S and Das A- Himalaya Publishing House

Suggested Readings

1. Software: "Excel Utility", incometaxindiaefiling.gov.in

Practical Aspects:

- **Creation of company and ledger accounts, voucher entries, payroll accounting, & data management in accounting software packages including TDS and GST**
- **Use of DBMS Package for various accounting database, designing of Payroll and report generation**
- **Preparation and submission of online Income Tax Returns, E-payment of tax, E-verification of returns, and viewing of 26AS.**

(Core-12)

FUNDAMENTALS OF FINANCIAL MANAGEMENT

Objective: To familiarize the students with the principles and practices of financial management.

Contents:

Unit – I: Introduction& Basic Concepts

Important functions of Financial Management, Objectives of the firm: Profit maximization vs. Value maximization, Role of Chief Financial Officer. Financial environment in which a firm has to operate, Time Value of Money: concept and reasons, Compounding and Discounting techniques, Concepts of Annuity and Perpetuity. Risk-return relationship (concepts only)

Unit – II: Sources of Finance and Cost of Capital/ Financing Decisions

Different sources of finance; long term and short term sources, Cost of capital: concept, relevance of cost of capital, Implicit and Explicit cost, specific costs (its computation) and weighted average cost (its computation) , rationale of after tax weighted average cost of capital, marginal cost of capital (its computation).

Unit – III: Capital Expenditure Decisions / Long term Financial Decisions & Dividend Decisions

Capital Expenditure Decisions / Long term Financial Decisions

Objectives of Capital Budgeting Process, Concept of Cash flow, Methods of long term investment decisions - Discounted Payback Period, Net Present Value, Profitability Index, Average Rate of Return / Accounting Rate of Return, Internal Rate of Return (Including relative merits and demerits of each of the methods)

Dividend Decisions

Meaning, Natureand Types of Dividend, concept of pay-out ratio, retention ratio Decisions and growth, Dividend policies and formulating a dividend policy, Dividend Theories: Walter's Model, Gordon's Model

Unit – IV: Working Capital Management/ Liquidity Management

Meaning and various concepts of Working Capital, Management of Working Capital and Issues in Working Capital, Estimating Working Capital Needs; Operating or Working Capital Cycle, Policies relating to Current Assets – Conservative, Aggressive and Balance, Various sources of finance to meet working capital requirements

Learning Outcome: After the completion of this paper, students will be able to understand finance in a better way along with giving them insight to practical management of long and short finance for real business houses.

Text Books Recommended

1. Rostogi, Fundamentals of Financial Management, Taxmann Publications
2. Fundamental of Financial Management, Sharma, Gupta, Kalyani Publishers**, New Delhi.**

Suggested Readings

1. Fundamentals of Financial Management, Vandana Dangi, V.K. Global Pvt. Ltd., New Delhi
2. Parasuraman – Financial Management : A Step by Step Approach, Cengage Learning

3. Pandey, I.M. Financial Management. Vikas Publications.
4. Financial Management, Himalaya Publishing House
5. BhallaV.K – Financial Management – S.Chand
6. Horne, J.C. Van and Wackowich. Fundamentals of Financial Management. 9th ed. New Delhi Prentice Hall of India.

(Core-13)

AUDITING AND CORPORATE GOVERNANCE

Objective: To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility

Unit-I

Auditing: Introduction, Meaning, Objects, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities

Unit-II

Audit of Limited Companies:

Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report-Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013

Special Areas of Audit:

Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Standard on Auditing(SA); Relevant Case Studies/Problems;

Unit-III

Corporate Governance : Conceptual framework of Corporate Governance, Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance Problems Noticed in various Corporate Failures. Codes & Standards on Corporate Governance

Unit-IV

Corporate Social Responsibility (CSR): Strategic Planning and Corporate Social Responsibility; Corporate Philanthropy, Meaning of CSR, CSR and CR, CSR and Corporate Sustainability, CSR and Business Ethics, CSR and Corporate Governance, Environmental Aspect of CSR, CSR provision under the Companies Act 2013, CSR Committees

Learning Outcome: At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities.

Text Books Recommended

1. Gupta, Kamal and Ashok Arora. Fundamentals of Auditing. Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
2. Auditing and corporate governance, Pradeep kumar , Klayani Publishers , New Delhi.

Suggested Readings:

1. Auditing and corporate governance, A. Sharma, V.K. Global Pvt. Ltd.,New Delhi
2. SATHEESH KUMAR Corporate Governance, Oxford University Press.
3. Shikha, N. and Sharma, G. Corporate Governance in India : Principles and Policies, CENGAGE Learning
4. Jha, Aruna. Auditing. Taxmann.
5. Tandon, B. N., S. Sudharsanam and S. Sundharabahu. A Handbook of Practical Auditing. S. Chand and Co. Ltd., New Delhi.
6. Ghatalia, S.V. Practical Auditing. Allied Publishers Private Ltd., New Delhi.
7. Singh, A. K. and Gupta Lovleen. Auditing Theory and Practice. Galgotia Publishing Company.
8. Alvin Arens and James Loebbecke, Auditing: an Integrated Approach
9. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers). (Relevant Chapters)
10. Khanka – Business Ethics & Corporate Governance – Vikash Publication
11. Auditing Principles and Techniques- S. K. Basu, Pearson Publication

(Core-14)

BUSINESS MATHEMATICS

Objective: The objective of this course is to familiarize the students with the basic mathematical tools with emphasis on applications to business and economic situations.

Contents:

Unit I Matrices and Determinant

Algebra of matrices., Inverse of a matrix, Matrix Operation – Business Application Solution of system of linear equations (having unique solution and involving not more than three variables) using matrix inversion Method and Cremer's Rule.

Unit II Calculus

Calculus I

Mathematical functions and their types- linear, quadratic, polynomial, exponential, logarithmic and logistic function. Concepts of limit and continuity of a function, Concept and rules of differentiation, Maxima and Minima involving second or higher order derivatives

Calculus II

Integration: Standard forms. Methods of integration – by substitution, by parts and by use of partial fractions, definite integration, Finding areas in simple cases, Application of Integration

to marginal analysis. Consumer's and Producer's Surplus, Rate of Sales and the Learning Curve.

Unit III Mathematics of Finance

Compounding and discounting of a sum using different types of rates. Types of annuities, like ordinary, due, deferred, continuous, perpetual, and their future and present values using different types of rates of interest. Depreciation of Assets (General annuities to be excluded)

Unit IV Linear Programming (Use of Excel spreadsheet & Other mathematical software)

Formulation of linear programming problems (LPP): Graphical solution to LPPs. Cases of unique and multiple optimal solutions, Unbounded solutions and infeasibility, Solution to LPPs using Simplex method – maximization and minimization cases, PERT and CPM (simple Problem)

Learning Outcome: After reading this subject the students will be able to understand basic concepts in the areas of business calculus and financial mathematics and to connect acquired knowledge with practical problems in economic practice.

Text Books Recommended

1. Business Mathematics, Patri and Patri, Kalyani Publishers, New Delhi
2. Business Mathematics - S K Sahoo, Vrinda Publications (P) Ltd.

Suggested Readings:

1. Arora P.N. Business Mathematics – S.Chand
2. Business Mathematics, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd., New delhi.
3. GHOSH & SINHA BUSINESS MATHEMATICS & STATISTICS, Oxford university press.
4. Francis, J. Business Statistics, Cengage Learning
5. Anthony, M. and N. Biggs. Mathematics for Economics and Finance. Cambridge University Press.
6. Arora S.R & Gupta K. – Business Mathematics – Taxmann Publication
7. Ayres, Frank Jr. Theory and Problems of Mathematics of Finance. Schaum's Outlines Series. McGraw Hill Publishing Co.
8. Mizrahi and John Sullivan. Mathematics for Business and Social Sciences. Wiley and Sons.
9. Zamirudeen&Bhambri – Business Statistics – Vikash Publication
10. Wikes, F.M. Mathematics for Business, Finance and Economics. Thomson Learning.
11. Prasad, Bindra and P.K. Mittal. Fundamentals of Business Mathematics. Har-Anand Publications.
12. Thukral, J.K. Mathematics for Business Studies. Mayur Publications.
13. Soni, R.S. Business Mathematics. Pitambar Publishing House.
14. Singh J. K. Business Mathematics. Himalaya Publishing House

DSE – 1

Elective – I (Any one of the following Groups)

Group – A: Accounting & Finance

Financial Markets, Institutions, & Services

Objectives: To enable the students to understand the financial institutions operating in India and services provided by them.

Unit-I

Basic Theoretical Framework: The financial system and its technology; The factors affecting the stability of the financial system; Development finance vs. universal banking; Financial intermediaries and Financial Innovation; RBI-Central Banking.

Unit-II: Financial Institutions & Non-Banking Financial Institutions

Financial Institutions:

A brief historical perspective. An update on the performance of IDBI, ICICI, IFCI and SFCs, LIC &GIC, Banking Institutions: Commercial banks - the public and the private sectors - structure and comparative performance, problems of competition; interest rates, spreads, and NPAs. Bank capital - adequacy norms and capital market support.

Non-banking financial institutions:

Evolution, control by RBI and SEBI. A perspective on future role, Unit Trust of India and Mutual Funds, Reserve bank of India Framework for/Regulation of Bank Credit . Commercial paper: Features and advantages, Framework of Indian CP Market, effective cost/ interest yield.

Unit-III

Financial services: Asset/fund based Financial services - lease finance, consumer credit and hire purchase finance, factoring definition, functions, advantages, evaluation and forfeiting, bills discounting, housing finance, venture capital financing. Fee-based / Advisory services: Stock broking, credit rating.

Unit-IV

Operations: Financial Assets/ Instruments Rights issues, issue of Debentures, issue of Equity shares - pre-issue activity, post-issue activities. The regulatory framework: SEBI and Regulation of Primary and Secondary Markets, Company Law provisions.

Learning Outcome: After completion of this paper, the students will be able to understand the role and benefits of financial institution and services.

Text Books Recommended

1. Financial Markets, Institutions & Services-Gordon, Natrajan-Himalaya Publishing House
2. Pathak: Indian Financial Systems Pearson Education

Suggested Readings

1. Financial Market and Int. , A. goyal and M. Goyal, V.K. Global Pvt. Ltd., New Delhi
2. Financial Markets , Institutions and Services, Kaur, Talwar, KAlyani Publishers, New Delhi.
3. BHATTACHARYYA INDIAN FINANCIAL SYSTEM 2e, Oxford University Press.
4. M.Y.Khan, Financial Services, Tata McGraw-Hill, New Delhi, 2004.
5. H.R Machiraju, Indian Financial Systems, Vikas Publishing House Pvt. Ltd.2002.
6. Madura, J., Financial Institutions and Markets; Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 1

Group B: Banking & Insurance

INDIAN BANKING AND INSURANCE SYSTEM

Objectives: To enable the students to acquire knowledge about basics of banking and insurance.

Unit-I: Concept of Bank and Banking & Types of Customers and Account holders

Concept of Bank and Banking:

Historical Evolution of Banking: Origin and Development of Banking - Structure of Banking in India – Banks and Economic Development –Functions of Commercial banks (conventional and innovative functions) – Central Bank – RBI – functions – Emerging trends in Banking.

Types of Customers and Account holders:

Procedure and practice in opening and operating the accounts of customers - individuals including minors - joint account holders -Partnership firms - joint stock companies - executors and trustees-clubs and associations

Unit-II

Introduction to insurance: Purpose and need of insurance, insurance as a social security tool - insurance and economic development - Principles of insurance -various kinds of insurance - life, marine, fire, medical, general insurance - features.

Unit-III

Life Insurance - Law relating to life Insurance; General Principles of Life Insurance Contract; Proposal and policy; assignment and nomination; title and claims; General Insurance - Law relating to general insurance; different types of general insurance; general insurance Vs life insurance – Insurance business in India.

Unit-IV

Fundamentals of Agency Law: Definition of an agent; Agents regulations; Insurance intermediaries; Agents' compensation. Procedure for Becoming an Agent: Pre-requisite for obtaining a license; Duration of license; Cancellation of license; Revocation or suspension/termination of agent appointment; Code of conduct; Unfair practices. Functions of the Agent: Proposal form and other forms for grant of cover; Financial and medical underwriting; Material information; Nomination and assignment; Procedure regarding settlement of policy claims.

Learning Outcome: After the completion of this paper, the student will acquired practical knowledge of working mechanism of banking and insurance industries in India.

Text Books Recommended

1. M.N. Mishra: Insurance Principles and Practice, S. Chand & Company Ltd, Delhi.
2. Indian Institute of Bankers (Pub) Commercial Banking Vol-I/Vol-II (part I&II) Vol- III.
3. Hota P.K., and Das S.K. Financial Literacy and Banking, Kalyani Publishers

Suggested Readings

1. Dr. P. Periasamy: Principles and Practice of Insurance, Himalaya Publishing House, Delhi.
2. Mishra S. Banking Law and Practice – S Chand
3. Prasad – Banking Insurance – Vikash Publication
4. Inderjit Singh, RakeshKatyal& Sanjay Arora: Insurance Principles and Practices, Kalyani Publishers, Chennai.
5. Sheldon H.P :Practice and Law of Banking.
6. Bedi. H.L :Theory and Practice of Banking.
7. Maheshwari. S.N. :Banking Law and Practice.
8. Shekar. K.C :Banking Theory Law and Practice.
9. Pannandikar&Mithami': Banking in India.
10. Radhaswamy&Vasudevan: Text Book of Banking.
11. Varshaney: Banking Law and Practice.
12. G. Krishnaswamy : Principles & Practice of Life Insurance
13. Kothari &Bahl : Principles and Pratices of Insurance.

DSE – 1

Group – C: Management

Human Resource Management

Objective: The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.

Contents:

Unit I: Nature and Scope & Human Resource Planning
Nature and Scope
Concept and meaning of IR &HR, Understanding the Nature and Scope of IR & HRM, Functions and importance
Human Resource Planning
Definition, Need and Features of Human Resource Planning, factors affecting Human Resource Planning
Unit II: Recruitment and Selection
Definition of Recruitment, Source, need and importance of Recruitment, Recruitment Policy process – sources of Recruitment Definition of Selection, Steps in selection.
Unit III: Training and Development
Training and Development Meaning and purpose of training, Benefits of training to organizationand employees -Training methods
Unit IV: Job Evaluation and Performance Appraisal
Job evaluation - objectives, scope, method, Job analysis, Job description, Job Specification - basic concept and significance, Performance Appraisal - Concept

Learning Outcomes: This paper can enhance the capability of the students to manage the most important assets of organization i.e. human beings which is much needed to ensure growth of that organization.

Text Books Recommended

1. Rao V.S.P - Human Resource Management. Vikash Publication
2. Human Resource Management, Sagun Ahuja, V.K. Global Pvt. Ltd., New Delhi

Suggested Readings:

1. Human Resource Management-Satapathy, Taheer and Mohanty—Himalaya Publishing House P Ltd.
2. Human Resource Management, Gupta, Joshi. Kalyani Publishers, Ne4w Delhi
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University press.
4. Sinha, P. R. N. Shekhar, S.P.Human Resource Management, Cengage Learning
5. Human Resource Management -Gajendran, A K Jha, Vrinda Publications (P) Ltd
6. DeCenzo, D.A. and S.P. Robbins, "Personnel/Human Resource Management", Prentice Hall of India, New Delhi.
7. Khanka S.S. Human Resource Management. S Chand.
8. Ivancevich, John M. Human Resource Management. McGraw Hill.

9. Wreather and Davis. Human Resource Management. Pearson Education.

DSE-2

Group B: Banking & Insurance

MERCHANT BANKING AND FINANCIAL SERVICES

Objectives: To enable the students to understand the basic knowledge about the financial services available in India.

Unit-I

Merchant Banking: Nature and scope of Merchant Banking - Regulation of Merchant Banking Activity - overview of current Indian Merchant Banking scene - structure of Merchant Banking industry - primary Markets in India and Abroad - professional Ethics and code of conduct - current Development

Unit-II

Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing

Unit-III

Factoring: concept, nature and scope of Factoring - Forms of Factoring - Factoring vis-à-vis Bills Discounting - Factoring vis-à-vis credit Insurance Factoring vis-à-vis Forfeiting- Evaluation of a Factor - Evaluation of Factoring - Factoring in India current Developments.

Unit-IV

Securitization / Mortgages: Meaning, nature and scope of securitization, securitization as a Funding Mechanism, securitization of Residential Real Estate - whole Loans - Mortgages - Graduated-payment. Depository: Meaning, Evolution, Merits and Demerits of Depository. Process of Dematerialization and Dematerialization, Brief description of NSDL and CDSL

Security Brokerage:

Meaning of Brokerage, types of brokers. Difference between broker and jobber, SEBI Regulations relating to brokerage business in India.

Learning Outcome: After the completion of this course, the student will be able to understand the structure and function of mercantile banking and various financial services available in the present business world.

Text Books Recommended

1. Machiraju, Indian Financial System, Vikas Publishing House, 2nd Edition, 2002.
2. Merchant banking and financial services, Gupta /Gupta, Kalyani Publishers, New delhi

Suggested Readings:

1. M.Y.Khan, Financial Services, Tata McGraw-Hill, 11th Edition, 2008
2. Gopal C.R – Management Financial Service – S.Chand
3. NaliniPravaTripathy, Financial Services, PHI Learning, 2008
4. J.C.Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi.
5. Varshney P.N. & Mittal D.K., Indian Financial System, Sultan Chand & Sons, New Delhi.
6. Sasidharan, Financial Services and System, Tata Mcgraw Hill, New Delhi, 1st Edition, 2008.
7. Website of SEBI.
8. Merchant Banking and Financial Services-Sharma M--Himalaya Publishing House
9. Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 2

Group – C: Management

INTERNATIONAL BUSINESS

Objective: The objective of the course is to familiarize the students with the concepts, importanceand dynamics of international business and India's involvement with global business. The coursealso seeks to provide theoretical foundations of international business to the extent these arerelevant to the global business operations and developments.

Unit I: Introduction to International Business

a. Introduction to International Business: Globalization and its importance in world economy; Impact of globalization; International business vs. domestic business: Complexities of international business; Modes of entry into international business
b. International Business Environment: National and foreign environments and their components - economic, cultural and political-legal environments,
Issues in International Trade

Unit –II Theories of International Trade and International Organizations

a. Theories of International Trade – an overview (Classical Theories, Product Life Cycle theory, Theory of National Competitive Advantage); Commercial Policy Instruments -tariff and non-tariff measures – difference in Impact on trade, types of tariff and non tariff barriers (Subsidy, Quota and Embargo in detail) ; Balance of payment account and its components.

b. International Organizations and Arrangements: WTO – Its objectives, principles, organizational structure and functioning; An overview of other organizations – UNCTAD,; Commodity and other trading agreements (OPEC).

Unit –III International Financial Environment

a. Regional Economic Co-operation: Forms of regional groupings; Integration efforts among in Europe, North America and Asia (NAFTA, EU , ASEAN and SAARC) .
b. International Financial Environment: International financial system and institutions (IMF and World Bank – Objectives and Functions) ; Foreign exchange markets and risk management; Foreign investments - types and flows; Foreign investment in Indian perspective

Unit –IV Foreign Trade Promotion and Financing of foreign trade

a. Foreign Trade Promotion Measures and Organizations in India; Special economic zones(SEZs) and export oriented units (EOUs), ; Measures for promoting foreign investments into and from India; Indian joint ventures and acquisitions abroad.
b. Financing of foreign trade and payment terms – sources of trade finance (Banks, factoring, for faiting, Banker's Acceptance and Corporate Guarantee) and forms of payment (Cash in advance, Letter of Credit, Documentary Collection, Open Account)

Text Books Recommended

1. Daniels John, D. Lee H. Radenbaugh and David P. Sullivan. International Business.
2. Pearson Education
3. Cherunilam, Francis. International Business: Text and Cases. PHI Learning

Suggested Readings:

1. Charles W.L. Hill and Arun Kumar Jain, International Business. New Delhi: McGraw Hill Education
2. Johnson, Derbe., and Colin Turner. International Business - Themes & Issues in the Modern
3. Global Economy. London: Roultedge.
4. Michael R. Czinkota. et al. International Business. Fortforth: The Dryden Press.
5. Peng and Srivastav, Global Business, Cengage Learning
6. Subba Rao P – International Business-Himalaya Publishing House
7. JOSHI INTERNATIONAL BUSINESS SITKIN INTERNATIONAL BUSINESS, Oxford University Press.

DSE – 3

Elective – III (Any one of the following Groups)

Group – A: Accounting & Finance

Fundamentals of Corporate Tax Planning

Objective: To provide a conceptual idea about the various provisions of tax planning related to corporate sector.

Contents

Unit-I:

Corporate Tax in India–Concept of Tax planning, Tax management, Tax avoidance, Tax evasion, Assessment year and Financial Year

Residential status of corporate and its incidence of tax, Minimum Alternate Tax, Calculation of Tax Liability.

Unit-II:

Carryforward and set-off of losses and unabsorbed depreciation (headwise)

Unit-III:

Tax Planning with reference to Depreciation, Capital Gain and Scientific Research

Unit-IV:

Corporate Tax returns–Assessment, Return Filing, Penal provision, Double taxation Relief

Learning outcome: After completion of this paper, students will be able to help tax consultants in tax planning, assessment and filing income tax returns of corporate sector, thereby they can get themselves self-employed.

Text Books Recommended

1. Bhagabati Prasad, Direct Tax Laws & Practices
2. Corporate Tax Planning, V.K. Global Publications

Suggested Readings

1. Singhania V.K. Direct Taxes: Law & Practices, Taxmann Publication.
2. Corporate Tax Planning, Kalyani Publishers

DSE – 3

Group B: Banking & Insurance

Fundamentals of Investment

Objective: To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Contents

Unit-I:

The Investment Environment- The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.

Investor Protection

Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism.

Unit-II:

Fixed Income Securities- Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating

Unit-III:

Approaches to Equity Analysis: Introductions to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalization models, and price-earnings multiple approach to equity valuation.

Unit-IV:

Portfolio Analysis and Financial Derivatives:(a) Portfolio and Diversification, Portfolio Risk and Return. (b) Mutual Funds. (c) Introduction to Financial Derivatives, Financial Derivatives Markets in India.

Learning outcome: After completion of this paper, this paper will educate the students about various aspect of investment in detail along with understandability of stock market operation, focusing on need for common investor protection.

Text Books Recommended

1. Bhalla – Fundamentals of Investment – S.Chand
2. Rustogi, R.P., Fundamentals of Investment, Sultan Chand & Sons, New Delhi**.**

Suggested Readings

3. Pandian P. – Security Analysis & Portfolio Management – Vikash Publication
4. Jones, C.P., "Investments Analysis and Management", Wiley, 8th ed.
5. Prasanna, Chandra., "Investment Analysis and Portfolio Management", Tata McGraw Hill.
6. Vohra, N.D., and B.R. Bagri, "Futures and Options", McGraw Hill Publishing
7. Mayo, An Introduction to Investment,Cengage Learning.
8. Fundamentals of Investment, Sashi Gupta, Kalyani Publishers, New Delhi,
9. Fundamentals of Investment, Vandana Dangi, V.K. Globa. Pub. Pvt. Ltd. New delhi.

DSE-3

Group – C: Management

Consumer Affairs & Customer Care

Objective: This paper seeks to familiarise the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.

It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Unit I: Conceptual Framework

Consumer and Markets: Concept of Consumer, Nature of markets, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP) and Local Taxes, Fair Price, labeling and packaging Experiencing and Voicing Dissatisfaction: Consumer Satisfaction/dissatisfaction-Grievances- complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Internal and External Complaint handling: Corporate Redress Systems and Public Redress Systems

Unit II: The Consumer Protection Act, 1986 (CPA) Objectives and Basic Concepts: Consumer, goods, service, defect in goods, deficiency in service, spurious goods and services, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels, Basic Consumer Rights; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA.

RTI Act

Unit III: Grievance Redress Mechanism under the Consumer Protection Act, 1986:

Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy to be provided; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Unit IV: Industry Regulators and Consumer Complaint Redress Mechanism

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI (an overview)
v. Electricity Supply: Electricity Regulatory commission
vi. Advertising: ASCI

Text Books Recommended

1. The Consumer Protection Act, 1986
2. Bhatta KG- Customer Care Management-Himalaya Publishing House

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. Consumer Affairs"
2. (2007) Delhi University Publication. 334 pp.
3. Aggarwal, V. K. (2003). Consumer Protection: Law and Practice. 5th ed. Bharat Law
4. House, Delhi, or latest edition.
5. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
6. Nader, Ralph (1973). The Consumer and Corporate Accountability. USA, Harcourt Brace
7. Jovanovich, Inc.
8. Sharma, Deepa (2011).Consumer Protection and Grievance-Redress in India: A Study of
9. Insurance Industry (LAP LAMBERT Academic Publishing GmbH & Co.KG,
10. Saarbrucken, Germany. 263 pp.
11. Empowering Consumers e-book, www.consumeraffairs.nic.in
12. ebook, www.bis.org
13. Nair Suja – Consumer Behaviour – Himalaya Publishing House

DSE-4

B.Com. (Hons.): Semester – VI

Business Research Methods and Project Work

Objective: This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

Section A: Business Research Methods 50 Marks

Unit-I

Introduction: Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

Unit-II

Research Process: An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method Existing Data Based Research, Longitudinal Studies, Panel Studies

Unit-III

Measurement: Definition; Designing and writing items; Uni-dimensional and Multi-dimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurst one, Likert and Semantic Differential scaling, Paired Comparison; Sampling –Steps, Types, Sample Size Decision; Secondary data sources

Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests; testing the assumptions of Classical Normal Linear Regression.

Section B – Project Report Marks (30 + 20)

Unit-IV Report Preparation: Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification

Note:

1. There shall be a written examination of 50% Marks on the basis of Unit I to III.

2. The student will write a project report under the supervision of a faculty member assigned by the college/institution based on field work. The Project Report carries 50% Marks and will be evaluated by University appointed examiners.

Learning Outcome: After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.

Text Books Recommended

1. Mishra Business Research Methods , Oxford University Press.
2. Business Research Methods and Project work, Priyaranjan Dash, VrindaPublications (P) Ltd

Suggested Readings:

1. Business Research methods, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd., New Delhi.
2. Upagade& Shende – Research Methodology – S. Chand
3. A.K.P.C. Swain, Business Research methods and Project work, Kalyani Publishers, New Delhi
4. Dangi, H.K. Business Research methods, Cengage Learning
5. Chawla Deepak – Research Methodology – Vikash Publication

(GE – 1)

MICRO ECONOMICS

Objective: Objective of the course is to acquaint the students with the concepts of micro-economics dealing with consumer behavior. The course also makes the student understand the supply side of the market through the production and cost behavior of firms.

Unit: I Demand and Consumer behaviour

Concept of demand: demand function, law of demand, derivation of individual and market demand curves, shifting of the demand curve, elasticity of demand, Consumer behavior, Marshallian utility approach and Indifference Curve approach; utility maximization conditions . Income-Consumption Curve (ICC) and Price-Consumption Curve (PCC)

Unit: II Production and Cost

Production function: Short-run and Long-run; Total Product, Average Product and Marginal Product, Law of returns to a variable factor, Law of Returns to Scale; Concepts of Iso-quant and iso-cost line;
Cost: Accounting and Economic Costs; Social and Private Costs; Short-run and Long-run Costs; Relation between Average and Marginal

Unit: III Perfect Competition

Concept of Perfectly Competitive market: Assumptions, Profit maximization conditions; Related concepts of Total Revenue, Average Revenue and Marginal Revenue, Short-run and Long- run equilibrium of a firm; determination of short-run supply curve of a firm, measuring producer surplus under perfect competition

Unit: IV Imperfect Competition

Monopoly

Concept of Monopoly: Sources of monopoly power; Short-run and Long-run equilibrium of a monopoly firm; Price discrimination; Social Cost of Monopoly (concept only).

Monopolistic Competition

Concept of Imperfectly Competitive market; Monopolistic Competition: Features and examples; Oligopoly: Non-Collusive Oligopoly: Sweezy's Kinked demand Curve Model, Collusive Oligopoly: Cartel (concept with example)

Learning Outcomes: The students would be able to apply tools of consumer behaviour and firm theory to business situations.

Text Books Recommended

1. Micro Economics-K C Dash- Himalaya Publishing House
2. Ahuja, H.L, Micro Economics, S.Chand

Suggested Readings:

1. Mehta P.K, Singh M. – Micro Economics – Taxmann Publication
2. Micro Economics-T.R. Jain , B.D. Majhi, V.K. Global
3. Browining, E.K. and J.M. Browning; Microeconomic Theory and Applications,
4. Kalyani Publishers, New Delhi.
5. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press
6. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning
7. Dwivedi, D.N. Micro Economics, Vikash Publication
8. Pindyck, R.S., D. L. Rubinfeld and P. L. Mehta; Microeconomics, Pearson Education.
9. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning
10. Maddala G.S.and E.Miller; Microeconomics: Theory and Applications,
11. MCGraw-Hill International.

(GE-2)

Macro & Indian Economy

Objectives: The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.

Contents:

Unit I Introduction to Macro Economics
Introduction: Meaning and definition of Microeconomics and macroeconomics, Difference between Microeconomics and macroeconomics, macro-economic goals, components of Macroeconomics, Economic Systems: Mixed economy, Socialism economy, Capitalism economy and Islamic economy (only meaning and characteristics)

Unit II National Income Accounting
Definition of National Income, Concepts of National Income,GDP and GNP, Methods of Measuring National Income, Uses of National Income, Difficulties in calculating National Income, Real Income, Per Capita Income and Growth Rate

Unit:III National Income Equilibrium
I Concepts of Equilibrium, Consumptions & Savings, Investment Theory, Government Sector, Foreign Sector, Determination of Equilibrium, Multiplier Concept, Inflationary Gap and Deflationary Gap, Summary of Two-, Three- and Four-sector Economies

Unit:IV Role of Government
Economic functions of Government, Types of Budget, Government Revenue, Government Expenditure, Public Debt, and Government Policy

Macroeconomic Problems

Introduction, Business cycle, Unemployment, Inflation, Deflation, Depression, RBI and monetary policy

Learning Outcomes: Students would be able to apply the modern tools of macro-economic analysis so as to minimize the adverse impact of macro-economic factors on business.

Text Books Recommended

1. Macro & Indian Economy, M. Treheran, T Treheran, V.K. Global publishing Pvt. Ltd., New Delhi
2. Ahuja H.L – Macro Economics – S.Chand

Suggested Readings

1. Mankiw, N. Gregory. Principles Macroeconomics.Cengage Learning
2. Macro and Indian economy, P.K. Dhar, Kalyani Publishers
3. Macro and Indian Economy-V K Puri- Himalaya Publishing House
4. Dornbusch, Rudiger., Stanley. Fischer and Richard Startz, Macroeconomics. Irwin/McGraw-Hill.
5. Vaish – Macro Economics – Vikash Publication
6. Macroeconomics & Indian Economy: Bhattacharyya, Oxford University Press.

(GE-3)

Business Statistics

Objective: The objective of this course is to familiarize students with the basic statistical toolsused for managerial decision-making.

Contents:

Unit I:

Statistical Data and Descriptive Statistics (With the use of Excel and other statistical software)

Nature and Classification of data: Univariate, Bivariate and multivariate data; time-series and cross-sectional data

Measures of Central Tendency

a) Mathematical averages including arithmetic mean, geometric mean and harmonic mean. Properties and applications.

b) Positional Averages

Mode and Median and other partition values including quartiles, deciles, and percentiles

Unit II:

Measures of Variation (With the use of Excel and other statistical software)

Absolute and relative, Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis

Unit III:

Simple Correlation and Regression Analysis (With the use of Excel and other latest software)

Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (proofs not required). Correlation and Probable error; Rank Correlation

Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate

Unit IV:

Index Numbers (With the use of Excel and other latest software)

Meaning and uses of index numbers: Construction of index numbers: fixed and chain base: univariate and composite. Aggregative and average of relatives – simple and weighted

Tests of adequacy of index numbers, Base shifting, splicing and deflating. Problems in the construction of index numbers

Construction of consumer price indices, important share price indices

Time Series Analysis (With the use of Excel and other latest software)

Components of time series, Additive and multiplicative models Trend analysis, Fitting of trend line using principle of least squares – linear, second degree parabola and exponential, Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages Seasonal variations- Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices

Learning Outcomes: Students would be armed with the knowledge of using different statistical tools very much required in the decision making process in any business as well as business research.

Text Books Recommended

1. Gupta, S.P., and Archana Gupta. Statistical Methods. Sultan Chand and Sons, New Delhi.
2. Business Statistics - Levine and Viswanathan, Pearson Publication

Suggested Readings:

1. Business statistics, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd, New Delhi.
2. Patri and Patri, Business statistics , Kalyani Publishers New Delhi.

3. Keller G, and Arora H, BSTAT, Cengage Learning
4. Gupta, S.C. Fundamentals of Statistics. Himalaya Publishing House.
5. Business Statistics– S K Sahoo, P K Prusty, Vrinda Publications (P) Ltd
6. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press.
7. Sharma J K, Fundamentals of Business Statistics – Vikash Publication
8. Vohra N. D., Business Statistics, McGraw Hill.

(GE-4)

Principles of Marketing

Objective: The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.

Contents:

Unit I: Introduction:

Nature, scope and importance of marketing; Selling vs Marketing; Marketing mix, Marketing environment: concept, importance, and components (Economic, Demographic, Technological, Natural, Socio-Cultural and Legal).

Consumer Behaviour and Market segmentation:

Consumer Behaviour: Nature and Importance, Factors influencing consumer buying behaviour. Market segmentation: concept, importance and bases; Product differentiation vs. market segmentation.

Unit II: Product:

Concept and importance, Product classifications; Concept of product mix; Branding, packaging and labeling; Product life-cycle; New Product Development Process

Unit III: Pricing, Distribution Channels and Physical Distribution

Pricing: Significance, Factors affecting price of a product, Pricing policies and strategies, Distribution Channels and Physical Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Factors affecting choice of distribution channel

Unit IV: Promotion and Recent developments in marketing:

Promotion: Nature and importance of promotion; Communication process; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics. Recent developments in marketing: Social Marketing, online marketing, direct marketing, services marketing, green marketing, Rural marketing; Consumerism

Learning outcome: After the completion of this paper, the students will able to identify marketing components and fit them in the value chain along with the various marketing strategies.

Text Books Recommended

1. Marketing Principles and Management-Sherleker and Pany-- Himalaya Publishing House
2. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and AhsanUlHaque. Principlesof Marketing. 13th edition. Pearson Education.

Suggested Readings:

1. Principles of Marketing, Bajaj, Kaur, Kalyani Publishers, New Delhi.
2. Principles of Marketing , R.K. Mittal , A. Sharma, V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University Press.
4. Lamb, C. W., Hair, J.F. and Sharma, D. MKTG, Cengage Learning
5. Principles of Marketing M K Nabi, K C Raut, Vrinda Publications (P) Ltd
6. Arun Kumar – Marketing management – Vikash Publication
7. Rudani R.B – Basics of Marketing Management – S. Chand
8. Majaro, Simon. The Essence of Marketing. Prentice Hall, New Delhi.
9. Zikmund William G. and Michael D'Amico. Marketing; Creating and Keeping Customers in an E-Commerce World. Thomson Learning.
10. Chhabra, T.N., and S. K. Grover. Marketing Management. Fourth Edition. DhanpatRai& Company.

U.G. Commerce Common Syllabus, Odisha

Course Structure (CBCS) B.Com (Pass)

Paper	Subject	Paper Code	Full Marks	End-term Marks	Mid-term Marks	Credit Points
	Semester I					
1.1	Environmental Science	AECC -1	100	80	20	4
1.2	Financial Accounting	CORE-1	100	80	20	6
1.3	Business Law	CORE-2	100	80	20	6
1.4	Micro Economics	GE-1	100	80	20	6
	Total		**400**			**22**
	Semester II					
2.1	Communicative English	AECC-1	100	80	20	4
2.2	Cost Accounting	CORE-3	100	80	20	6
2.3	Corporate Law	CORE-4	100	80	20	6
2.4	Macro & Indian Economy	GE-2	100	80	20	6
	Total		**400**			**22**
	Semester III					
3.1	Corporate Accounting	CORE-5	100	80	20	6
3.2	Management Principles and Application	CORE-6	100	80	20	6
3.3	Business Statistics	GE-3	100	80	20	6
3.4	E-Commerce	SEC-1	100	80	20	4
	Total		**400**			**22**
	Semester IV					
4.1	Income-tax Law and Practice	CORE-7	100	60 25 Practical	15	6
4.2	Management Accounting	CORE-8	100	80	20	6
4.3	Principles of Marketing	GE-4	100	80	20	6
4.4	Entrepreneurship Development and Business Ethics	SEC-2	100	80	20	4
	Total		**400**			**22**
	Semester V					
5.1	Fundamentals of Data Management (End Term Exam = 60, Practical = 25, Mid-term = 15	CORE-9	100	60+25	15	6
5.2	Fundamentals of Financial Management	CORE-10	100	80	20	6
5.3	Elective I (Any *one* of the following)	DSE-1	100	80	20	6
	A. Accounting and Finance Financial Markets,					

		Institutions & Services					
	B. Banking and Insurance	Indian Banking and Insurance System					
	C. Management	Human Resource Management					
5.4	Elective II (Any *one* of the following)		DSE-2	100	80	20	6
	A. Accounting and Finance	Financial Statement Analysis and Reporting					
	B. Banking and Insurance	Merchant Banking and Financial Services					
	C. Management	International Business					
	Total			**400**			**24**
	Semester VI						
6.1	Auditing and Corporate Governance		CORE-11	100	80	20	6
6.2	GST and Indirect Taxes		CORE-12	100	80	20	6
6.3	Elective III (Any *one* of the following)		DSE-3	100	80	20	6
	A. Accounting and Finance	Fundamentals of Corporate Tax Planning					
	B. Banking and Insurance	Fundamentals of Investment					
	C. Management	Consumer Affairs and Customer Care					
6.4	Business Research Methods and Project work	End Term Exam = 50 Project = 30 Viva-voce = 20	DSE-4	100	50 30 Project 20 Viva-voce		6
	Total			**400**			**24**
	Grand Total			**2400**			**136**

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

(CORE – 1)

FINANCIAL ACCOUNTING

Objectives: The objective of this paper is to help students to acquire conceptual knowledge of financial accounting and to impart skills for recording various kinds of business transactions.

Unit - I.

(a) Basics of Accounting

1. Accounting as the language of business and an information system, the users of financial accounting information and their needs. Qualitative characteristics of accounting information, Functions, advantages and limitations of accounting. Branches of accounting. Bases of accounting: cash basis and accrual basis.
2. The nature of financial accounting principles – Basic concepts and conventions: entity, money measurement, going concern, cost, realization, accruals, periodicity, consistency, prudence (conservatism), materiality and full disclosures and Accounting Equation.

(b)Accounting Process

From recording of business transactions to the preparation of trial balance including adjustments: journal, sub-division of journal, ledger accounts, trial balance

Unit – II: Reporting Standards &Business Income

1. Concepts of AS, Ind AS (Indian Accounting Standards), IFRS (International Financial Reporting Standards) & XBRL (eXtensible Business Reporting Language)
2. Measurement of business income-Net income: the accounting period, the continuity doctrine and matching concept. Objectives of measurement and revenue recognition.
3. Depreciation Accounting: The accounting concept of depreciation. Factors in the measurement of depreciation. Methods of computing depreciation: straight line method and diminishing balance method; Disposal of depreciable assets-change of method. Salient features of Accounting Standard 6 (AS- 6) issued by ICAI

Unit – III: Final Accounts

Capital and revenue expenditures and receipts, Preparation of financial statements of Sole Trade and Partnership Business with adjustments

Accounting for Partnership Firm: Accounting of Admission of partner, Retirement and Death of partner and Dissolution of the Partnership Firm Including Insolvency of partners

Unit – IV:

1. Hire Purchase and Installment Systems and Accounting for Branch & Department
2. Concepts of operating and financial lease (theory only)
3. Departmental Accounting and Branch Accounting including foreign branch (Theory and Problem)

4. Hire purchase and Installment System

Learning Outcomes: The course structure of this paper would equip the students to get in-depth knowledge of financial accounting along with its practical application thereby giving an opportunity to gain easy access to this competitive business world.

Text Books Recommended

1. Financial Accounting I and Financial Accounting II: Mukherjee, Oxford University Press
2. Jain, S.P. and K.L. Narang. Financial Accounting, Kalyani Publishers, New Delhi

Suggested Readings:

1. Financial Accounting, R.K. Mittal , M.R. Bansal, V.K, Global Publication.
2. Bal Ranjan Kumar, Financial Accounting – S. Chand
3. Text Book of Financial Accounting-Anil Kumar and Mariappa- Himalaya Publishing House
4. Financial Accounting - P. C. Tulsiani, Pearson Publication
5. Anthony, R.N. Hawkins, and Merchant, Accounting: Text and Cases. McGraw-Hill Education.
6. Bansal.K.M- Financial Accounting – Taxman Publication
7. Horngren, Introduction to Financial Accounting, Pearson Education.
8. Maheshwari, S.N. and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi.
9. Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi
10. N.Godwin and D. Sanyal, Financial ACCT, Cengage Learning

(CORE – 2)

BUSINESS LAW

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case laws.

Unit I: The Indian Contract Act, 1872

1. Contract – meaning, characteristics and kinds, Essentials of a valid contract
2. Offer and acceptance (Definition, Rules, Communication and Revocation of offer and acceptance)
3. Consideration (Definition, Elements, Types, Rules), "No Consideration No Contract" and its exceptions; Capacity to Parties (Definition and Types)
4. Consent, Free consent, Coercion, Undue Influence, Fraud, Misrepresentation, Mistake
5. Legality of objects and Consideration
6. Void and Voidable agreements – Definition, Types and Distinction
7. Discharge of a contract – Modes of discharge, Breach and Remedies against breach of contract
8. Specific Contracts - Contingent contracts, Quasi, Contract of Indemnity, Guarantee, Bailment, Pledges

Unit II: The Sale of Goods Act, 1930

1. Contract of sale, meaning and difference between sale and agreement to sell
2. Conditions and warranties
3. Transfer of ownership in goods including sale by a non-owner
4. Unpaid seller – meaning, rights of an unpaid seller against the goods and the buyer

Consumers Protection Act, 1986 and Right to Information Act

Objectives and features of Consumers Protection Act
Definitions – Complainant, Complaint, Consumer, Consumer Dispute, Defect, Deficiency, District Forum, Person
Unfair trade practices
Consumer Protection Council (Central, State and District – their constitutions and objectives

Unit III: Partnership Laws

B. The Partnership Act, 1932
g. Definition – Partner, Partnership
h. Nature and Characteristics of Partnership
i. Types of Partners
j. Registration of a Partnership Firms and consequences of non-registration
k. Rights and Duties of Partners
l. Dissolution of firms – meaning and grounds
C. The Limited Liability Partnership Act, 2008
f. Definition
g. Salient Features of LLP
h. Advantages and disadvantages of LLP
i. Differences between: LLP and Partnership, LLP and Company
j. Incorporation of LLP

Unit IV: The Negotiable Instruments Act 1881

c. Definition, Features, Types, Parties of Negotiable Instruments: Promissory Note, bill of exchange, Cheque (Definition and Types)
d. Endorsement: Meaning and Types of Endorsement
e. Holder and Holder in Due Course, Privileges of Holder in Due Course.
f. Dishonour of Negotiable Instruments: Modes, Consequences, Notice of Dishonour; Noting and Protesting
g. Discharge of Negotiable Instruments: Meaning and Modes

Learning Outcomes: The students would be able to deal with the legal aspect of different business situations.

Text Books Recommended

1. Business Law, Garg K.C., Saareen,Sharma, Kalyani Publishers
2. Kumar, R. Legal Aspects of Business, Cengage Learning

Suggested Readings:

1. Arora Sushma – Business Law – Taxmann Publication
2. A Book of Business Laws-Jena B and Mohapatra-Himalaya Publishing House
3. Business Law, Ashok Sharma, V.K. Global Publication.
4. Business Laws: Das & Roy, Oxford University Press
5. Business Law- S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Business Law - Tejpal Singh, Pearson Publication
7. Kuchhal, M.C. and Vivek Kuchhal, Business Law, Vikas Publishing House, New Delhi.
8. Tulsian, P.C, Business Law, S.Chand
9. Maheshwari & Maheshwari, Business Law, National Publishing House, New Delhi.

(Core-3)

COST ACCOUNTING

Objective: To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment.

CONTENTS:

Unit- 1:

Introduction to Cost Accounting: Meaning, concept, scope, objectives, principles, importance and limitations of cost accounting; Implementation of costing system; Methods & Techniques of costing; Cost concepts and Cost Sheet, Job costing and Batch Costing.

Unit – II:

Accounting for Material: Concept and technique of accounting for material; Methods of pricing of materials issues – FIFO, LIFO and Average; Treatment of material losses; Techniques of material control – level setting, Economic Ordering Quantity, ABC Analysis, VED Analysis, Perpetual inventory system, & Just-In-Time.

Unit – III:

Accounting for Labour:

Accounting for labour cost, control procedure, labour turnover, idle time, overtime, Methods of wage payment and the Incentive schemes- Halsey, Rowan, Taylor's Differential piece wage plan.

Accounting for Overheads:

Classification, Allocation & Apportionment of production overheads; Re-apportionment of Service department overheads; Absorption of overheads, methods of absorption – actual and predetermined rates, blanket and multiple rates, choice of an overhead absorption rate; Administration, selling and distribution overheads; Under absorption and over absorption of overheads.

Unit – IV:

Methods of Costing: Contract costing: Features and procedure of contract costing, uncompleted contract profit determination, Escalation clause, cost plus contracts. Process costing: Meaning and characteristics of Process costing, Procedure for process costing, treatment of process losses and wastages.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

i. Cost Accounting-Arora MN A- Himalaya Publishing House
ii. Nigam, B.M. Lall and I.C. Jain. Cost Accounting: Principles and Practice. Prentice Hall of India, New Delhi.

Suggested Reading:

i. Jain, S.P. and K.L. Narang. Cost Accounting: Principles and Methods. Kalyani Publishers, Jalandhar.
ii. Cost accounting, S.P. Gupta/ A Sharma- V.K. Global Publishing Pvt. Ltd.
iii. Cost & Management Accounting I: Mitra, Oxford University Press.
iv. Cost & Management Accouning, Taxmann Publications
v. Colin Drury, Management and Cost Accounting, Cengage Learning
vi. Lal, Jawahar. Cost Accounting. Tata McGraw Hill Publishing Co., New Delhi.
vii. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
viii. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
ix. Cost Accounts- Datar and Rajan, Pearson Publication

(Core-4)

CORPORATE LAWS

Objectives: The objective of the course is to impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.

Contents:

Unit – I: INTRODUCTION TO COMPANY

Meaning and Definition – Features –, High Lights of Companies Act 2013 - Body Corporate ,Kinds of Companies (Concept, Definition and Features) – One Person Company, Private Company, Public Company, Company limited by Guarantee, Company limited by Shares, Holding Company, Subsidiary Company, Government Company, Associate Company, Small Company, Foreign Company, Listed Company, Dormant company

FORMATION OF A COMPANY

Steps in formation of a Company, Promotion Stage, Meaning of Promoter, Position of Promoter & Functions of Promoter, Incorporation Stage – Meaning, Contents, Forms of Memorandum of Association & Articles of Association and its alteration, Distinction between Memorandum of Association and Articles of Association, Certificate of Incorporation, Subscription Stage – Meaning & contents of Prospectus, Types, Mis-statement in prospectus and its consequences.

Unit - II: COMPANY ADMINISTRATION

Director (Concept and Definition), DIN, Qualification, Disqualification, Appointment, Position, Rights, Duties, Power, Resignation, Liabilities, Removal and Resignation of director, Key Managerial Personnel (Definition, Appointment and Qualifications) – Managing Director, Whole time Directors, the Companies Secretary, Chief Financial Officer, Resident Director, Independent Director, Women director.

Unit - III: SHARE CAPITAL & DEBENTURE

Share and Share Capital - Types and Definition, Allotment and Forfeiture, Calls on Shares, ESOP, Buyback, Sweat Equity, Bonus, Right, Capital Reduction, Share Certificate, Demat System, Transfer and Transmission, Redemption of Preference Shares, Debenture – Definition, Types, Rules Regarding Issue of Debenture, Rules regarding Dividend and distribution of dividend.

Unit - IV: CORPORATE MEETINGS

Corporate Meetings - Shareholder and Board, Types of Meetings – Annual General Meeting Extraordinary General meeting, Minutes of Proceedings of General Meeting, Meeting of BOD and other meetings (Section 118), Requisite of Valid Meeting- Notice, Agenda, Chairman, Quorum, Proxy, Resolutions, Minutes, Postal Ballot, E- voting, Video Conferencing,

Learning Outcomes: Students would acquire knowledge about the legal framework and the ways and means to deal with the legal aspect of different situations of corporate sector.

Text Books Recommended

1. Corporate Laws-Maheswari, Maheswari- Himalaya Publishing House
2. Corporate Law, Ashok Sharma, V.K. Global Publishing Pvt. Ltd., New Delhi

Suggested Readings:

1. **A** Compendium of Companies Act 2013, along with Rules, by Taxmann Publications.
2. Corporate Law, Gupta,Garg,Dhingra, Kalyani Publication
3. Company Law: Roy & Das, Oxford University Press.

4. Kumar, R., Legal Aspects of Business, Cengage Learning
5. Corporate Law– S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Arora &Banshal, Corporate Law – Vikash Publication
7. Gogna, P.P.S – Company Law, S. Chand
8. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers).
9. GK Kapoor& Sanjay Dhamija, Company Law, Bharat Law House.

(Core-5)

CORPORATE ACCOUNTING

Objectives: To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements

Contents:

Unit – I

Meaning of Company; Maintenance of Books of Accounts; Statutory Books; Annual Return Company – Issue of Shares – issue, forfeiture, reissue, issue other than cash consideration and issue to the promoters; Pro-rata issue of shares. Issue of Right and Bonus Share – Rules,

Accounting for debentures: Issue of debenture, Underwriting of shares and debentures: Determination of Underwriters Liability – with marked, unmarked & firm underwriting; Accounting of Employee Stock Option Plan – meaning; rules; Vesting Period; Exercise Period, Accounting for ESOP and Accounting of ESPS.

Unit – II: Redemption of Preference shares & Debentures

Buy Back of Securities: meaning, rules and accounting. Redemption of Preference Shares – Rules and Accounting (with and without Bonus Shares) ; Redemption of Debenture – Important Provisions, Redemption of debenture

Accounting for Redemption: by conversion, by lot, by purchase in the open market (cum and ex-interest), held as Investment and Use of Sinking Fund

Unit – III: Company's Final Accounts

Introduction to Schedule III of Companies Act 2013; Treatment of Tax; transfer to reserve, Dividend and applicable tax (out of current profit, out of past reserve); Preparation of Statement of Profit & Loss and Balance Sheet. (tax on net profit without recognizing deferred tax)

Valuation of Goodwill & Shares

Goodwill – valuation using different methods, i.e., Average Profit, Super Profit, Capitalization and Annuity. Shares – Valuation using different methods: Asset approach, Earnings approach, Dividend Yield, Earnings-Price, Cum-div and Ex-div, Majority and Minority view and Fair Value

Unit – IV: Liquidation

Meaning of liquidation, modes of winding up, consequences of winding up, statement of affairs, liquidator's final statement of account, list 'B' contributories

Learning Outcomes: This paper can provide conceptual clarity about the techniques to prepare financial statements of companies along with accounting treatment of various situations viz. floating of shares, amalgamation and liquidation of companies.

Text Books Recommended

1. Jain, S.P. and K.L. Narang. Corporate Accounting. Kalyani Publishers, New Delhi.
2. Maheshwari, S.N. and S. K. Maheshwari. Corporate Accounting. Vikas Publishing House, New Delhi.

Suggested Readings:

1. Sehgal, Ashok and Deepak Sehgal. Corporate Accounting. Taxman Publication, New Delhi.
2. Corporate Accounting, R.K. Mittal? S. Ahuja- V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Corporate Accounting – Anil Kumar, Mariappa- Himalaya Publishing House
4. Tulsian, P.C, Corporate Accounting, S. Chand
5. Monga, J.R. Fudamentals of Corporate Accounting. Mayur Paper Backs, New Delhi.
6. Gupta, Nirmal. Corporate Accounting. SahityaBhawan, Agra.
7. Bhushan Kumar Goyal, Fundamentals of Corporate Accounting, International Book House

(Core-6)

MANAGEMENT PRINCIPLES & APPLICATIONS

Objective: The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices.

Unit-I: Introduction:

Management-definition, importance, functions, nature-as profession, science and art, universality of management; levels of management; managerial tasks and skills

Different Schools of Thoughts: Classical School-contributions of Taylor and Henri Fayol; Neo-classical school-Human Relations approach and Behavioral Science Approach; Modern School; System approach and Contingency approach

Unit-II: Planning:

Concept, importance, steps, types, premises, barriers to effective planning and remedial measures; strategic planning-concept forecasting –concept, techniques.

Organizing:

Concept, importance, principles, different organization models-line and staff; Functional; Departmentation-need, basis, principles, Delegation of Authority-elements, steps barriers; Centralization and Decentralization of Authority; Span of Management; concept and determining factors

Unit-III: Directing and Staffing:

Directing: concepts, importance of directing,

Leadership: Concept, importance, types, leadership traits, Tannenbaum & Schmidt's Model and Blake & Mouton's Model.

Staffing: concepts, importance

Unit- IV: Motivation, Co-ordination and Control:

Motivation: Concept, importance, importance of need theory, and contributions of McGregor, Maslow, Herzberg.

Coordination: concepts, importance, principles and implementation techniques. Control: concepts, importance and tools of control.

Learning Outcomes: Students would be able to make use of different management principles in the course of decision making in different forms of business organizations.

Text Books Recommended

1. Pany Tushar K , Management Principles and Application, Kalyani
2. Prasad, L.M. Principles and Practice of Management, Sulatan Chand

Suggested Readings:

1. Sharma gupta , Management: Principles and application , Kalyani Publishers
2. R. K . Singhal, Management Principle and application, V.K. Global Pub. Pvt. Ltd, New Delhi.
3. Management Principles and Applications-Jhunjhunwala J Mohanty- Himalaya Publishing House
4. Principles of Management: Mitra, Oxford University Press.
5. Griffin, R.W. – Management :Principles& Practices, Cengage Learning
6. Gupta R.N - Principles & Practice of Management – S. Chand
7. A K Jha, Management Principles and Application - Vrinda Publications (P) Ltd.
8. Chandan J.S – Management Concepts of Strategy – Vikash Publication
9. B.P. Singh and A.K.Singh, Essentials of Management, Excel Books
10. TN Chhabra, Management Concepts and Practice, DhanpatRai& Co. (Pvt. Ltd.), New Delhi
11. Peter F Drucker, Practice of Management, Mercury Books, London

(Core-7)

Income Tax Law and Practice

Objective: To provide basic knowledge and equip students with the application of principles and provisions of Income Tax Act 1961.

Contents:

Unit I :

Basic Concepts and Definitions under IT Act:
Assessee, Previous year, Assessment year, Person, Income, Sources of income, Heads of income, Gross total income, Total income, Maximum marginal rate of tax, Tax Evasion, Tax avoidance and Tax planning
Residential Status and Incidence of Tax, Residential status of all persons except company
Incomes which do not form part of Total Income Except section 10AA.
Agricultural Income Definition, determination of agricultural and non-agricultural Income, assessment of tax liability when there is both agricultural and non-agricultural income

Unit II:

Heads of Income and Provisions governing Heads of Income

a) Income from Salary
b) Income from House property

Unit III: Heads of Income and Provisions governing Heads of Income
a) Profits and Gains of Business and Profession
Special emphasis on sec. 32, 32AC, 32AD, 35, 35D, 36(i)(ib), (ii), (iii), (iv), (vii), 37, 37(2B), 40A(2), 40A(3), 43B, (Excluding presumptive taxation)

b) Capital Gains
Meaning and types of capital assets, basic concept of transfer, cost of acquisition, cost of improvement and indexation, computation of STCG and LTCG, exemptions u/s 54, 54B, 54EC and 54F, capital gain on transfer of bonus shares, right entitlement and right shares, taxability of STCG and LTCG.

c) Income from Other Sources
Basis of charge excluding deemed dividend

Unit IV:
a) **Income of other Persons** included in Assessee's Total Income Remuneration of spouse, income from assets transferred to spouse and Son's wife, income of minor.

b) Set off and Carry Forward of Losses
Mode of set off and carry forward, inter source and inter head set off, carry forward and set off of losses u/s 71B, 72, 73, 74, 74A.

c) Deductions from Gross Total Income
Basic concepts, deductions u/s 80C, 80CCC, 80CCD, 80CCE, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGC, 80TTA, 80U
Rebate u/s 87A

Computation of Total Income and Tax Payable

a) Rate of tax applicable to individual assessee
b) Computation of tax liability of an individual
c) Provision for Filing of Return Date of filing of return, relevant forms of return, different types of returns, return by whom to be signed, PAN, TAN
d) Assessment of Return Self assessment u/s140A, Summary assessment u/s 143(1), Scrutiny assessment u/s 143(3) and Best judgement assessment u/s 144.
e) Advance Tax Who is liable to pay, due dates and computation of advance tax (excluding corporate assessees)
f) Interest & Fees Section 234A, 234B, 234C, 234F
g) TDS Provisions regarding TDS from salary, interest on securities, horse racing, lottery.

Learning Outcomes: This paper would provide the understanding of various provisions of Income Tax Act as well as equip the students to make practical applications of the provisions for taxation purpose.

Text Books Recommended

1. Gour and Narang, Income tax: Law and practice, kalyani Publishers
2. Dr. Vinod Kumar Singhania, e-filing of Income Tax Returns and Computation ofTax,
3. Taxmann Publication Pvt. Ltd, New Delhi. Latest version**.**

Suggested readings:

1. Income tax Law and practice, Makta Jain/ Rakesh Jain, V.K. Global Pub. Pvt. Ltd., New Delhi
2. Income Tax Law and Pratcice-Saha, Dash- Himalaya Publishing House.
3. Pagare, Dinkar. Law and Practice of Income Tax. Sultan Chand and Sons, New Delhi.
4. Lal, B.B. Income Tax Law and Practice. Konark Publications, New Delhi.

(Core-8)

MANAGEMENT ACCOUNTING

Objective: To acquaint the students with basic concepts of management accounting, and basic understanding of tools and techniques used for managerial decision making.

CONTENTS: `

Unit – I:

Management Accounting: Meaning, nature, scope, and importance of management accounting; Role of management accounting; management accounting vs. financial accounting; Role of management accounting in modern business; Tools and techniques of management accounting.

Unit – II: Ratio Analysis & Cash flow statement

Ratio Analysis:

Meaning and utility of ratios; significance of Ratio analysis; Classification of Ratios – Profitability ratios, Efficiency Ratios, Liquidity Ratios, Solvency Ratios; Advantages and limitations of Ratio Analysis.

Cash flow Statements:

Cash Flow Statements: Meaning and utility of Cash flow statements; Preparation of Cash flow statements – Indirect method; Limitations of Cash flow statements; Cash flow statements vs. Funds flow statements. (Reference to Revised AS-3 and Ind AS-7)

Unit – IV:

Absorption & Marginal Costing: P/V Ratio, Break-even analysis, Margin of safety, angle of incidence; Marginal and differential costing as a tool for decision making – make or buy, change of product mix, exploring new markets, shut down decisions.

Unit – V:

Budgeting & Standard Costing: Concept of budget and budgetary control; objectives, merits and limitations of budgetary system; Master budget, Functional budget, Fixed and Flexible budgets; Zero based budgeting. Standard Costing & Variance Analysis: Meaning of standard cost and standard costing, Advantages and disadvantages of standard costing and variance analysis: Material, Labour, & Overhead.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

1. Management Accounting, S swain/ S.P. Gupta/ A Sharma, V.K. Global Pub. Pvt. Ltd., New Delhi.
2. Horngreen, Charles T., Gary L. Sundem. Introduction to Management Accounting.
3. Prentice Hall.

Suggested Reading:

1. Jain & Narang, Management Accounting, Kalyani Publications
2. Management Accounting-M Wilson- Cost Accounting-Jena B,Bal S and Das A-

Himalaya Publishing House
3. Narasimhan M.S. , Management Accounting, Cengage Learning
4. Cost & Management Accouning, Taxmann Publications
5. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
6. Maheshwari, S.N. and S.N. Mittal. Cost Accounting: Theory and Problems. Shri Mahabir Book Depot, New Delhi.
7. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
8. Khan, M.Y. and P.K. Jain. Management Accounting. Tata McGraw Hill, Publishing Co., New Delhi.

(Core-9)

FUNDAMENTALS OF DATA MANAGEMENT

Unit I: Word Processing

Working with word document- Editing text, Find and Replace text, Formatting, Spell check, Autocorrect, Auto text; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Macros, Drop cap; Tables: Inserting, Filling and formatting a Table, Inserting Pictures and Video; Mail Merge- including linking with Database, Printing documents. Creating Business Documents using the above facilities

Preparing Presentations

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation, Hyperlink and Slideshow. Creating Business Presentations using above facilities

Unit II: Spreadsheet and its Business Applications

Managing worksheets- Formatting, Entering data, Editing, and Printing a worksheet; handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs, Pivot Table

Spreadsheet Functions: Mathematical [SUMIF, SQRT, SUBTOTAL, SUMPRODUCT etc.], Statistical [AVERAGE, STDEV, VAR, CORRELATION, REGRESSION etc.], Financial [PMT, RATE, PV, FV, NPER, IRR, NPV, Data Table Etc.] Logical [AND, OR, IF etc.], Date and Time, lookup and reference, Database and Text functions.

Creating Spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll Statements; Capital Budgeting; Depreciation Accounting; Graphical Representation of Data; Frequency Distribution and its Statistical Parameters; Correlation and Regression

Unit III: Database Management System

Creation of Tables, Multiple Table Handling-Defining Relationship [Foreign Key], Simple and Conditional Queries, Types of Queries [Update, Delete, Append], Forms,

Reports, Introduction to SQL through Basic Commands.

Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, managing the data records of Employees, Suppliers and Customers

Unit IV: Website Designing

Introduction to HTML; Tags and Attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets

Text Books Recommended

1. Coronel and Rob, Database Principles, Cengage Learning
2. Fundamentals of Data Managemnet –Saha RG- Himalaya Publishing House

Suggested Readings

1. Thareja, IT & Application, Oxford
2. Aurora, Computer Fundamentals, Vikash
3. Sinha & Sinha, Fundamentals of Computers, BPB Publications
4. Dhar, P., Fundamental of IT and Its Application in Business, APH

(Core-10)

FUNDAMENTALS OF FINANCIAL MANAGEMENT

Objective: To familiarize the students with the principles and practices of financial management.

Contents:

Unit – I: Introduction& Basic Concepts

Important functions of Financial Management, Objectives of the firm: Profit maximization vs. Value maximization, Role of Chief Financial Officer. Financial environment in which a firm has to operate, Time Value of Money: concept and reasons, Compounding and Discounting techniques, Concepts of Annuity and Perpetuity. Risk-return relationship (concepts only)

Unit – II: Sources of Finance and Cost of Capital/ Financing Decisions

Different sources of finance; long term and short term sources, Cost of capital: concept, relevance of cost of capital, Implicit and Explicit cost, specific costs (its computation) and weighted average cost (its computation) , rationale of after tax weighted average cost of capital, marginal cost of capital (its computation).

Unit – III: Capital Expenditure Decisions / Long term Financial Decisions & Dividend Decisions

Capital Expenditure Decisions / Long term Financial Decisions

Objectives of Capital Budgeting Process, Concept of Cash flow, Methods of long term investment decisions - Discounted Payback Period, Net Present Value, Profitability Index,

Average Rate of Return / Accounting Rate of Return, Internal Rate of Return (Including relative merits and demerits of each of the methods)

Dividend Decisions

Meaning, Natureand Types of Dividend, concept of pay-out ratio, retention ratio Decisions and growth, Dividend policies and formulating a dividend policy, Dividend Theories: Walter's Model, Gordon's Model

Unit – IV: Working Capital Management/ Liquidity Management

Meaning and various concepts of Working Capital, Management of Working Capital and Issues in Working Capital, Estimating Working Capital Needs; Operating or Working Capital Cycle,Policies relating to Current Assets – Conservative, Aggressive and Balance, Various sources of finance to meet working capital requirements

Learning Outcome: After the completion of this paper, students will be able to understand finance in a better way along with giving them insight to practical management of long and short finance for real business houses.

Text Books Recommended

1. Rostogi, Fundamentals of Financial Management, Taxmann Publications
2. Fundamental of Financial Management, Sharma, Gupta, Kalyani Publishers, New Delhi.

Suggested Readings

1. Fundamentals of Financial Management, Vandana Dangi, V.K. Global Pvt. Ltd., New Delhi
2. Parasuraman – Financial Management : A Step by Step Approach, Cengage Learning
3. Pandey, I.M. Financial Management. Vikas Publications.
4. Financial Management, Himalaya Publishing House
5. BhallaV.K – Financial Management – S.Chand
6. Horne, J.C. Van and Wackowich. Fundamentals of Financial Management. 9thed. New Delhi Prentice Hall of India.

(Core-11)

AUDITING AND CORPORATE GOVERNANCE

Objective: To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility

Unit-I

Auditing: Introduction, Meaning, Objects, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities

Unit-II

Audit of Limited Companies:

Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report-Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013

Special Areas of Audit:

Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Standard on Auditing (SA); Relevant Case Studies/Problems;

Unit-III

Corporate Governance: Conceptual framework of Corporate Governance, Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance Problems Noticed in various Corporate Failures. Codes & Standards on Corporate Governance

Unit-IV

Corporate Social Responsibility (CSR): Strategic Planning and Corporate Social Responsibility; Corporate Philanthropy, Meaning of CSR, CSR and CR, CSR and Corporate Sustainability, CSR and Business Ethics, CSR and Corporate Governance, Environmental Aspect of CSR, CSR provision under the Companies Act 2013, CSR Committees

Learning Outcome: At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities.

Text Books Recommended

1. Gupta, Kamal and Ashok Arora. Fundamentals of Auditing. Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
2. Auditing and corporate governance, Pradeep kumar , Klayani Publishers , New Delhi.

Suggested Readings:

3. Auditing and corporate governance, A. Sharma, V.K. Global Pvt. Ltd.,New Delhi
4. SATHEESH KUMAR Corporate Governance, Oxford University Press.
5. Shikha, N. and Sharma, G. Corporate Governance in India : Principles and Policies, CENGAGE Learning
6. Jha, Aruna. Auditing. Taxmann.
7. Tandon, B. N., S. Sudharsanam and S. Sundharabahu. A Handbook of Practical Auditing. S. Chand and Co. Ltd., New Delhi.
8. Ghatalia, S.V. Practical Auditing. Allied Publishers Private Ltd., New Delhi.
9. Singh, A. K. and Gupta Lovleen. Auditing Theory and Practice. Galgotia Publishing Company.
10. Alvin Arens and James Loebbecke, Auditing: an Integrated Approach

11. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers). (Relevant Chapters)
12. Khanka – Business Ethics & Corporate Governance – Vikash Publication
13. Auditing Principles and Techniques - S. K. Basu, Pearson Publication

(Core-12)

GST & INDIRECT TAX

OBJECTIVE:

The objective is to equip students with the principles and provisions of Goods and Services Tax (GST), which is, implemented from 2017 under the notion of One Nation, One Tax and One Market and to acquaint students with basic provisions of GST Law and basic working knowledge.

Unit I- INTRODUCTION TO GOODS AND SERVICES TAX (GST)

Introduction to GST : Introduction, Constitutional provisions regarding Taxation In India, Pre-GST Indirect Taxation Structure in India, What is GST, Need for GST in India, Overview and Genesis of GST IN INDIA, GST objectives, Scope of GST, Salient features of GST, GST and Centre-State Financial Relations, The Constitution (122nd Amendment) Bill, Constitutional Amendments required for introduction of GST Indirect Taxes subsumed Post-GST : Principles for subsuming taxes under Goods & Services Tax (GST) in India, Indirect Taxes and Levies subsumed in GST, Events that have led to the introduction of GST, DUAL GST : Benefits of Dual GST, Structure Of Dual Model of GST , Key Features of Dual Model of GST, Benefits of implementing GST, CENTRAL GST – STATE / UNION TERRITORY GST – INTEGRATED GST and GST Cess, Pre-GST Regime Vs. GST Regime, Indirect Taxes

Unit II- GST ACTS: (Structure & Terminology)

Salient features of CGST Act, SGST Act (Odisha State), IGST Act, Meaning and Definition of various terms used under GST

(Coverage- Provisions and Illustration)

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX: (CGST & SGST)- Meaning and Scope of 'Supply' under GST Law, Taxable Person, Time of supply, Place of supply and Value of supply. Computation of Taxable Value and Tax Liability, Composition scheme; INPUT TAX CREDIT; PROCEDURE RELATING TO LEVY, COLLECTION AND EXEMPTION OF IGST; PAYMENT OF TAX, TCS, TDS; PRACTICAL PROBLEMS.

(Coverage- Provisions and Illustration)

Unit III- REGISTRATION, RETURNS AND ASSESSEMENT

REGISTRATION - Persons liable for registration, Persons not liable for registration, Types: Compulsory registration, Voluntary registration, Deemed registration - Procedure for registration, Special provisions for Casual taxable persons and Non-resident taxable persons; CLASSIFICATION OF GOODS & SERVICES- HSN, SAC; TAX INVOICE AND OTHER SUCH INSTRUMENTS IN GST - Debit Note, Credit Note, Vouchers, Invoice; ACCOUNTS AND RECORDS; RETURN- Process of Return Filing, Furnishing details of outward supplies and inward supplies, First return, Claim of input tax credit, Matching reversal and reclaim of input tax credit, Annual return and Final return; REFUND; OFFENCES AND PENALTIES; ASSESSMENT; AUDIT; APPEALS AND REVISION.

Unit IV- GST Council AND REGULATORY FRAMEWORK

GST COUNCIL: Structure, Powers and Functions. Provisions for amendments; ROLE OF CBEC; Division of Administrative Powers; GST AND TECHNOLOGY- GST Network, GST ECO SYSTEM, GSP, ASP; NATIONAL ANTI-PROFITEERING AUTHORITY IN GST; COMPLIANCE RATING.

Text Books Recommended

1. Swain AK & Agrawal – GST: Concepts and Applications, Himalayan Publishing House.
2. GST Manual:Taxman's Publication Ltd., New Delhi.

Suggested Books:

1. GST and Indirect Taxes,Sanjeet Sharma, V.K. Global Pub. Pvt. Ltd, New Delhi.
2. Mishra, Padhi and Bera – Text Books on GST & Practice, Vikash Publishing House Pvt. Ltd. New Delhi.

DSE – 1

Elective – I (Any one of the following Groups)

Group – A: Accounting & Finance

Financial Markets, Institutions, & Services

Objectives: To enable the students to understand the financial institutions operating in India and services provided by them.

Unit-I

Basic Theoretical Framework: The financial system and its technology; The factors affecting the stability of the financial system; Development finance vs. universal banking; Financial intermediaries and Financial Innovation; RBI-Central Banking.

Unit-II: Financial Institutions & Non-Banking Financial Institutions

Financial Institutions:

A brief historical perspective. An update on the performance of IDBI, ICICI, IFCI and SFCs, LIC &GIC, Banking Institutions: Commercial banks - the public and the private sectors - structure and comparative performance, problems of competition; interest rates, spreads, and NPAs. Bank capital - adequacy norms and capital market support.

Non-banking financial institutions:
Evolution, control by RBI and SEBI. A perspective on future role, Unit Trust of India and Mutual Funds, Reserve bank of India Framework for/Regulation of Bank Credit . Commercial paper: Features and advantages, Framework of Indian CP Market, effective cost/ interest yield.

Unit-III
Financial services: Asset/fund based Financial services - lease finance, consumer credit and hire purchase finance, factoring definition, functions, advantages, evaluation and forfeiting, bills discounting, housing finance, venture capital financing. Fee-based / Advisory services: Stock broking, credit rating.

Unit-IV
Operations: Financial Assets/ Instruments Rights issues, issue of Debentures, issue of Equity shares - pre-issue activity, post-issue activities. The regulatory framework: SEBI and Regulation of Primary and Secondary Markets, Company Law provisions.
Learning Outcome: After completion of this paper, the students will be able to understand the role and benefits of financial institution and services.

Text Books Recommended

1. Financial Markets, Institutions & Services-Gordon, Natrajan-Himalaya Publishing House
2. Pathak: Indian Financial Systems Pearson Education

Suggested Readings

1. Financial Market and Int. , A. goyal and M. Goyal, V.K. Global Pvt. Ltd., New Delhi
2. Financial Markets , Institutions and Services, Kaur, Talwar, KAlyani Publishers, New Delhi.
3. BHATTACHARYYA INDIAN FINANCIAL SYSTEM 2e, Oxford University Press.
4. M.Y.Khan, Financial Services, Tata McGraw-Hill, New Delhi, 2004.
5. H.R Machiraju, Indian Financial Systems, Vikas Publishing House Pvt. Ltd.2002.
6. Madura, J., Financial Institutions and Markets; Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 1

INDIAN BANKING AND INSURANCE SYSTEM

Objectives: To enable the students to acquire knowledge about basics of banking and insurance.

Unit-I: Concept of Bank and Banking & Types of Customers and Account holders
Concept of Bank and Banking:
Historical Evolution of Banking: Origin and Development of Banking - Structure of Banking in India – Banks and Economic Development –Functions of Commercial banks (conventional and innovative functions) – Central Bank – RBI – functions – Emerging trends in Banking.
Types of Customers and Account holders:
Procedure and practice in opening and operating the accounts of customers - individuals including minors - joint account holders -Partnership firms - joint stock companies - executors and trustees-clubs and associations

Unit-II
Introduction to insurance: Purpose and need of insurance, insurance as a social security tool - insurance and economic development - Principles of insurance -various kinds of insurance - life, marine, fire, medical, general insurance – features
.
Unit-III
Life Insurance - Law relating to life Insurance; General Principles of Life Insurance Contract; Proposal and policy; assignment and nomination; title and claims; General Insurance - Law relating to general insurance; different types of general insurance; general insurance Vs life insurance – Insurance business in India.

Unit-IV
Fundamentals of Agency Law: Definition of an agent; Agents regulations; Insurance intermediaries; Agents' compensation. Procedure for Becoming an Agent: Pre-requisite for obtaining a license; Duration of license; Cancellation of license; Revocation or suspension/termination of agent appointment; Code of conduct; Unfair practices. Functions of the Agent: Proposal form and other forms for grant of cover; Financial and medical underwriting; Material information; Nomination and assignment; Procedure regarding settlement of policy claims.
Learning Outcome: After the completion of this paper, the student will acquired practical knowledge of working mechanism of banking and insurance industries in India.

Text Books Recommended

1. M.N. Mishra: Insurance Principles and Practice, S. Chand & Company Ltd, Delhi.
2. Indian Institute of Bankers (Pub) Commercial Banking Vol-I/Vol-II (part I&II) Vol-III.
3. Hota P.K., and Das S.K. Financial Literacy and Banking, Kalyani Publishers

Suggested Readings

1. Dr. P. Periasamy: Principles and Practice of Insurance, Himalaya Publishing House, Delhi.
2. Mishra S. Banking Law and Practice – S Chand
3. Prasad – Banking Insurance – Vikash Publication
4. Inderjit Singh, RakeshKatyal& Sanjay Arora: Insurance Principles and Practices, Kalyani Publishers, Chennai.
5. Sheldon H.P :Practice and Law of Banking.
6. Bedi. H.L :Theory and Practice of Banking.
7. Maheshwari. S.N. :Banking Law and Practice.
8. Shekar. K.C :Banking Theory Law and Practice.
9. Pannandikar&Mithami': Banking in India.
10. Radhaswamy&Vasudevan: Text Book of Banking.
11. Varshaney: Banking Law and Practice.
12. G. Krishnaswamy : Principles & Practice of Life Insurance
13. Kothari &Bahl : Principles and Pratices of Insurance.

DSE – 1

Group – C: Management

Human Resource Management

Objective: The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.

Contents:

Unit I: Nature and Scope & Human Resource Planning

Nature and Scope

Concept and meaning of IR &HR, Understanding the Nature and Scope of IR & HRM, Functions and importance

Human Resource Planning

Definition, Need and Features of Human Resource Planning, factors affecting Human Resource Planning

Unit II: Recruitment and Selection

Definition of Recruitment, Source, need and importance of Recruitment, Recruitment Policy process – sources of Recruitment Definition of Selection, Steps in selection.

Unit III: Training and Development

Training and Development Meaning and purpose of training, Benefits of training to organizationand employees -Training methods

Unit IV: Job Evaluation and Performance Appraisal

Job evaluation - objectives, scope, method, Job analysis, Job description, Job Specification - basic concept and significance, Performance Appraisal - Concept

Learning Outcomes: This paper can enhance the capability of the students to manage the most important assets of organization i.e. human beings which is much needed to ensure growth of that organization.

Text Books Recommended

1. Rao V.S.P - Human Resource Management. Vikash Publication
2. Human Resource Management, Sagun Ahuja, V.K. Global Pvt. Ltd., New Delhi

Suggested Readings:

1. Human Resource Management-Satapathy, Taheer and Mohanty—Himalaya Publishing House P Ltd.
2. Human Resource Management, Gupta, Joshi. Kalyani Publishers, Ne4w Delhi
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University press.
4. Sinha, P. R. N. Shekhar, S.P.Human Resource Management, Cengage Learning
5. Human Resource Management -Gajendran, A K Jha, Vrinda Publications (P) Ltd
6. DeCenzo, D.A. and S.P. Robbins, "Personnel/Human Resource Management", Prentice Hall of India, New Delhi.
7. Khanka S.S. Human Resource Management. S Chand.
8. Ivancevich, John M. Human Resource Management. McGraw Hill.
9. Wreather and Davis. Human Resource Management. Pearson Education.
10.

DSE – 2
Elective – II (Any one of the following Groups)
Group – A: Accounting & Finance
Financial Statement Analysis & Reporting

Objectives: To enable the students to understand the basic knowledge about the financial statement analysis and reporting for economic decision making.

Unit-I
Introduction Concepts of financial statements – Nature of financial statements – Objectives of financial statements – Different types of financial statements: income statement, balance sheet, statement of retained earnings, fund flow statement, cash flow statement, Notes to Accounts – Limitations of financial statements.

Unit-II
Analysis & Interpretation of Financial Statements: Traditional Approaches Vs. Modern Approaches to financial statement analysis – Classification of financial statement analysis: based on modus operandi and based on materials used – Techniques of financial statement analysis: Comparative Statements, Common-size Statements, Trend Ratios and Ratio Analysis – Problems encountered in financial statement analysis.

Unit-III: Ratio Analysis
Ratio Analysis:
Classification of ratios – Ratio formation – Ratio interpretation – Practical methods of ratio analysis: Time Series (intra firm) Analysis, Cross Sectional (inter firm) Analysis, Residual Analysis and Multivariate Analysis.

Multivariate Ratio Analysis:
Concept, objectives, uses and limitations – Univariate analysis Vs. Multivariate ratio analysis – Application of statistical tools in financial statement analysis.

Unit-IV
Corporate Reporting: Cash Flow statement Analysis (AS 3) and Statutory and Non Statutory Reports, Integrated Reporting and Sustainability Reporting

Learning Outcome: After the completion of this paper, the students will be able to prepare the end result of a business houses by preparation through financial statement analysis and reporting.

Text Books Recommended

1. Financial Statement Analysis and Reporting, S Swain/ B. Mishra, V.K. Global Pvt. Ltd., New Delhi.
2. Financial Statement Analysis and Reporting-Prashanth Athma-Himalaya Publishing House

Suggested Readings:

1. Financial Statement Analysis and Reporting. Gupta, Mehra Kalyani Publishers.
2. Narasimhan, M.S. : Financial Statement and Analysis, Cengage Learning
3. Foster, G.: Financial Statement Analysis, Englewood Cliffs, NJ, Prentice Hall.

4. Sahaf M.A – Management Accounting – Principles & Practice – Vikash Publication
5. Maheswari, S.N.: Management Accounting & Financial Control, New Delhi, Sultan Chand.
6. Foulke, R.A.: Practical Financial Statement Analysis, New York, McGraw-Hill.
7. Hendriksen, E.S.: Accounting Theory, New Delhi, Khosla Publishing House.
8. Porwal, L.S.: Accounting Theory – An Introduction, New Delhi, Tata-McGraw-Hill

DSE-2

Group B: Banking & Insurance

MERCHANT BANKING AND FINANCIAL SERVICES

Objectives:To enable the students to understand the basic knowledge about the financial services available in India.

Unit-I

Merchant Banking: Nature and scope of Merchant Banking - Regulation of Merchant Banking Activity - overview of current Indian Merchant Banking scene - structure of Merchant Banking industry - primary Markets in India and Abroad - professional Ethics and code of conduct - current Development

Unit-II

Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing

Unit-III

Factoring: concept, nature and scope of Factoring - Forms of Factoring - Factoring vis-à-vis Bills Discounting - Factoring vis-à-vis credit Insurance Factoring vis-à-vis Forfeiting-Evaluation of a Factor - Evaluation of Factoring - Factoring in India current Developments.

Unit-IV

Securitization / Mortgages: Meaning, nature and scope of securitization, securitization as a Funding Mechanism, securitization of Residential Real Estate - whole Loans - Mortgages - Graduated-payment. Depository: Meaning, Evolution, Merits and Demerits of Depository. Process of Dematerialization and Dematerialization, Brief description of NSDL and CDSL

Security Brokerage:

Meaning of Brokerage, types of brokers. Difference between broker and jobber,SEBI Regulations relating to brokerage business in India.

Learning Outcome: After the completion of this course, the student will be able to understand the structure and function of mercantile banking and various financial services available in the present business world.

Text Books Recommended

1. Machiraju, Indian Financial System, Vikas Publishing House, 2nd Edition, 2002.
2. Merchant banking and financial services, Gupta /Gupta, Kalyani Publishers, New delhi

Suggested Readings:

1. M.Y.Khan, Financial Services, Tata McGraw-Hill, 11th Edition, 2008
2. Gopal C.R – Management Financial Service – S.Chand
3. NaliniPravaTripathy, Financial Services, PHI Learning, 2008
4. J.C.Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi.
5. Varshney P.N. & Mittal D.K., Indian Financial System, Sultan Chand & Sons, New Delhi.
6. Sasidharan, Financial Services and System, Tata Mcgraw Hill, New Delhi, 1st Edition, 2008.
7. Website of SEBI.
8. Merchant Banking and Financial Services-Sharma M--Himalaya Publishing House
9. Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 2

Group – C: Management

International Business

Objective: The objective of the course is to familiarize the students with the concepts, importanceand dynamics of international business and India's involvement with global business. The coursealso seeks to provide theoretical foundations of international business to the extent these arerelevant to the global business operations and developments.

Unit I: Introduction to International Business

a. Introduction to International Business: Globalization and its importance in worldeconomy; Impact of globalization; International business vs. domestic business:Complexities of international business; Modes of entry into international business
b. International Business Environment: National and foreign environments and theircomponents - economic, cultural and political-legal environments,
Issues in International Trade

Unit –II Theories of International Trade and International Organizations

a. Theories of International Trade – an overview (Classical Theories, Product Life Cycletheory, Theory of National Competitive Advantage); Commercial Policy Instruments - tariff and non-tariff measures – difference in Impact on trade, types of tariff and non tariffbarriers (Subsidy, Quota and Embargo in detail) ; Balance of payment account and itscomponents.
b. International Organizations and Arrangements: WTO – Its objectives, principles, organizational structure and functioning; An overview of other organizations – UNCTAD,;Commodity and other trading agreements (OPEC).

Unit –III International Financial Environment

a. Regional Economic Co-operation: Forms of regional groupings; Integration efforts among in Europe, North America and Asia (NAFTA, EU , ASEAN and SAARC) .
b. International Financial Environment: International financial system and institutions (IMF and World Bank – Objectives and Functions) ; Foreign exchange markets and riskmanagement; Foreign investments - types and flows; Foreign investment in Indianperspective

Unit –IV Foreign Trade Promotion and Financing of foreign trade
a. Foreign Trade Promotion Measures and Organizations in India; Special economic zones(SEZs) and export oriented units (EOUs), ; Measures for promoting foreign investmentsinto and from India; Indian joint ventures and acquisitions abroad.
b. Financing of foreign trade and payment terms – sources of trade finance (Banks, factoring, forfaiting, Banker's Acceptance and Corporate Guarantee) and forms of payment (Cash in advance, Letter of Credit, Documentary Collection, Open Account)

Text Books Recommended

1. Daniels John, D. Lee H. Radenbaugh and David P. Sullivan. International Business.
2. Pearson Education
3. Cherunilam, Francis. International Business: Text and Cases. PHI Learning

Suggested Readings:

1. Charles W.L. Hill and Arun Kumar Jain, International Business. New Delhi: McGraw Hill
    a. Education
2. Johnson, Derbe., and Colin Turner. International Business - Themes & Issues in the Modern
3. Global Economy. London: Roultedge.
4. Michael R. Czinkota. et al. International Business. Fortforth: The Dryden Press.
5. Peng and Srivastav, Global Business, Cengage Learning
6. Subba Rao P – International Business-Himalaya Publishing House
7. JOSHI INTERNATIONAL BUSINESS SITKIN INTERNATIONAL BUSINESS, Oxford University Press.

DSE – 3

Elective – III (Any one of the following Groups)

Group – A: Accounting & Finance

Fundamentals of Corporate Tax Planning

Objective: To provide a conceptual idea about the various provisions of tax planning related to corporate sector.

Contents

Unit-I:

Corporate Tax in India–Concept of Tax planning, Tax management, Tax avoidance, Tax evasion, Assessment year and Financial Year

Residential status of corporate and its incidence of tax, Minimum Alternate Tax, Calculation of Tax Liability.

Unit-II:

Carryforward and set-off of losses and unabsorbed depreciation (headwise)

Unit-III:

Tax Planning with reference to Depreciation, Capital Gain and Scientific Research

Unit-IV:

Corporate Tax returns–Assessment, Return Filing, Penal provision, Double taxation Relief

Learning outcome: After completion of this paper, students will be able to help tax consultants in tax planning, assessment and filing income tax returns of corporate sector, thereby they can get themselves self-employed.

Text Books Recommended

1. Bhagabati Prasad, Direct Tax Laws & Practices
2. Corporate Tax Planning, V.K. Global Publications
3.

Suggested Readings

1. Singhania V.K. Direct Taxes: Law & Practices, Taxmann Publication.
2. Corporate Tax Planning, Kalyani Publishers

DSE – 3

Group B: Banking & Insurance

Fundamentals of Investment

Objective: To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Contents

Unit-I:

The Investment Environment- The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.

Investor Protection

Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism.

Unit-II:

Fixed Income Securities- Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating

Unit-III:

Approaches to Equity Analysis: Introductions to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalization models, and price-earnings multiple approach to equity valuation.

Unit-IV:

Portfolio Analysis and Financial Derivatives:(a) Portfolio and Diversification, Portfolio Risk and Return. (b) Mutual Funds. (c) Introduction to Financial Derivatives, Financial Derivatives Markets in India.

Learning outcome: After completion of this paper, this paper will educate the students about various aspect of investment in detail along with understandability of stock market operation, focusing on need for common investor protection.

Text Books Recommended

1. Bhalla – Fundamentals of Investment – S.Chand
2. Rustogi, R.P., Fundamentals of Investment, Sultan Chand & Sons, New Delhi.

Suggested Readings

1. Pandian P. – Security Analysis & Portfolio Management – Vikash Publication
2. Jones, C.P., "Investments Analysis and Management", Wiley, 8th ed.
3. Prasanna, Chandra., "Investment Analysis and Portfolio Management", Tata McGraw Hill.
4. Vohra, N.D., and B.R. Bagri, "Futures and Options", McGraw Hill Publishing
5. Mayo, An Introduction to Investment,Cengage Learning.
6. Fundamentals of Investment, Sashi Gupta, Kalyani Publishers, New Delhi,
7. Fundamentals of Investment, Vandana Dangi, V.K. Globa. Pub. Pvt. Ltd. New delhi.

DSE-3

Group – C: Management

Consumer Affairs & Customer Care

Objective: This paper seeks to familiarise the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Unit I: Conceptual Framework

Consumer and Markets: Concept of Consumer, Nature of markets, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP) and Local Taxes, Fair Price, labeling and packaging Experiencing and Voicing Dissatisfaction: Consumer Satisfaction/dissatisfaction-Grievances- complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Internal and External Complaint handling: Corporate Redress Systems and Public Redress Systems

Unit II: The Consumer Protection Act, 1986 (CPA)

Objectives and Basic Concepts: Consumer, goods, service, defect in goods, deficiency in service, spurious goods and services, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels, Basic Consumer Rights; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA.

RTI Act

Unit III: Grievance Redress Mechanism under the Consumer Protection Act, 1986:

Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy to be provided; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Unit IV: Industry Regulators and Consumer Complaint Redress Mechanism

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI (an overview)
v. Electricity Supply: Electricity Regulatory commission
vi. Advertising: ASCI

Text Books Recommended

1. The Consumer Protection Act, 1986
2. Bhatta KG- Customer Care Management-Himalaya Publishing House

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. Consumer Affairs"
2. (2007) Delhi University Publication. 334 pp.
3. Aggarwal, V. K. (2003). Consumer Protection: Law and Practice. 5th ed. Bharat Law
4. House, Delhi, or latest edition.
5. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
6. Nader, Ralph (1973). The Consumer and Corporate Accountability. USA, Harcourt Brace
7. Jovanovich, Inc.
8. Sharma, Deepa (2011).Consumer Protection and Grievance-Redress in India: A Study of
9. Insurance Industry (LAP LAMBERT Academic Publishing GmbH & Co.KG,
10. Saarbrucken, Germany. 263 pp.
11. Empowering Consumers e-book, www.consumeraffairs.nic.in
12. ebook, www.bis.org
13. Nair Suja – Consumer Behaviour – Himalaya Publishing House

DSE-4

Semester – VI

Business Research Methods and Project Work

Objective: This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

Section A: Business Research Methods 50 Marks

Unit-I

Introduction: Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

Unit-II

Research Process: An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method Existing Data Based Research, Longitudinal Studies, Panel Studies

Unit-III

Measurement: Definition; Designing and writing items; Uni-dimensional and Multi-dimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurst one, Likert and Semantic Differential scaling, Paired Comparison; Sampling –Steps, Types, Sample Size Decision; Secondary data sources

Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests; testing the assumptions of Classical Normal Linear Regression.

Section B – Project Report Marks (30 + 20)

Unit-IV Report Preparation: Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification

Note:

1. There shall be a written examination of 50% Marks on the basis of Unit I to III.
2. The student will write a project report under the supervision of a faculty member assigned by the college/institution based on field work. The Project Report carries 50% Marks and will be evaluated by University appointed examiners.

Learning Outcome: After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.

Text Books Recommended

Mishra Business Research Methods , Oxford University Press.
Business Research Methods and Project work, Priyaranjan Dash, VrindaPublications (P)

Ltd

Suggested Readings:

1. Business Research methods, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd., New Delhi.
2. Upagade& Shende – Research Methodology – S. Chand
3. A.K.P.C. Swain, Business Research methods and Project work, Kalyani Publishers, New Delhi
4. Dangi, H.K. Business Research methods, Cengage Learning
5. Chawla Deepak – Research Methodology – Vikash Publication

(GE – 1)

MICRO ECONOMICS

Objective: Objective of the course is to acquaint the students with the concepts of micro-economics dealing with consumer behavior. The course also makes the student understand the supply side of the market through the production and cost behavior of firms.

Unit: I Demand and Consumer behaviour

Concept of demand: demand function, law of demand, derivation of individual and market demand curves, shifting of the demand curve, elasticity of demand, Consumer behavior, Marshallian utility approach and Indifference Curve approach; utility maximization conditions . Income-Consumption Curve (ICC) and Price-Consumption Curve (PCC)

Unit: II Production and Cost

Production function: Short-run and Long-run; Total Product, Average Product and Marginal Product, Law of returns to a variable factor, Law of Returns to Scale; Concepts of Iso-quant and iso-cost line;
Cost: Accounting and Economic Costs; Social and Private Costs; Short-run and Long-run Costs; Relation between Average and Marginal

Unit: III Perfect Competition

Concept of Perfectly Competitive market: Assumptions, Profit maximization conditions; Related concepts of Total Revenue, Average Revenue and Marginal Revenue, Short-run and Long- run equilibrium of a firm; determination of short-run supply curve of a firm, measuring producer surplus under perfect competition

Unit: IV Imperfect Competition

Monopoly

Concept of Monopoly: Sources of monopoly power; Short-run and Long-run equilibrium of a monopoly firm; Price discrimination; Social Cost of Monopoly (concept only).

Monopolistic Competition

Concept of Imperfectly Competitive market; Monopolistic Competition: Features and examples; Oligopoly: Non-Collusive Oligopoly: Sweezy's Kinked demand Curve Model, Collusive Oligopoly: Cartel (concept with example)

Learning Outcomes: The students would be able to apply tools of consumer behaviour and firm theory to business situations.

Text Books Recommended

1. Micro Economics-K C Dash- Himalaya Publishing House
2. Ahuja, H.L, Micro Economics, S.Chand

Suggested Readings:

1. Mehta P.K, Singh M. – Micro Economics – Taxmann Publication
2. Micro Economics-T.R. Jain , B.D. Majhi, V.K. Global
3. Browining, E.K. and J.M. Browning; Microeconomic Theory and Applications,
4. Kalyani Publishers, New Delhi.
5. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press
6. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning
7. Dwivedi, D.N. Micro Economics, Vikash Publication
8. Pindyck, R.S., D. L. Rubinfeld and P. L. Mehta; Microeconomics, Pearson Education.
9. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning
10. Maddala G.S.and E.Miller; Microeconomics: Theory and Applications,
11. MCGraw-Hill International.

(GE-2)

MACRO & INDIAN ECONOMY

Objectives: The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.

Contents:

Unit I Introduction to Macro Economics

Introduction: Meaning and definition of Microeconomics and macroeconomics, Difference between Microeconomics and macroeconomics, macro-economic goals, components of Macroeconomics, Economic Systems: Mixed economy, Socialism economy, Capitalism economy and Islamic economy (only meaning and characteristics)

Unit II National Income Accounting

Definition of National Income, Concepts of National Income,GDP and GNP, Methods of Measuring National Income, Uses of National Income, Difficulties in calculating National Income, Real Income, Per Capita Income and Growth Rate

Unit:III National Income Equilibrium

I Concepts of Equilibrium, Consumptions & Savings, Investment Theory, Government Sector, Foreign Sector, Determination of Equilibrium, Multiplier Concept, Inflationary Gap and Deflationary Gap, Summary of Two-, Three- and Four-sector Economies

Unit:IV Role of Government

Economic functions of Government, Types of Budget, Government Revenue, Government Expenditure, Public Debt, and Government Policy

Macroeconomic Problems

Introduction, Business cycle, Unemployment, Inflation, Deflation, Depression, RBI and monetary policy

Learning Outcomes: Students would be able to apply the modern tools of macro-economic analysis so as to minimize the adverse impact of macro-economic factors on business.

Text Books Recommended

1. Macro & Indian Economy, M. Treheran, T Treheran, V.K. Global publishing Pvt. Ltd., New Delhi
2. Ahuja H.L – Macro Economics – S.Chand

Suggested Readings

1. Mankiw, N. Gregory. Principles Macroeconomics.Cengage Learning
2. Macro and Indian economy, P.K. Dhar, Kalyani Publishers
3. Macro and Indian Economy-V K Puri- Himalaya Publishing House
4. Dornbusch, Rudiger., Stanley. Fischer and Richard Startz, Macroeconomics. Irwin/McGraw-Hill.
5. Vaish – Macro Economics – Vikash Publication
6. Macroeconomics & Indian Economy: Bhattacharyya, Oxford University Press.

(GE-3)

Business Statistics

Objective: The objective of this course is to familiarize students with the basic statistical toolsused for managerial decision-making.

Unit I:

Statistical Data and Descriptive Statistics (With the use of Excel and other statistical software)

Nature and Classification of data: Univariate, Bivariate and multivariate data; time-series and cross-sectional data
Measures of Central Tendency
a. Mathematical averages including arithmetic mean, geometric mean and harmonic mean. Properties and applications.
b. Positional Averages
Mode and Median and other partition values including quartiles, deciles, and percentiles

Unit II:

Measures of Variation (With the use of Excel and other statistical software)

Absolute and relative, Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis

Unit III:

Simple Correlation and Regression Analysis (With the use of Excel and other latest software)

Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (proofs not required). Correlation and Probable error; Rank Correlation

Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate

Unit IV:

Index Numbers (With the use of Excel and other latest software)

Meaning and uses of index numbers: Construction of index numbers: fixed and chain base: univariate and composite. Aggregative and average of relatives – simple and weighted

Tests of adequacy of index numbers, Base shifting, splicing and deflating. Problems in the construction of index numbers. Construction of consumer price indices, important share price indices

Time Series Analysis (With the use of Excel and other latest software)

Components of time series, Additive and multiplicative models Trend analysis, Fitting of trend line using principle of least squares – linear, second degree parabola and exponential, Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages Seasonal variations- Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices

Learning Outcomes: Students would be armed with the knowledge of using different statistical tools very much required in the decision making process in any business as well as business research.

Text Books Recommended

1. Gupta, S.P., and Archana Gupta. Statistical Methods. Sultan Chand and Sons, New Delhi.
2. Business Statistics - Levine and Viswanathan, Pearson Publication

Suggested Readings:

1. Business statistics, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd, New Delhi.
2. Patri and Patri, Business statistics , Kalyani Publishers New Delhi.
3. Keller G, and Arora H, BSTAT, Cengage Learning
4. Gupta, S.C. Fundamentals of Statistics. Himalaya Publishing House.
5. Business Statistics– S K Sahoo, P K Prusty, Vrinda Publications (P) Ltd
6. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press.
7. Sharma J K, Fundamentals of Business Statistics – Vikash Publication
8. Vohra N. D., Business Statistics, McGraw Hill.

(GE-4)

Principles of Marketing

Objective: The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.

Contents:

Unit I: Introduction:

Nature, scope and importance of marketing; Selling vs Marketing; Marketing mix, Marketing environment: concept, importance, and components (Economic, Demographic, Technological, Natural, Socio-Cultural and Legal).

Consumer Behaviour and Market segmentation:

Consumer Behaviour: Nature and Importance, Factors influencing consumer buying behaviour. Market segmentation: concept, importance and bases; Product differentiation vs. market segmentation.

Unit II: Product:

Concept and importance, Product classifications; Concept of product mix; Branding, packaging and labeling; Product life-cycle; New Product Development Process

Unit III: Pricing, Distribution Channels and Physical Distribution

Pricing: Significance, Factors affecting price of a product, Pricing policies and strategies, Distribution Channels and Physical Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Factors affecting choice of distribution channel

Unit IV: Promotion and Recent developments in marketing:

Promotion: Nature and importance of promotion; Communication process; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics. Recent developments in marketing: Social Marketing, online marketing, direct marketing, services marketing, green marketing, Rural marketing; Consumerism

Learning outcome: After the completion of this paper, the students will able to identify marketing components and fit them in the value chain along with the various marketing strategies.

Text Books Recommended

1. Marketing Principles and Management-Sherleker and Pany-- Himalaya Publishing House
2. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and AhsanUlHaque. Principlesof Marketing. 13th edition. Pearson Education.

Suggested Readings:

1. Principles of Marketing, Bajaj, Kaur, Kalyani Publishers, New Delhi.
2. Principles of Marketing , R.K. Mittal , A. Sharma, V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University Press.
4. Lamb, C. W., Hair, J.F. and Sharma, D. MKTG, Cengage Learning
5. Principles of Marketing M K Nabi, K C Raut, Vrinda Publications (P) Ltd
6. Arun Kumar – Marketing management – Vikash Publication
7. Rudani R.B – Basics of Marketing Management – S. Chand
8. Majaro, Simon. The Essence of Marketing. Prentice Hall, New Delhi.
9. Zikmund William G. and Michael D'Amico. Marketing; Creating and Keeping Customers in an E-Commerce World. Thomson Learning.
10. Chhabra, T.N., and S. K. Grover. Marketing Management. Fourth Edition. DhanpatRai& Company.

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SEC 2 Paers for both B.COM Pass and Honours

(SEC-1)

E-Commerce

Objectives: To enable the student to become familiar with the mechanism for conducting business transactions through electronic means.

Unit I:

Introduction E-Commerce-meaning, nature, concepts, types; e-commerce business models B2B [concept, major activities, types of B to B market (independent, buyer oriented, supplier oriented, e- market place)], B2C [portals, e-tailer, content provider, transaction broker, real life examples of B2C], C2C, C2B, etc.; forces behind e-commerce, e-Governance [meaning, types, significance, real life examples].

Unit II:

E-CRM and SCM E-CRM-definition, features, goals of E-CRM business framework, phases of E-CRM, types of E-CRM, Functional components of E-CRM, strategies for E-CRM solutions; SCM-definition, features, types of supply chain.

Unit III:

Digital Payment Methods of e-payments [Debit Card, Credit Card, Smart Cards, e-Money, NEFT, RTGS], electronic or digital wallet, digital signature (procedures, working and legal provisions), payment gateways [Core Banking Solution or CBS, Mobile Payment, UPI, NCPI, International Payments], Online banking [meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting], risks involved in e-payments.

Unit IV: ERP & New Trends in E-Commerce

ERP

Definition, features, major characteristics, levels of ERP, benefits of ERP, enterprise potential of ERP, modules of ERP, phases of ERP implementation, limitations of ERP.

New Trends in E-Commerce

Social Commerce-concept, definition, features; Digital Marketing-definition, objectives, methods, limitations; Advertisement in Social Media-objectives, advantages and disadvantages, procedures

Learning Outcomes: This paper would enhance the technical skills of the students to get into the business ventures using electronic means thereby providing the opportunity to gain access to a larger customer base.

Text Books Recommended

1. E Commerce-D Mohapatra, Das and K M Das- Himalaya Publishing House
2. Bhaskar, B., E–Commerce, McGraw Hill

Suggested Readings:

1. E-Commerce ,Kakkar, Sendhu, Kalyani Publishers ,New delhi
2. E-Commerce, S.K. Dey/ M. Behera ,V.K. Global Pub. Pvt. Ltd, New Delhi.
3. Schneider G., E-Business, Cengage
4. E-Commerce and Business Communication: Datta &Somani, Oxford University Press.
5. E-Commerce– A K Jha, Vrinda Publications (P) Ltd
6. Pandey U.S – E.Commerce& Mobile Commerce Technology – S. Chand
7. P. T. Joseph, E-Commerce: An Indian Perspective, PHI Learning
8. Laudon, E-Commerce, Pearson Education India

Entrepreneurship Development and Business Ethics (SEC-2)

Objective: The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior for effectiveness at work and in life.

Contents:

Unit-I: Introduction:

Meaning, elements, determinants and importance of entrepreneurship and creative behavior; Entrepreneurship and Micro, Small and Medium Enterprises, Role of family business in India; The contemporary role models in Indian business: their values, business philosophy and behavioural orientations; Conflict in family business and its resolution

Unit-II: **Sources of business ideas**

Sources of business ideas and tests of feasibility: Significance of writing the business plan/ project proposal; Contents of business plan/ project proposal; Designing business processes, location, layout, operation, planning & control; preparation of project report

Unit-III: Public and private system of stimulation

Public and private system of stimulation: support and sustainability of entrepreneurship. Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of industries/entrepreneur's associations and self-help groups, The concept, role and functions of business incubators, angel investors, venture capital and private equity fund

Mobilizing Resources

Mobilizing Resources: Mobilizing resources for start-up, Accommodation and utilities; Preliminary contracts with the vendors, suppliers, bankers, principal customers; Basic start-up problems

Unit IV: Business Ethics

Meaning - Scope – Types of Ethics – features – Factors influencing Business Ethics – significance of Business Ethics - Arguments for and against business ethics- Basics of business ethics - Corporate Social Responsibility and Business Ethics

Principles of Business Ethics Introduction – Meaning – Element – Ethics, Morale, Business ethics, Ethical dilemma [basic idea, features and significance of each of element]

Text Books Recommended

1. Entrepreneurship Development and Business Ethics: Mukherjee & Roy, Oxford University Press.

2. Entrepreneurship Development and Business Ethics-Desai V- Himalaya Publishing House- Himalaya Publishing House

Suggested Readings:

1. Kuratko and Rao, Entrepreneurship: A South Asian Perspective; Ferrell, Fraedrich, Farrell, Business Ethics, Cengage Learning

2. Ferrell, Fraedrich, Farrell, Business Ethics, Cengage

3. Entrepreneurship, R. Saibaba, Kalyani Publishers, New Delhi.

4. Entrepreneurship Develeopment and Business Ethics, Sanjeet Sharma – V.K. Global Pvt. Ltd., New Delhi.

5. SS Khanka, Entrepreneurial Development, S. Chand & Co, Delhi.
6. Rao, V.S.P – Business Entrepreneurship & Management – Vikash Publication
7. Desai, Vasant. Dynamics of Entrepreneurial Development and Management. Mumbai, Himalaya Publishing House.
8. Plsek, Paul E. Creativity, Innovation and Quality(Eastern Economic Edition), New Delhi:Prentice-Hall of India. ISBN-81-203-1690-8.
9. Singh, Nagendra P. Emerging Trends in Entrepreneurship Development. New Delhi: ASEED.
10. Entrepreneurship Development and Business Ethics - M K Nabi, K C Rout, Vrinda Publications (P) Ltd

Training Requirement for Subjects(7 Days each)

1. GST and Financial Markets and E-Commerce

2. IFRS, IND AS and Computerised Accounting

3. Data Management and Analytics, Business Mathematics (Only Derivatives and Integration)

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN PHYSICS

(Bachelor of Science Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course structure of UG Physics Honors

SEMESTER	COURSE OPTED	COURSE NAME	Credits
I 4 Papers (400 Marks)	Ability Enhancement Compulsory Course-I	AECC-1	4
	Core course-I	Mathematical Physics-I	4
	Core Course-I Practical/Tutorial	Mathematical Physics-I Lab	2
	Core course-II	Mechanics	4
	Core Course-II Practical/Tutorial	Mechanics Lab	2
	Generic Elective -1	GE-1	4/5
	Generic Elective -1	Practical/Tutorial	2/1
II 4 Papers (400 Marks)	Ability Enhancement Compulsory Course-II	AECC-II	4
	Core course-III	Electricity and Magnetism	4
	Core Course-III Practical/Tutorial	Electricity and Magnetism Lab	2
	Core course-IV	Waves and Optics	4
	Core Course-IV Practical/Tutorial	Waves and Optics Lab	2
	Generic Elective -2	GE-2	4/5
	Generic Elective -2	Practical/Tutorial	2/1
III 5 Papers (500 Marks)	Core course-V	Mathematical Physics-II	4
	Core Course-V Practical/Tutorial	Mathematical Physics-II Lab	2
	Core course-VI	Thermal Physics	4
	Core Course-VI Practical/Tutorial	Thermal Physics Lab	2
	Core course-VII	Analog Systems and Applications	4
	Core Course-VII Practical/Tutorial	Analog Systems & Applications Lab	2
	Skill Enhancement CompulsoryCourse -1	SECC-1	4
	Generic Elective -3	GE-3	4/5
	Generic Elective -3	Practical/Tutorial	2/1

IV 5 Papers (500 Marks)	Core course-VIII	Mathematical Physics III	4
	Core Course-VII Practical/Tutorial	Mathematical Physics-III Lab	2
	Core course-IX	Elements of Modern Physics	4
	Core Course-IX Practical/Tutorial	Elements of Modern Physics Lab	2
	Core course-X	Digital Systems and Applications	4
	Core Course-XPractical/Tutorial	Digital Systems & Applications Lab	2
	Skill Enhancement Compulsory Course -2	SECC -2	4
	Generic Elective -4	GE-4	4/5
	Generic Elective -4	Practical/Tutorial	2/1
V 4 Papers (400 Marks)	Core course-XI	Quantum Mechanics & Applications	4
	Core Course-XI Practical/Tutorial	Quantum Mechanics Lab	2
	Core course-XII	Solid State Physics	4
	Core Course-XII Practical/Tutorial	Solid State Physics Lab	2
	Discipline Specific Elective -1	DSE-1	4/5
	Discipline Specific Elective -1	Practical/Tutorial	2/1
	Discipline Specific Elective -2	DSE-2	4/5
	Discipline Specific Elective- 2	Practical/Tutorial	2/1
VI 4 Papers (400 Marks)	Core course-XIII	Electro-magnetic Theory	4
	Core Course-XIII Practical/Tutorial	Electro-magnetic Theory Lab	2
	Core course-XIV	Statistical Mechanics	4
	Core Course-XIV Practical/Tutorial	Statistical Mechanics Lab	2
	Discipline Specific Elective4	DSE-4	4/5
	Discipline Specific Elective -4	Practical/Tutorial	2/1
	Or Discipline Specific Elective-4	(Eligible Students may do a Project in DSE-IV)	6
		Total Credits	148

Generic Elective Papers (GE) (Minor-Physics) for other Departments/Disciplines: (Credit: 06 each)

Depending on their requirements, Universities may choose 2 (two)GE subjects with 2 papers from each subject or only one GE subject with 4 papers from it.

Two papers GE subject will be :

1. **GE-I** (Mechanics & Properties of matter, Oscillation & Waves, Thermal Physics, Electricity and Magnetism & Electronics) + Lab
2. **GE-II** (Optics, Special Theory of Relativity, Atomic Physics, Quantum Mechanics and Nuclear Physics)+ Lab

A student who chooses to read only Physics subject GE will take 4 DSC papers of the Pass Course as below

1.**GE-I** as **DSC-1**(Mechanics)+ Lab

2.**GE-II** as **DSC-2**,(Electricity, Magnetism & Emt))+ Lab

3. **GE-III** as **DSC-3**,(Thermal Physics & Statiscal Mechanics))+ Lab

4. **GE-IV** as **DSC-4** (Waves And Optics))+ Lab

(GE-I same paper as DSC-1,GE-II same as DSC-2 ,GE-III same as DSC-3,GE-IV same as DSC-4)

PHYSICS

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (out of the 5 papers suggested)

Generic Elective for Non Physics students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper –

For practical paper: Midterm : 15 marks, End term : 60 marks, Practical- 25 marks

For non practical paper: Midterm : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper –

Practical paper-40 hours theory classes + 20 hours Practical classes

Non Practical paper-50 hours theory classes + 10 hours tutorial

CORE PAPER-1

MATHEMATICAL PHYSICS-I

The emphasis of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen andunseen.

UNIT-I

Calculus -I: Plotting of functions, Intuitive ideas of continuous, differentiable functions and plotting of curves, Approximation: Taylor and binomial series (statements only), First Order Differential Equations and Integrating Factor, Second Order Differential equations: Homogeneous Equations with constant coefficients, Wronskian and general solution, Statement of existence and UniquenessTheoremforInitialValueProblems,ParticularIntegral.

UNIT-II

Calculus-II: Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration, Constrained Maximization using Lagrange Multipliers,

Vector algebra: Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations, Vector product, Scalar tripleproductandtheirinterpretationintermsofareaandvolumerespectively, Scalar and Vectorfields.

UNIT-III

Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates, Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems, Comparison of velocity and accelerationincylindricalandsphericalcoordinatesystem

Dirac Delta function and its properties: Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular Function, Properties of Dirac delta function.

UNIT-IV

Vector Differentiation: Directional derivatives and normal derivative, Gradientofascalarfieldanditsgeometricalinterpretation,Divergenceandcurlof a vector field, Del and Laplacian operators, Vectoridentities

Vector Integration: Ordinary Integrals of Vectors, Multiple integrals, Jacobian, Notion of infinitesimal line, surface and volume elements, Line, surface and volume integrals of Vector fields, Flux of a vector field, Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs)

TextBooks:

1. MathematicalMethodsforPhysicists,G.B.Arfken,H.J.Weber,F.E.Harris (2013,7th Edn.,Elsevier)
2. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India)

Reference books:

1. Mathematical Physics C. Harper (Prentice Hall India)

2. Complex Variable: Schaum's Outlines Series M. Spiegel (2nd Edition , Mc-Graw Hill Education)
3. Complex variables and applications, J. W. Brown and R.V.Churchill
   Mathematical Physics, Satya Prakash (SultanChand)
4. Mathematical Physics, B. D. Gupta (4th edition, Vikas Publication)
   Mathematical Physics and Special Relativity, M. Das, P.K. Jena and B.K.Dash (Srikrishna Prakashan)
5. Mathematical Physics–H.K.Dass, Dr. Rama Verma (S. ChandPublishing)

CORE PAPER I LAB:

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- Highlights the use of computational methods to solve physicalproblems
- Thecoursewillconsistoflectures(boththeoryandpractical)intheLab
- Evaluation done not on the programming but on the basis of formulating theproblem
- Aim at teaching students to construct the computational problem to be solved
- StudentscanuseanyoneoperatingsystemLinuxorMicrosoftWindows

Introduction and Overview: Computer architecture and organization, memory and Input/output devices.

Basics of scientific computing: Binary and decimal arithmetic, Floating pointnumbers,algorithms,Sequence,SelectionandRepetition,singleanddouble precision arithmetic, underflow and overflow emphasize the importance of makingequationsintermsofdimensionlessvariables,Iterativemethods. Algorithm

Errors and error Analysis: Truncation and round off errors, Absolute and relative errors, Floating point computations. Systematic and Random Errors, Propagation of Errors, Normal Law of Errors, Standard and Probable Error.

Review of C and C++ Programming: Introduction to Programming, constants,

variables and Fundamentals data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data format- ting, Control statements (decision making and looping statements) (If Statement,IfelseStatement,NestedIfstructure,ElseIfStatement,Ternaryoperator, Goto Statement. Switch Statement. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops), Arrays (1D and 2D) and strings, user defined functions,Structures and Unions, Idea of classes andobjects

Programs: Sum and average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search

Random number generation: Area of circle, area of square, volume of sphere, value ofπ.

Reference Books:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.
2. Schaum'sOutlineofProgrammingwithC++.J.Hubbard,2000,McGraw–HillPub.
3. NumericalRecipesinC:TheArtofScientificComputing,W.H.Pressetal, 3rd Edn. 2007, Cambridge UniversityPress.
4. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning.
5. Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn. , 2007 , Wiley India Edition.
6. Numerical Methods for Scientists and Engineers, R.W. Hamming, 1973, Courier DoverPub.
7. AnIntroductiontocomputationalPhysics,T.Pang,2ndEdn., 2006,Cam- bridge Univ.Press.

CORE PAPER-II
MECHANICS

UNIT-I

Rotational Dynamics: Centre of Mass, Motion of CoM, Centre of Mass and Laboratory frames, Angular momentum of a particle and system of particles, Principle of conservation of angular momentum, Rotation about a fixed axis, Moment of Inertia, Perpendicular and Parallel Axis Theorems, Routh Rule, Calculation of moment of inertia for cylindrical and spherical bodies, Kinetic energy of rotation, Eulers Equations of Rigid Body motion, Motion involving both translation and rotation. Moment of Inertia of a Flywheel.

Non-Inertial Systems: Non-inertial frames and fictitious forces, Uniformly rotating frame, Laws of Physics in rotating coordinate systems, Centrifugal force, Coriolis force and itsapplications.

UNIT-II Elasticity: Relation between Elastic constants, Twisting torque on a Cylinder or Wire, Bending of beams, External bending moment, Flexural rigidity, Single and double cantilever

Fluid Motion: Kinematics of Moving Fluids: Poiseuilles Equation for Flow of a Liquid through a Capillary Tube, Surface tension, Gravity waves andripple

Viscocity: Poiseuilles Equation for Flow of a Liquid with corrections.

UNIT-IIIGravitation and Central Force Motion: Law of gravitation, Gravitational potential energy, Inertial and gravitational mass, Potential and field due to spherical shell and solid sphere, Motion of a particle under a central force field, Two-body problem and its reduction to one-body problem and its solution, Differential Equation of motion with central force and its solution, The first Integrals (two), Concept of power Law Potentials, Keplers Laws of Planetary motion, Satellites:. Geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS), Physiological effects on astronauts.

UNIT-IV

Oscillations: Simple Harmonic Oscillations. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Equation of motion and solution(,cases of oscillatory, critically damped and overdamped) Forced oscillations: Transient and steady states; Resonance, sharpness of resonance;powerdissipationandQualityFactor,BarPendulum,KatersPendulum

Special Theory of Relativity: Michelson-Morley Experiment and its out- come, Postulates of Special Theory of Relativity, Lorentz Transformations,Simultaneityandorderofevents,Lorentzcontraction,Timedilation, Relativistic transformation of velocity, Frequency and wave number, Relativistic addition of velocities, Variation of mass with velocity, Massless Particles,Mass-energy Equivalence, Relativistic Doppler effect, Relativistic Kinematics,Transformation of Energy andMomentum.

Text Books:

1. Mechanics, D.S. Mathur (S. Chand Publishing)
2. Introduction to Special Relativity, R. Resnick (John Wiley)

Reference Books:

1. Introduction to Mechanics Daniel Klapnner and Robert Kolenkow, McgrawHill.
2. Mechanics by K.R Simon
3. Mechanics, Berkeley Physics, vol.1, C.Kittel, W. Knight, etal (Tata McGraw-Hill)
4. Physics, Resnick, Halliday and Walker (8/e.2008,Wiley)
5. Theoretical Mechanics-M.R. Spiegel (Tata McGrawHill).
6. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands (Pearson)
7. Mechanics-M.Das, P.K.Jena and R.N. Mishra (SrikrishnaPublications)

CORE PAPER-1I LAB

(minimum 5 experiments are to be done):

1. To study surface tension by capillary rise method
2. To determine the height of a building using a Sextant.
3. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuilles method).
6. To determine the Modulus of Rigidity of a Wire by Maxwellsneedle.
7. To determine the value of g using BarPendulum.
8. To determine the value of g using KatersPendulum

Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, AsiaPublishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash and Ramakrishna, 11thEdn, 2011, Kitab Mahal

CORE PAPER-III

ELECTRICITY AND MAGNETISM

UNIT-I

Electric Field and Electric Potential

Electric field: Electric field lines, Electric flux, Gauss Law with applications to charge distributions with spherical, cylindrical and planar symmetry, Conservative nature of Electrostatic Field. Electrostatic Potential, Potential and Electric Field of a dipole, Force and Torque on a dipole, Potential calculation indifferentsimplecases,LaplacesandPoissonequations,TheUniquenessTheorem,

Method of Images and its application to (1) Plane Infinite Sheet and (2) Sphere.

Electrostaticenergyofsystemofcharges,Electrostaticenergyofacharged sphere,ConductorsinanelectrostaticField,Surfacechargeandforceonaconductor.

UNIT-II

Magnetic Field: Magnetic Force, Lorentz Force, Biot Savarts Law, Cur- rent Loop as a Magnetic Dipole and its Dipole Moment (analogy withElectric Dipole), Amperes Circuital Law and its application to (1) Solenoid (2)Toroid
(3) Helmhotz coil, Properties of B:curl and divergence, Vector Potential, Ballistic Galvanometer: Torque on a current Loop, Current and Charge Sensitivity, Electromagnetic damping, Logarithmic damping, CDR.

UNIT-III

Dielectric Properties of Matter: Electric Field in matter, Polarization, PolarizationCharges,ElectricalSusceptibilityandDielectricConstant,Capacitor (parallelplate,spherical,cylindrical)filledwithdielectric,Displacementvector D, Relations between E, P and D, Gauss Law in dielectrics. Magnetic Properties of Matter: Magnetization vector (M), Magnetic Intensity (H), Magnetic Susceptibility and permeability, Relation between B, H, M, Ferromagnetism, B-H curve andhysteresis.
Electromagnetic Induction: Faradays Law, Lenzs Law, Self Inductance and Mutual Inductance, Reciprocity Theorem, Energy stored in a Magnetic Field, Introduction to MaxwellsEquations

UNIT-IV

Electrical Circuits: AC Circuits: Kirchhoffs laws for AC circuits, Complex Reactance and Impedance, Series LCR Circuit: (1) Resonance (2) Power Dissipation (3) Quality Factor, (4) Band Width, Parallel LCR Circuit.

Network theorems: Ideal Constant-voltage and Constant-current Sources,

Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem, Applications to DC circuits. Transient Currents Growth and decay of current in RC and LR circuits.

Text Books:

1. Introduction to Electrodynamics – D.J. Griffiths (Pearson, 4th edition, 2015)
2. Foundations of Electromagnetic Theory-Ritz and Milford (Pearson)

Reference Books:

1. Classical Electrodynamics, J. D. Jackson (Wiley).
2. Electricity and Magnetism D. C. Tayal (Himalaya Publishing house)
3. Electricity, Magnetism and Electromagnetic Theory- S. Mahajan and Choudhury (Tata McGraw Hill)
4. Feynman Lectures Vol.2, R. P. Feynman, R. B. Leighton, M. Sands (Pear- son)
5. Electricity and Magnetism, J. H. Fewkes and J. Yarwood. Vol. I (Oxford Univ. Press)

CORE PAPER-II1

LAB (minimum of 6 experiments are to be done)

Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, c)DC Current, (d) Capacitances, and (e) Checking electricalfuses.

1. To study the characteristics of a series RCCircuit.
2. To determine an unknown Low Resistance using Potentiometer.
3. To determine an unknown Low Resistance using Carey Fosters Bridge. To compare capacitances using DeSautysbridge.
4. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
5. To verify the Thevenin and Norton theorems.

6. To determine self inductance of a coil by Andersons bridge.
7. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
8. To study the response curve of a parallel LCR circuit and determine its (a) Antiresonance frequency and (b) Quality factor Q.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash and Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

CORE PAPER-1V: WAVES AND OPTICS

UNIT - I

Geometrical optics : Fermats principle, reflection and refraction at plane interface, Matrix formulation of geometrical Optics, Cardinal points and Cardinal planes of an optical system, Idea of dispersion, Application to thick Lens and thin Lens, Ramsden and Huygens eyepiece. Wave Optics : Electromagnetic nature of light. Definition and properties of wave front Huygens Principle. Temporal and SpatialCoherence.

UNIT - II

Wave Motion : Plane and Spherical Waves, Longitudinal and Transverse Waves, Plane Progressive (Traveling) Waves, Wave Equation, Particle and Wave Velocities, Differential Equation, Pressure of a Longitudinal Wave, Energy Trans- port, Intensity of Wave. Superposition of two perpendicular Harmonic Oscillations : Graphical and

Analytical Methods, Lissajous Figures (1:1 and 1:2) and theiruses,SuperpositionofNharmonicwaves.

UNIT- III

Interference : Division of amplitude and wave front, Youngs double slit experiment, Lloyds Mirror and Fresnels Bi-prism, Phase change on reflection: Stokes treatment, Interference in Thin Films: parallel and wedge-shaped films, Fringes of equal inclination (Haidinger Fringes), Fringes of equal thickness (Fizeau Fringes), Newtons Rings: Measurement of wavelength and refractive index. Interferometer : Michelsons Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility ofFringes, Fabry-Perot interferometer.

UNIT - IV

Fraunhofer diffraction: Single slit, Circular aperture, Resolving Power of a telescope, Double slit, Multiple slits, Diffraction grating, Resolving power of grating. Fresnel Diffraction: Fresnels Assumptions, Fresnels Half-Period Zones for Plane Wave, Explanation of Rectilinear Propagation of Light, Theory of a Zone Plate: Multiple Foci of a Zone Plate, Fresnels Integral, Fresnel diffraction patternofastraightedge,aslitandawire.

TextBooks:

1. AtextbookofOpticsN.SubrahmanyamandBrijLal(S.Chand Publishing)
2. Optics - Ajoy Ghatak (McGraw Hill)

Reference Books:

1. Optics-E.Hecht(Pearson)
2. FundamentalsofOptics-F.A.JenkinsandH.E.White(McGraw-Hill)
3. Geometrical and Physical Optics R.S. Longhurst (OrientBlackswan)
4. ThePhysicsofVibrationsandWaves-H.J.Pain(JohnWiley)
5. OpticsP.K.Chakrabarty

6. PrinciplesofOptics-MaxBornandEmilWolf(PergamonPress)
7. ThePhysicsofWavesandOscillations-N.K.Bajaj(McGrawHill)

CORE PAPER-IV LAB

(minimum 5 experiments are to be done)

1. Todeterminethefrequencyofanelectrictuningforkby Meldesexperiment and verify 2 Tlaw.
2. To plot the I-D curve and to determine the refractive index of a prism
3. To determine refractive index of the Material of a prism using sodium source.
4. . To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
5. To determine wavelength of sodium light using Newtons Rings.
6. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
7. To determine dispersive power and resolving power of a plane diffraction grating.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D. P. Khandelwal, 1985, Vani

CORE PAPER-V

MATHEMATICAL PHYSICS-II

Theemphasisofthecourseisonapplicationsinsolvingproblemsofinterest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Fourier Series-I: Periodic functions, Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only), Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients, Complex representation of Fourier series, Expansion of functions with arbitrary period, Expansion of non-periodic functions over an interval, Even and odd functions and their Fourier expansions and Application, Summing of Infinite Series, Term-by-Term differentiation and integration of Fourier Series, Parseval Identity.

UNIT-II

Frobenius Method and Special Functions: Singular Points of Second OrderLinearDifferentialEquationsandtheirimportance,SingularitiesofBessels and Laguerre Equations, Frobenius method and its applications to differential equations:LegendreandHermiteDifferentialEquations,LegendreandHermite Polynomials: Rodrigues Formula, Generating Function,Orthogonality.

UNIT-III

Polynomials: Simple recurrence relations of Legendre and Hermite Polynomials, Expansion of function in a series of Legendre Polynomials, Associated Legendre Differential Equation, Associated Legendre polynomials, Spherical Harmonics

Some Special Integrals: Beta and Gamma Functions and relation between them, Expression of Integrals in terms of Gamma Functions, Error Function (Probability Integral).

UNIT-IV

Partial Differential Equations: Solutions to partial differential equations using

separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Conducting and dielectric sphere in an external uniform electric field. Wave equation and its solution for vibrational modes of a stretched string

Text Books:

1. MathematicalMethodsforPhysicists,G.B.Arfken,H.J.Weber,F.E.Harris (2013, 7th Edn.,Elsevier)
2. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India)

Reference Books:

1. Mathematical Physics and Special Relativity, M. Das, P.K. Jena and B.K. Dash (Srikrishna Prakashan)
2. Mathematical Physics–H. K. Dass, Dr. Rama Verma (S. Chand Publishing)
3. Mathematical Physics C. Harper (Prentice HallIndia)ComplexVariable:
4. Schaum's Outlines Series M. Spiegel (2nd Edition, McGraw Hill Education)
5. Complex variables and applications J.W.Brown and R.V.Churchill
6. Mathematical Physics, Satya Prakash (Sultan Chand)
7. Mathematical Physics B.D.Gupta (4th edition, VikasPublication

CORE PAPER-VLAB

The aim of this Lab is to use the computational methods to solve physical problems. Course will consist of lectures (both theory and practical) in the Lab. Evaluation done not on the programming but on the basis of formulating the problem.

Topics

Introduction to Numerical computation software Scilab: Introduction to Scilab, Advantages and disadvantages, Scilab computation software Scilab environment, Command window, Figure window, Edit window, Variables and arrays, Initialising variables in Scilab, Multidimensional arrays, Subarray, Special values, Displaying output data, data file, Scalar and array operations, Hierarchy of operations, Built in Scilab functions, Introduction to plotting, 2D and 3D plotting (2),

Branching Statements and program design, Relational and logical operators, the while loop, for loop, details of loop operations, break and continue statements, nested loops, logical arrays and vectorization (2) User defined functions, Introduction to Scilab functions, Variable passing in Scilab, optional arguments, preserving data between calls to a function, Complex and Character data, string function, Multidimensional arrays (2) an introduction to Scilab file processing, file opening and closing, Binary I/o functions, comparing binary and formatted functions, Numerical methods and developing the skills of writing a program(2).

Curve fitting, Least square fit Goodness of fit, standard constant Deviation: Ohms law to calculate R, Hookes law to calculate spring constant

Solution of Linear system of equations by Gauss elimination Solution method and Gauss Seidal method. Diagonalization matrices, Inverse of a matrix, Eigen vectors, problems: Solution of mesh equations of electriccircuits(3meshes),Solutionofcoupledspringmasssystems(3masses)

Solution of ODE First order Differential equation Euler, modiftedEuler Runge-Kutta second methods Second order differential equation. Fixed difference method: First order differentialequation

- Radioactivedecay
- Current in RC, LC circuits with DCsource
- Newtons law ofcooling
- Classical equations ofmotion

Second order DifferentialEquation

- Harmonic oscillator (nofriction)
- Damped Harmonicoscillator
- Overdamped
- Criticaldamped
- Oscillatory
- Forced Harmonicoscillator

- Transient and Steady statesolution
- Apply above to LCR circuitsalso

Reference Books:

1. MathematicalMethodsforPhysicsandEngineers,K.FRiley,M.P.Hobson and S. J.20 Bence, 3rd ed., 2006, Cambridge UniversityPress
2. Complex Variables, A.S. Fokas and M.J. Ablowitz, 8th Ed., 2011, Cambridge Univ. Press
3. Firstcourseincomplexanalysiswithapplications,D.G.ZillandP.D.Shanahan, 1940, Jones andBartlett
4. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A.V. Wouwer, P. Saucez, C.V. Fern- ndez. 2014 Springer
5. Scilab by example: M. Affouf 2012, ISBN: 978-1479203444
6. Scilab(AfreesoftwaretoMatlab):H.Ramchandran,A.S.Nair.2011S.Chand andCompany
7. Scilab Image Processing: Lambert M. Surhone. 2010 BetascriptPublishing

CORE PAPER-VI

THERMAL PHYSICS

UNIT-I

Introduction to Thermodynamics Recapitulation of Zeroth and First law of thermodynamics,

Second Law of Thermodynamics: Reversible and Irreversible process with examples, Kelvin-Planck and Clausius Statements and their Equivalence, Carnots Theorem, Applications of Second Law of Thermodynamics: Thermodynamic ScaleofTemperatureanditsEquivalencetoPerfectGasScale.

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy, Entropy of a perfect gas, Principle of

increase of Entropy, Entropy Changes in Reversible and Irreversible processes with examples, Entropy of the Principle of Increase of Entropy, Temperature Entropy diagrams for Carnots Cycle, Third Law of Thermodynamics, Unattainability of AbsoluteZero.

UNIT-II

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables,

Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy,GibbsFreeEnergy,TheirDefinitions,PropertiesandApplications,Sur-faceFilmsandVariationofSurfaceTensionwithTemperature,MagneticWork, Cooling due to adiabaticdemagnetization

Phase Transitions: First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations

Maxwells Thermodynamic Relations: Derivations and applications of Maxwells Relations, Maxwells Relations: (1) Clausius Clapeyron equation (2) Relation between$C_p$andC_v(3)TdSEquations,(4)Joule-KelvincoefficientforIdealand Van der Waal Gases (5) Energy equations (6) Change of Temperature during Adiabatic Process.

UNIT-III

Kinetic Theory ofGases

Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification, Sterns Experiment, Mean, RMS and Most Probable Speeds, Degrees of Freedom, Law of Equipartition of Energy (No proof required), Specific heats of Gases.

Molecular Collisions: Mean Free Path, Collision Probability, Estimates of Mean Free Path,

Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance.

UNIT-IV

Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation, The Virial Equation, Andrews Experiments on CO2 Gas. Critical Constants, Continuity of Liquid and Gaseous State. Vapour and Gas, Boyle Temperature, Van der Waals Equation of State for Real Gases, Values of Critical Constants, Law of Corresponding States, Comparison with Experimental Curves, P-V Diagrams, Joules Experiment, Free Adiabatic Expansion of a Perfect Gas, Joule- Thomson Porous Plug Experiment, Joule- Thomson Effect for Real and Van der Waal Gases, Temperature of Inversion, Joule-ThomsonCooling

Text Books:

1. Thermal Physics, A. B. Gupta (Books and allied Ltd)
2. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman (McGraw- Hill)

Reference Books:

1. Theory and experiments on thermal Physics, P.K.Chakrabarty (New cen- tral book agency limited)
2. Thermodynamics,KineticTheoryandStatisticalThermodynamics-Searsand Salinger(Narosa)
3. A Treatise on Heat- Meghnad Saha and B.N.Srivastava (The Indian Press) Heat, Thermodynamics and Statistical Physics, N.Subrahmanyam and Brij Lal (S.Chand Publishing)
4. Thermal and Statistical Physics M.Das, P.K. Jena, S. Mishra, R.N.Mishra (Shri Krishna Publication)

CORE PAPER-VI LAB

(minimum 5 experiments are to be done):

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barnes constant flow method.
2. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charltons disc method.
3. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
4. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
5. To determine J byCaloriemeter
6. Todeterminethespecificheatofliquidbythemethodofcooling
7. Todeterminethespecificheatofsolidbyapplyingradiationofcorrection.

Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash and Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes,D.P.Khandelwal,1985, Vani Pub.

CORE PAPER-VII
ANALOG SYSTEMS AND APPLICATIONS

UNIT-I

Semiconductor Diodes: P and N type semiconductors, energy level diagram, conductivity and Mobility, Concept of Drift velocity, PN junction fabrication (simple idea), Barrier formation in PN Junction Diode, Static and Dynamic Resistance, Current flow mechanism in Forward and Reverse Biased Diode, Drift velocity, derivation for Barrier Potential, Barrier Width and current Step Junction.

Two terminal device and their applications: (1) Rectifier Diode: Half-

waveRectifiers.center-tappedandbridgetypeFull-waveRectifiers,Calculation of Ripple Factor and Rectification Efficiency,L and C Filters (2) Zener Diode and Voltage Regulation, Principle and structure of LEDS, (2) Photo diode(3) SolarCell.

UNIT II

Bipolar Junction Transistors: n-p-n and p-n-p transistors, Characterstics of CB, CE and CC Configurations, Current gains a and b, Relation between a and b, Load line analysis of Transistors, DC Load line and Q-point, Physical mechanismofcurrentflow,Active,Cut-offandSaturationRegions.

Transistors Biasing: Transistor Biasing and Stabilization circuits, Fixed Bias and Voltage DividerBias.

Amplifiers: Transistors as 2-port network h-parameter Equivalent Circuit, Analysis of a single stage CE amplifier using Hybrid Model, Input and Output impedance, Current, Voltage and Power Gains, Classification of class A, B and C amplifiers, Push-pull amplifier (classB)

UNIT-III

Coupled Amplifier: RC-coupled amplifier and its frequency response.

Feedback in Amplifiers: Effect of Positive and Negative Feedback on In- put Impedance, Output Impedance, Gain Stability, Distortion and Noise. Sinusoidal Oscillations: Barkhausens Gaterian for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency, Hartley and Colpitts oscillators.

UNIT-IV

Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical OP-AMP (IC741). Open-loop and Closed loop Gain. Frequency Response. CMRR, Slew Rate and concept of virtualground.

Application of Op-Amps: (1) Inverting and non-inverting amplifiers (2) Adder (3) Subtractor (4) Differentiator, (5) Integrator (6) Log amplifier, (7) Zero

crossing detector (8) Wein bridgeoscillator.

Text Books:

1. Foundations of Electronics-Raskhit and Chattopadhyay (New age International Publication)
2. Concept of Electronics- D.C.Tayal (HimalayPublication)

Reference Books:

1. ElectronicdevicesandcircuitsR.L.Boylstad(PearsonIndia)
2. Electronic Principles- A.P.Malvino (Tata McGrawHill)
3. Principles of Electronics- V. K. Mehta and Rohit Mehta (S. Chand Publication)
4. OP-Amps and Linear Integrated Circuit-R. A. Gayakwad (PrenticeHall)
5. PhysicsofSemiconductordevices,DonaldANeamen(PrenticeHall)

CORE PAPER-VII LAB

(minimum 5 experiments are to bedone)

1. To study the V-I characteristics of a Zener diode and its use as voltage regulator.
2. Study of V-I and power curves of solar cells, and find maximum power point and efficiency.
3. To study the characteristics of a Bipolar Junction Transistor in CE configuration.
4. To study the various biasing configurations of BJT for normal class A operation.
5. To study the frequency response of voltage gain of a RC-coupled transistor amplifier.
6. TodesignaWienbridgeoscillatorforgivenfrequencyusinganop-amp.
7. Todesignaphaseshiftoscillatorofgivenspecificationsusing BJT.

8. To study the Colpitt'soscillator.

Reference Books:

1. Modern Digital Electronics, R.P. Jain, 4th Edition, 2010, Tata McGraw
2. Hill.
3. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.
4. Microprocessor Architecture Programming and applications with 8085, R.S. Goankar, 2002, Prentice Hall.
5. Microprocessor 8085:Architecture, Programming and interfacing, A. Wadhwa, 2010, PHI Learning.

CORE PAPER-VIII
MATHEMATICAL PHYSICS-III

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation Eulers formula, De Moivres theorem, Roots of complex Numbers, Functions of Complex Variables, Analyticity and Cauchy-Riemann Conditions, Examples of analytic functions, Singular functions: poles and branch points, order of singularity, branch cuts, Integration of a function of a complex variable, Cauchys Inequality, Cauchys Integral formula, Simply and multiply connected region, Laurent and Taylors expansion, Residues and Residue Theorem, Application in solving Definite Integrals.

UNIT-II

Integral Transforms-I: Fourier Transforms: Fourier Integral theorem,Fourier Transform,Examples,FourierTransformoftrigonometric,Gaussian,finitewave train and other functions, Representation of Dirac delta function as a Fourier Integral, Fourier transform of derivatives, Inverse FourierTransform.

UNIT-III

Integral Transforms-II : Convolution theorem, Properties of Fourier Trans- forms (translation, change of scale, complex conjugation), Three dimensional Fouriertransformswithexamples,ApplicationofFourierTransformstodifferentialequations: OnedimensionalWaveandDiffusion/HeatflowEquations.

UNIT-IV

Laplace Transforms: Laplace Transforms (LT) of Elementary functions,

Properties of Laplace Transforms: Change of Scale Theorem, Shifting Theorem, LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions, Inverse LT, Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits.

Text Books:

1. MathematicalMethodsforPhysicists,G.B.Arfken,H.J.Weber,F.E.Harris (2013,7th Edn.,Elsevier)
2. AdvancedEngineeringMathematics,ErwinKreyszig(WileyIndia)

Reference Books:

1. MathematicalPhysicsandSpecialRelativity–M.Das,P.K.JenaandB.K. Dash (SrikrishnaPrakashan)
2. Mathematical Physics–H. K. Dass, Dr. Rama Verma (S. Chand Publishing) Mathematical Physics C. Harper (Prentice Hall India)
3. Complex Variable: Schaum's Outlines Series M. Spiegel (2nd Edition , Mc- Graw

Hill Education)

4. Complex variables and applications J.W.Brown and R.V.Churchill
5. Mathematical Physics, Satya Prakash (Sultan Chand)
6. MathematicalPhysicsB.D.Gupta(4thedition,VikasPublication)

CORE PAPER-VIII LAB

Scilab based simulations(XCos) experiments based on Mathematical Physics problems like

PRACTICAL-C VIII LAB

20 Classes (2hrs duration each)

Scilab based simulations(XCos) experiments based on Mathematical Physics problems like

- Solve simple differential equations like :

$\frac{dy}{dx} = e^{-x}$ with y(x=0) = 0

$\frac{dy}{dx} + e^{-x} = x^2$ with y(x=0) = 0

$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = -y$ with y(x=0) = 0, $y'(x=0) = 1$

$\frac{d^2y}{dx^2} + e^{-x}\frac{dy}{dx} = -y$ with y(x=0) = 0, $y'(x=0) = 1$

- Direct Delta Function

Evaluate $\int_{-3}^{3} dx \ \frac{(x+3)}{\sqrt{2\pi\sigma^2}} \quad e^{-\frac{(x-2)^2}{2\sigma^2}}$, for $\sigma = 0.1, 0.01, 0.001$ and show that it tends to 5.

- **Fourier Series:**

Program to sum

Evaluate the Fourier coefficients of a given periodic function (square wave)

- **Frobenius method and Special functions:**

$\int_{-1}^{1} d\mu \ P_n(\mu) \ P_m(\mu) = \frac{2}{2n+1}\delta_{m,n}$

Plot $P_n(x)$, Legendre polynomial of degree n, and $J_n(x)$, Bessel function of first kind.

Show recursion relation

- Calculation of error for each data point of observations recorded in experiments done in previous semesters (choose any two).

- Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program.

- Evaluation of trigonometric functions e.g. sin θ, Given Bessels function at N points find its value at an intermediate point.

Complex analysis: Calculate $\int \frac{dx}{(x^2+2)}$ and check it with computer integration.

- Integral transform: FFT of e^{-x^2}

Reference Books:

1. MathematicalMethodsforPhysicsandEngineers,K.FRiley,M.P.Hobson and S. J. Bence, 3rd ed., 2006, Cambridge UniversityPress
2. MathematicsforPhysicists,P.DenneryandA.Krzywicki,1967,DoverPublications
3. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. VandeWouwer, P. Saucez, C. V. Fernndez. 2014 Springer ISBN: 978-3319067896
4. Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
5. Scilab(AfreesoftwaretoMatlab):H.Ramchandran,A.S.Nair.2011S.Chand

andCompany
6. Scilab Image Processing: Lambert M. Surhone. 2010 BetascriptPublishing

CORE PAPER-IX

ELEMENTS OF MODERN PHYSICS

UNIT- I

Atomic Spectra and Models: Inadequacy of classical physics, Brief Review of Black body Radiation, Photoelectric effect, Compton Effect, dual nature of radiation wave nature of particles, Atomic spectra, Line spectra of hydrogen atom, Ritz Rydberg combination principle, Alpha Particle Scattering, Rutherford Scattering Formula, Rutherford Model of atom and its limitations.

Atomic Model: Bohrs Model of Hydrogen atom, explanation of atomic spec- tra, correction for finite mass of the nucleus, Bohr correspondence principle, limitations of Bohr model, discrete energy exchange by atom, Frank Hertz Experiment, Sommerfelds modification of BohrsTheory.

UNIT- II

Wave Packet: superposition of two waves, phase velocity and group velocity, wave packets, Gaussian Wave Packet, spatial distribution of wave packet, Localizationofwavepacketintime,Timedevelopmentofawavepacket,Wave Particle Duality,Complemntarity.

Wave Particle Duality: de Broglie hypothesis, Experimental confirmation ofmatterwave,DavissonGermerExperiment,velocityofdeBrogliewave,wave particle duality,Complementarity.

Uncertainty Principle: Heisenberg Uncertainty Principle, Illustration of the PrinciplethroughthoughtExperimentsofGammaraymicroscopeandelectron diffraction through a slit, Estimation of ground state energy of harmonicoscillator and hydrogen atom, non existence of electron in the nucleus,Uncertainty andcomplementarities.

UNIT- III

Nuclear Physics- I: Size and structure of atomic nucleus and its relation with atomic weight, Impossibility of an electron being in the nucleus as a con- sequence of the uncertainty principle, Nature of the nuclear force, NZ graph, Liquid Drop model: semi empirical mass formula and binding energy, Nuclear Shell Model and magicnumbers.

UNIT- IV

Nuclear Physics- II: Radioactivity, stability of the nucleus, Law of radioactivedecay,MeanlifeandHalflifeAlphadecay,Betadecay-energyreleased,spectrum and Paulis prediction of neutrino, Gamma ray emission energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus, Fission and fusion mass deficit, relativity and generation of energy, Fission-nature of fragments and emission of neutrons, Nuclear reactor: slow neutron interacting with Uranium 235, Fusion and thermonuclear reactions driving stellar energy (brief qualitativediscussion).

Text Books:

1. Concepts of Modern Physics Arthur Beiser (McGrawHill)
2. Modern Physics Murugeshan and Sivaprasad(S.Chand)

Reference Books:

1. QuantumMechanics:TheoryandApplications,A.K.GhatakandS.Lokanathan, (Macmillan)
2. Introduction to Quantum Theory, David Park (DoverPublications)
3. TheoryandProblemsofModernPhysics,Schaum‘soutline,R.Gautreau and W.Savin- (Tata McGraw-Hill)
4. Modern Physics-Serway (CENGAGELearnings)
5. Physics of Atoms and Molecules Bransden and Joachim (PearsonIndia)
6. Atomic and Nuclear Physics-A.B.Gupta (NewCentral)

7. Theoretical Nuclear Physics , J.M.Blatt and V.F. Weisskopf(Springer)

CORE PAPER-IX LAB

(minimum 4 experiments are to bedone):

1. To show the tunneling effect in tunnel diode using I-Vcharacteristics.
2. To determine the wavelength of laser source using diffraction of single slit.
3. To determine the wavelength of laser source using diffraction of double slits.
4. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating.
5. Todetermine the Plancks constant using LEDs of at least 4 differentcolours.
6. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
7. To setup the Millikan oil drop apparatus and determine the charge of an electron.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Books Book of Practical Physics, I.Prakashand Ramakrishna, 11th Edn, 2011,Kitab Mahal

CORE PAPER-X

DIGITAL SYSTEMS AND APPLICATIONS

UNIT-I

Integrated Circuits (Qualitative treatment only): Active and Passive Components, Discrete components, Wafer Chip, Advantages and Drawbacks of ICs, Scale of Integration: SSI, MSI, LSI and VLSI (basic idea and definitions only), Classification of ICs, Examples of Linear and Digital ICs.

Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversation, BCD, Octal and Hexadecimal numbers, AND, OR and NOT. Gates (realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gates and application as Parity Checkers.

UNIT-II

Boolean algebra: De Morgans Theorems: Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Fundamental Products, Idea of Minterms andMaxterms,ConversionofaTruthtableintoEquivalentLogicCircuitby

(1) Sum of Products Method and (2) KarnaughMap.

Introduction to CRO: Block Diagram of CRO, Electron Gun, Deflection system and Time Base, Deflection Sensitivity,

Applications of CRO: (1) Study of Wave Form, (2) Measurement of Volt- age, Current, Frequency and Phase Difference.

UNIT-III

Data Processing Circuits: Basic Idea of Multiplexers, De-multiplexers, Decoders, Encoders.

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2s complement. Half and Full Adders. Half and Full Subtractors, 4 bit binary Adder/Subtractor.

Timers: IC 555: block diagram and application is Astable multivibrator and Monostable multivibrator.

UNIT-IV

Introduction to Computer Organization: Input/output Devices, Data storage (idea of RAM and ROM), Computer memory, Memory organization and addressing, Memory Interfacing, Memory Map.

Shift registers: Serial-in-serial-out, Serial-in-Parallel-out, Parallel-in-Serial- out

and Parallel-in-Parallel-out. Shift Registers (only up to 4 bits)

Counters (4 bits): Ring Counter, Asynchronous counters, Decade Counter. Synchronous Counter.

Text Books:

1. DigitalCircuitsandLogicdesign:SamuelC.Lee(PrinticeHall)
2. Digital Principles and Applications - A.P. Malvino, D.P.Leach and Saha (TataMcGraw)

Reference Books :

1. The Art of Electronics by Paul Horowitz and Wilfield Hill ,Cambridge University
2. Electronics by Allan R. Hambley ,Prentice Hall 3. Principles of Electronics V.K.Mehta and Rohit Mehta (S.Chand Publishing)
3. Digital Logic and Computer design M. Morris Mano (Pearson) 5. Concepts of Electronics D.C.Tayal (Himalaya Publishing house)

CORE PAPER--X LAB

(minimum 6 experiments are to bedone):

1. To measure (a) Voltage, and (b) Time period of a periodic waveform usingCROandtotestaDiodeandTransistorusingaMillimeter.
2. To design a switch (NOT gate) using atransistor.
3. To verify and design AND, OR, NOT and XOR gates using NANDgates.
4. Half Adder, Full Adder and 4-bit binaryAdder.
5. Half Subtractor, Full Subtractor, Adder-Subtractor using Full AdderI.C.
6. TobuildFlip-Flop(RS,ClockedRS,D-typeandJK)circuitsusingNAND gates.
7. To design an astable multivibrator of given specifications using 555Timer.
8. To design a monostable multivibrator of given specifications using 555 Timer.

Reference Books:

1. Basic Electronics: A Text Books lab manual, P.B. Zbar, A.P. Malvino,
2. M.A. Miller, 1994, Mc-GrawHill.
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
4. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.
   ElectronicDevicesandcircuitTheory,R.L.BoylestadandL.D.Nashelsky,2009, Pearson

CORE PAPER-XI

QUANTUM MECHANICS AND APPLICATIONS

UNIT- I

Schrodinger equation : Time dependent Schrodinger equation , Properties of Wave Function, Interpretation of wave function, Probability and probability current densities in three dimensions, Conditions for Physical Acceptability of Wave Function, Normalization, Linearity and Superposition Principles. Wave function of a free particle ,Wave Packet, Fourier Transform and momemtum space Wavefunction ,Spread of Gaussian Wave packet, Evolution with time, Position and MomentumUncertainty.

UNIT-II

Operators: Operators, Commutator Algebra, Position, Momentum Angular Momentum and Energy operators, Hermitian Operators, Expectation valuesof position and momentum, Ehrenfest Theorem, Eigenvalues andEigenfunctions of Hermitian Operator, Energy Eigen Spectrum, Degeneracy, Orthonormality of Eigen functions, Linear Dependance.Orthogonalisation.

UNIT-III

Time Independent Schrodinger equation in one dimension (1d), 2d and 3d, Hamiltonian, stationary states and energy eigen values, expansion of an arbitrary

wave function as a linear combination of energy eigen functions, General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. General Discussion of Bound states in an arbitrary potential: Continuity of wave function, Boundary condition and emergence of discrete energy levels, Application to one dimensional problem-Square well potential, Quantum mechanics of simple Harmonic Oscillator-Energy Levels and energy eigen functions, ground state, zero point energy and uncertainty principle, One dimensional infinitely rigid boxenergy eigen values and eigen functions, normalization, quantum dot as example, Quantum mechanical scattering and tunnelling in one dimension across a step potential and rectangular potential barrier.

UNIT-IV

Atoms in Electric and Magnetic Fields: Electron angular momentum. Spacequantization,ElectronSpinandSpinAngularMomentum,LarmorsTheorem,SpinMagneticMoment,SternGerlachExperiment,VectorAtomModel,L-S and J-J coupling, Zeeman Effect, Electron Magnetic Moment and Magnetic Energy,GyromagneticRatioandBohrMagneton.AtomsinExternalMagnetic Fields:-NormalandAnomalousZeemanEffect,PaschenbackandStarkEffect (qualitative Discussiononly)

Text Books:

1. Introduction to Quantum Theory David Park (DoverPublications)
2. Introduction to Quantum Theory, D. J. Griffiths(Pearson)

Reference Books :

1. QuantumMechanics,TheoryandapplicationsA.GhatakandS.Lokanathan (McMillanIndia)
2. QuantumMechanics-G.Aruldhas(PrinticeHallofIndia)
3. Quantum Physics–S. Gasiorowicz (Wiley)
4. QuantumMechanics-G.R.ChatwalandS.K.Anand

5. Quantum Mechanics -J.L. Powell and B. Craseman(Narosa)
6. Introduction to Quantum Mechanics M.Das and P.K.Jena (Shri Krishna Publication)

CORE PAPER- XILAB

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like (Use finite difference method,matrixmethod,ODE Solver method in all cases)

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom:
$\frac{d^2y}{dr^2} = A(r)u(r),\ A(r) = \frac{2m}{\hbar^2}[V(r) - E],\ V(r) = -\frac{e^2}{r},$

where m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wave functions. Remember that the ground state energy of the hydrogen atom is ~ -13.6eV. Take $e = 3.795\sqrt{(eV\mathring{A})},\ \hbar c = 1973(eV\mathring{A})$ and $m = 0.511 \times 10^6 eV/c^2$

2. Solve the s-wave radial Schrodinger equation for an atom:
$\frac{d^2y}{dr^2} = A(r)u(r),\ A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, where m is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential: $V(r) = -\frac{e^2}{r}e^{-r/a}$

Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wave function. Take $e = 3.795\sqrt{(eV\mathring{A})},\ \hbar c = 1973(eV\mathring{A})$ and $m = 0.511\times10^6 eV/c^2$, and $a = 3\mathring{A}, 5\mathring{A}, 7\mathring{A}$. The ground state energy is expected to be above -12 eV in all three cases.

3. Solve the s-wave radial Schrodinger equation for a particle of mass m: $\frac{d^2y}{dr^2} = A(r)u(r),\ A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, for the anharmonic oscillator potential: $V(r) = \frac{kr^2}{2} + \frac{br^3}{3}$.

Find the ground state energy (in MeV) of the particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose $m = 940MeV/c^2, k = 100MeV/fm^2, b = 0, 10, 30MeV/fm^3$. In these Units, c = 197.3 MeV fm. [The ground state energy is expected to lie between 90 and 110 M eV for all three cases.]

4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule: $\frac{d^2y}{dr^2} = A(r)u(r),\ A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, where m is the reduced mass of the two-atom system for the Morse potential $V(r) = D(e^{-2\alpha r} - e^{-\alpha r})$, where $r = r - r_0$ Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave functions for the choices given below:

a) $m = 940x10^6 eV/c^2, D = 0.755501eV, \alpha = 1.44, r_0 = 0.131349\mathring{A}$

b) $m = 940x106eV/c^2, D = 0.755501eV, \alpha = 1.44, r_0 = 0.131349\mathring{A}$

Laboratory based experiments:

1. Study of Electron spin resonance- determine magnetic field as a function of the resonancefrequency
2. StudyofZeemaneffect:withexternalmagneticfield;Hyperfinesplitting
3. To show the tunneling effect in tunnel diode using I-Vcharacteristics.
4. Quantum efficiency ofCCDs

Reference Books:

1. Schaum'soutlineofProgrammingwithC++.J.Hubbard,2000,McGraw–HillPublication
2. Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal., 3rd Edn., 2007, Cambridge University Press.

3. An introduction to computational Physics, T.Pang, 2nd Edn.,2006, Cam- bridge Univ. Press
4. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. VandeWouwer, P. Saucez, C. V. Fernndez.2014 Springer.
5. Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011S. Chand andCo.
6. Scilab Image Processing: L.M.Surhone.2010 Betascript Publishing ISBN:9786133459274

CORE PAPER-XII

SOLID STATE PHYSICS

UNIT-I

Crystal Structure: Solids, Amorphous and Crystalline Materials, Lattice translation Vectors, Lattice with a Basis. Central and Non-Central Elements. Unit Cell, Miller Indices, Types of Lattices, Reciprocal Lattice, Brillouin zones, DiffractionofX-raysbycrystals,BraggLaw,AtomicandGeometricalFactor

UNIT-II

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear, Monotomic and Diatomic Chains, Acoustical and Optical Phonons, Qualitative Description of the phonon spectrum in solids, Dulong and Petits Law, Einstein and Debye theories of specific heat of solids, T^3 Law

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials, Classical Langevins theory of dia and Paramagnetic Domains, Curies law,WeissTheoryofFerromagnetismandFerromagneticDomains,Discussion of B-H Curve, Hysteresis and EnergyLoss.

UNIT-III

Dielectric Properties of Materials: Polarization Local Electrical Field at anAtom,DepolarizationField,ElectricSusceptibility,Polarizability,Clausius Mosotti Equation, Classical theory of ElectronicPolarizability.

Lasers: Einsteins A and B co-efficientnts, Metastable States, Spontaneous and Stimulated emissions, Optical Pumping and population Inversion, Three Level and Four Level Lasers, Ruby Laser and He-Ne Laser.

UNIT-IV

Elementary band theory: Kronig-Penny model of band Gap, Conductor , Semiconductor(PandNtype)andinsulator,ConductivityofSemiconductor, mobility,HallEffect,Measurementofconductivity(04probemethod)andHall Co-efficient.

Superconductivity: Experimental Results, Critical Temperature, Critical magneticfield,Meissnereffect,TypeIandtypeIISuperconductors,Londons EquationandPenetrationDepth,Isotopeeffect,IdeaofBCStheory(Noderivation)

Text Books:

1. Introduction to Solid State Physics- Charles Kittel (WileyIndia)
2. LASERS:FundamentalsandApplications- ThyagarajanandGhatak(McMil- lanIndia)

Reference Books:

1. SolidStatePhysics-N.W.AshcroftandN.D.Mermin(Cengage)
2. Solid State Physics- R.K.Puri and V.K. Babbar (S.ChandPublication)
3. Solid State Physics S. O. Pillai (New AgePublication)
4. Lasers and Non linear Optics B.B.Laud (WileyEastern)
5. Elements of Solid State Physics-J.P. Srivastava (Prentice Hall ofIndia)
6. Elementary Solid State Physics-Ali Omar (AddisonWiley)

CORE PAPER-XII LAB

(minimum 4experiments are to bedone)

1. Measurement of susceptibility of paramagnetic solution (Quincks Tube-Method)
2. To measure the Magnetic susceptibility ofSolids.
3. To measure the Dielectric Constant of a dielectric Materials with frequency
4. To determine the Hall coefficient of a semiconductorsample.
5. To draw the BH curve of Fe using solenoid and to determine the energy loss fromHysteresis
6. To measure the band gap of a given semiconductor by four-probemethod.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Books Book of Practical Physics, I.Prakashand Ramakrishna, 11 Ed., 2011, Kitab Mahal
4. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice- Hall of India.

CORE PAPER-XIII

ELECTROMAGNETIC THEORY

UNIT-I

Maxwell Equations: Maxwells equations, Displacement Current, Vector and ScalarPotentials,GaugeTransformations:LorentzandCoulombGauge,Boundary Conditions at Interface between Different Media, Wave Equations, Plane Waves in Dielectric Media, Poynting Theorem and Poynting Vector, Electro-magnetic(EM)EnergyDensity,PhysicalConceptofElectromagneticFieldEnergyDensity

UNIT-II

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuumandisotropicdielectricmedium,transversenatureofplaneEMwaves, refractive index and dielectric constant, wave impedance, Propagationthrough conductingmedia,relaxationtime,skindepth,Electricalconductivityofionized gases,plasmafrequency,refractiveindex,skindepth,applicationtopropagation throughionosphere.

UNIT-III

EM Wave in Bounded Media: Boundary conditions at a plane interface betweentwomedia,ReflectionandRefractionofplanewavesatplaneinterface betweentwodielectricmedia,LawsofReflectionandRefraction,Fresnel'sFormulaefor perpendicularandparallelpolarizationcases,Brewster'slaw,ReflectionandTransmiss ioncoefficients,Totalinternalreflection,evanescentwaves, Metallic reflection (normalIncidence)

UNIT IV

Polarization of Electromagnetic Waves: Description of Linear, Circular andEllipticalPolarization,UniaxialandBiaxialCrystals,LightPropagationin UniaxialCrystal,DoubleRefraction,PolarizationbyDoubleRefraction,Nicol Prism,Ordinaryandextraordinaryrefractiveindices,Productionanddetection of Plane, Circularly and Elliptically PolarizedLight,

Phase Retardation Plates: Quarter-Wave and Half- Wave Plates. Babinets Compensator and its Uses, Analysis of Polarized Light.

Rotatory Polarization: Optical Rotation, Biots Laws for Rotatory Polarization, Fresnels Theory of optical rotation, Calculation of angle of rotation, Experimental verification of Fresnels theory, Specific rotation, Laurents half- shade polarimeter.

Text Books:

1. Introduction to Electrodynamics, D.J. Griffiths (Pearson)

2. PrinciplesofOptics-MaxBornandE.Wolf

Reference Books :

1. Classical Electrodynamics by J.D.Jackson
2. Foundationofelectromagnetictheory:RitzandMilford(Pearson)
3. Electricity and Magnetism : D C Tayal (HimalayaPublication)
4. Optics : A.K.Ghatak
5. Electricity and Magnetism : Chattopadhyaya, Rakhit (NewCentral)

CORE PAPER XIII LAB

(minimum 4 experiments are to bedone):

1. ToverifythelawofMalusforplanepolarizedlight.
2. To determine the specific rotation of sugar solution usingPolarimeter.
3. To analyze elliptically polarized Light by using a Babinetscompensator.
4. To determine the refractive index of liquid by total internal reflection using Wollastonsair-film.
5. To determine the refractive Index of (1) glass and (2) a liquid by total internal reflection using a Gaussianeyepiece.
6. To study the polarization of light by reflection and determine the polarizing angle for air-glass interface.
7. ToverifytheStefan‘slawofradiationandtodetermineStefansconstant.
8. To determine the Boltzmann constant using V-I characteristics of PN junctiondiode.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Books Book of Practical Physics, I.Prakashand Ramakrishna, 11 Ed., 2011, Kitab Mahal Electromagnetic Field Theory for Engineers and Physicists, G. Lehner, 2010,Springer

CORE PAPER-XIV

STATISTICAL MECHANICS

UNIT- I

Classical Statistics-I: Macrostate and Microstate, Elementary Concept of Ensemble, Microcanonical, Canonical and Grand Canonical ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function.

UNIT- II

Classical Statistics-II : Thermodynamic Functions of an Ideal Gas, classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of equipartition of Energy (with proof)- Applications to Specific Heat and its Limitations, Thermodynamic Functions of a two energy levels system, NegativeTemperature.

UNIT-III

Quantum Statistics: Identical particles, macrostates and microstates, Fermions and Bosons, Bose Einstein distribution function and Fermi- Dirac distribution function. Bose- Einstein Condensation, Bose deviation from Plancks law, Effect of temperature on Fermi-Dirac distribution function, degenerate Fermi gas, Density of States Fermienergy.

UNIT-IV

Radiation: Properties of Thermal Radiation, Blackbody Radiation, Pure Temperature dependence, Kirchhoffs law, Stefan Boltzmann law: Thermodynamic proof, Radiation Pressure, Weins Displacement law, Wiens distribution Law, Sahas Ionization Formula, Rayleigh Jeans Law, Ultra Violetcatastrophe.

Plancks Law of Black body Radiation: Experimental verification, Deduction of

(1) Wiens Distribution Law, (2) Rayleigh Jeans Law, (3) Stefan Boltzmann Law, (4)Weins Displacement Law from Plancks Law.

Text Books:

1. Introduction to Statistical Physics by Kerson Huang(Wiley).
2. StatisticalPhysics,BerkeleyPhysicsCourse,F.Reif(TataMcGraw-Hill)

ReferenceBooks:

1. Statistical Mechanics, B.K.Agarwal and Melvin Eisner (New Age International)
2. Thermodynamics, Kinetic Theory and Statistical Thermodynamics: FrancisW.SearsandGerhardL.Salinger(Narosa)
3. Statistical Mechanics: R.K.Pathria and Paul D. Beale (AcademicPress)

CORE PAPER-XIV LAB

Use C/C++/Scilab for solving the problems based on Statistical Mechanics like

1. PlotPlanckslawforBlackBodyradiationandcompareitwithWeins
2. Law and Raleigh-Jeans Law at high temperature (room temperature) and low temperature.
3. Plot Specific Heat of Solids by comparing (a) Dulong-Petit law, (b) Einsteindistributionfunction,(c)Debyedistributionfunctionforhightemperature (roomtemperature)andlowtemperatureandcomparethemforthesetwocases
4. Plot Maxwell-Boltzmann distribution function versustemperature.
5. Plot Fermi-Dirac distribution function versustemperature.
6. Plot Bose-Einstein distribution function versustemperature.

Reference Books:

1. Elementary Numerical Analysis, K.E.Atkinson, 3rdEdn. 2007, Wiley India Edition
2. Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford UniversityPress.

3. Thermodynamics, Kinetic Theory and Statistical Thermodynamics, FrancisW.SearsandGerhardL.Salinger,1986,Narosa.
4. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009,Springer
5. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. VandeWouwer, P. Saucez, C. V. Fernndez. 2014 Springer ISBN: 978-3319067896
6. Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
7. Scilab Image Processing:L.M.Surhone. 2010, Betascript Pub., ISBN: 978-6133459274

Discipline Specific Elective Paper-1

CLASSICALDYNAMICS

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Generalised co-ordinates and Velocities, Generalised Force, Principle of virtual work Derivation of Lagranges equation of motion from DAlemberts Principles, Lagrangian and its Application to Simple, Compound and Double Pendulums, Single Particle in Space, Atwoods Machine, Dumb-bell, Linear harmonic oscillator.

UNIT-II

Hamiltons Principle, Calculus of Variation and derivation of Euler-Lagranges equation, Langranges Equations derived from Hamiltons Principles, Hamiltoian and its applications to Shortest Distance between two points in a plane, Geodesic Problem, minimum surface of revolution, Brachistochrone problem, The Equations of motion and first integrals, The equivalent one-dimensional problem and classification of orbits, canonical momenta, Hamiltions equations of motion, Motion of charged particles in external electric and magnetic fields, Applicationstocentralforcemotionandcoupledoscillators.

UNIT- III

SpecialtheoryofRelativity(Postulatesofspecialtheoryofrelativity),Lorentz transformations, Minkowski space, The invariant interval, light cone and world lines, space time diagrams, Times-dilation, length contraction and Twin paradox, Variation of mass with velocity mass energyrelation

UNIT- IV

Four Vectors: Space Like, Time-like and light-like. Four velocity and acceleration, Four momentum and energy-momentum relation. Doppler effects from a four vector perspective, Concept of four-force, Conservation of four momentum,Applicationtotwobodydecayofanunstableparticle

Text Books:

1.Classical Mechanics, H.Goldstein, C.P. Poole, J.L. Safko (Pearson)

2.Classical Mechanics N C Rana and P S Joag.

Reference Books :

1. Mechanics-D.S.Mathur (SultanChand)
2. Solved problems in Classical Mechanics, O.L. Delange and J.Pierrus (Oxford Press)(2010)
3. Classical Mechanics-M. Das, P.K.Jena, M. Bhuyan, R.N.Mishra (SrikrishnaPrakashan)
4. Mathematical Physics with Classical Mechanics-Satya Prakash (Sultan Chand andsons)
5. Introduction to classical dynamics R.K.Takwale and S.Puranik (Tata McGrawHill)
6. Classical Mechanics J.C.Upadhyay (HimalayanPublisher)
7. Classical Dynamics of particles and systems -S.T.Thorton and Marion (Cengagepublication)

Discipline Specific Elective Paper-1I

Nuclear and Particle Physics

UNIT-I

General properties of Nuclei: Constituents of nucleus and their intrinsic properties, Quantitative facts about mass, radius, charge density (matter density), binding energy, average binding energy and its variation with mass number,mainfeaturesofbindingenergyversusmassnumbercurve,N/Aplot, angularmomentum,parity,magneticmomentelectricmoments,nuclearexcites states.

Radioactivity decays: (a) Alpha decay: basics of alpha- decay processes, theory ofalpha-emission, Gamow factor, Geiger Nuttall law (b) beta-decay: energy kinematics for beta-decay, positron emission, electron capture, neutrino hypothesis.

(c) Elementary idea of Gammadecay.

UNIT-II

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, conditions of nuclear stability, two nucleon separation energies, evidence for nuclear shell structure, nuclear magic number, basic assumption of shellmodels.

UNIT-III

Detector for nuclear radiations: Detector for nuclear radiations: Gas detectors:estimationofelectricfield,mobilityofparticle,forionizationchamber andGMCounter.BasicPrincipleofScintillationDetectorsandConstructionof photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) forcharge Particleandphotondetection(Conceptofchargecarrierandmobility),neutron detector.

Particle Accelerators: Van-de Graff generator (Tandem Accelerator), Lin- ear accelerator, Cyclotron, Synchrotrons

UNIT-IV

Particle Physics: Particle interactions, basic features, types of particles and itsfamilies,

Symmetries and conservation laws: Energy and momentum, angular momentum,parity,baryonnumber,Leptonnumber,Isospin,strangenessandcharm, Elementary ideas of quarks andgluons.

Text Books:

1. Introduction to Nuclear Physics By Roy andNigam
2. AtomicandNuclearPhysics-N.Subramanyam,BrijLalandJivanSeshan (S. ChandPublishing)

Reference Books:

1. IntroductiontoModernPhysics-H.S.ManiandG.K.Mehta(Affilatedeast and west)
2. Introductory nuclear Physics-Kenneth S. Krane (Wiley India Pvt. Ltd)
3. Introduction to Elementary Particles-D. Griffith (John Wiley andSons)
4. Concepts of Nuclear Physics - Bernard L. Cohen. (Tata Mcgraw Hill).
5. Concepts of Modern Physics-Arthur Beiser (McGrawHill)

Discipline Specific Elective Paper- II1

Nano Materials and Applications

UNIT-I

Nanoscale Systems: Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale, size effects in nano systems, Quantum confinement Applications of Schrodinger equation-infinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructure and itsconsequences.

UNIT-II

Synthesis of Nanostructure Materials: Top down and botton up approach,PhotolithographyBallmilling.Gasphasecondensation,Vacuumdeposition, Physical vapour deposition (PVT): Thermal evaporation, E-beam evaporation, Pulsed Laser deposition, Chemical vapour deposition (CVD), Sol-Gel Electrodeposition,Spraypyrolysis,Hydrothemalsynthesis,Preparationthrough colloidal methods, MBE growth of quantumdots.

UNIT-III

Characterization: X-Ray Diffraction, Optical Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Scanning TunnelingMicroscopy

UNIT-IV

Applications: Applications of nanoparticles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells). Single electron devices (no derivation). CNT based transistors. Nonmaterial Devices: Quantum dots heterostructure lasers, optical switching and optical data storage. Magnetic quantum well; magnetic dots-magmetic data storage. Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems(NEMS)

Text Books:

1. S.K. Kulkarni, Nanotechnology: Principles and Practices (Capital PublishingCompany)
2. Nano science and nano technology, K.K.Choudhury(Narosa)

Reference Books:

1. NanoScienceandnanotechnology,SundarSingh(PragatiPrakashan)
2. C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt.Ltd.).

3. RichardBooker,EarlBoysen,Nanotechnology(JohnWileyandSons).
4. M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama, Nanoparticle Technology Handbook (Elsevier,2007).
5. K.K. Chattopadhyay and A. N. Banerjee, Introduction to Nanoscience and Technology (PHI Learning PrivateLimited).

Discipline Specific Elective Paper-1V

Project

OR

Basic Instrumentation

Basic Instrumentation

UNIT-I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects.

Multimeter: Principles of measurement of dc voltage and dc current, ac volt- age, ac current and resistance. Specifications of a multimeter and their significance.

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage,measurement(blockdiagramonly).SpecificationsofanelectronicVoltmeter/ Multimeter and theirsignificance.

AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier-amplifier. Block diagram ac millivoltmeter, specifications and their significance.

UNIT-II

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only no mathematical treatment), brief discussion on screen phosphor, visual persistence and chemical composition. Time base operation, synchronization. Front panel controls.

Specifications of a CRO and their significance.

Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle ofworking.

UNIT-III

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators, pulse generator, and function generator, Brief idea for testing, specifications, Distortion factor meter, waveanalysis.

UNIT-V

Digital Instruments: Principle and working of digital meters, Comparison of analog and digital instruments, Characteristics of a digital meter, Working principles of digital voltmeter.

Digital Multimeter: Block diagram and working of a digital multimeter, Working principle of time interval, frequency and period measurement using universalcounter/frequencycounter,time-basestability,accuracyandresolution.

The test of lab skills will be of the following test items:

1. Use of anoscilloscope.
2. CRO as a versatile measuringdevice.
3. Circuit tracing of Laboratory electronicequipment,
4. Use of Digital multimeter/VTVM for measuringvoltages
5. Circuit tracing of Laboratory electronicequipment,
6. Winding a coil /transformer.
7. Study the layout of receivercircuit.
8. Trouble shooting acircuit
9. Balancing ofbridges

Laboratory Exercises:

1. To observe the loading effect of a multimeter while measuring voltage acrossalowresistanceandhighresistance.
2. To observe the limitations of a multimeter for measuring highfrequency voltage andcurrents.
3. To measure Q of a coil and its dependence on frequency, using a Q-meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/ frequencycounter.
6. Measurement of rise, fall and delay times using aCRO.
7. MeasurementofdistortionofaRFsignalgeneratorusingdistortionfactor meter.
8. MeasurementofR,LandCusingaLCRbridge/universalbridge.

Open Ended Experiments:

1. Using a Dual TraceOscilloscope
2. Convertingtherangeofagivenmeasuringinstrument(voltmeter,ammeter)

More emphasis should be given on hands-on experiments.

Text Books:

1. A Text Books book of electrical technology-B.L.Theraja (S.ChandPublishing)
2. Digital circuits and systems Venugopal (Tata McGraw Hill)

Reference Books :

1. Digital Electronics-Subrata Ghoshal (CengageLearning)
2. Electronic Devices and circuits - S. Salivahanan and N. S.Kumar (Tata Mc-GrawHill)
3. Electronic Devices-Thomas L. Floyd (Pearson)

Additional Reference Books for Practical papers :

1. Advanced Practical Physics for students, B.L.Flint and H.T.Worsnop (Asia PublishingHouse)
2. Practical Physics-B.B.Swain (KitabMahal)
3. Practical Physics-B.Ghosh (Vol. I andII)
4. ALaboratoryManualofPhysicsforUndergraduateClasses,D.P.Khandelwal (VaniPublication)
5. B.Sc. Practical Physics- C.L.Arora (S.ChandPublishing)
6. B.Sc. Practical Physics H. Singh and P.S. Hemne (S. ChandPublishing)

GENERIC ELECTIVE (GE)

Generic Elective Paper I
(Mechanics and Properties of matter, Oscillation and Waves, Thermal Physics, Electricity and Magnetism and Electronics

UNIT-I

Mechanics and Properties of Matter

Moment of Inertia Parallel axis and perpendicular axis theorem, M.I. of a Solid sphere and Solid cylinder, Gravitational potential and field due to a thin spherical shell and a solid sphere at external points and internal points, Relationamongelasticconstants,depressionatfreeendofalightcantilever,Surface tension,pressure,differenceacrossacurvedmembrane,viscousflow,Poiseulles formula.

UNIT-II

Oscillation and Waves

Simple harmonic motion, damped harmonic motion, under damped, over damped and critically damped motion, Forced vibration, Resonance, Wave equation in a medium, Velocity of Longitudinal waves in an elastic medium and velocity of transverse wave in a stretched string, Composition of SHM, Lissajous figures for superposition of two orthogonal simple harmonic vibrations (a) with same frequency, (b) frequency with 2:1.

UNIT-III

Thermal Physics

Entropy, change in entropy in reversible and irreversible process, Carnot engine and its efficiency. Carnot Theorem, Second law of thermodynamics, Kelvin-Planck,

Clausius formula. Thermal conductivity, differential equation for heat flow in one dimension, Maxwell thermodynamic relation (statement only), Clausius Clapeyron equation, Black body radiation, Planck radiation formula (Noderivation).

UNIT-IV

Electricity and Magnetism

Gauss law of electrostatics, use of Gauss law to compute electrostatic field due to a linear charge distribution, Magnetic induction B, Lorentz force law, Biot Savarts law, Magnetic induction due to long straight current carrying conductor, and in the axis of a current carrying circular coil, Amperes Circuital law,itsdifferentialform,Thelawofelectromagneticequations,itsdifferential and integral form, Maxwells electro-magnetic equations and their physical significance, Growth and decay of currents in LR and RC circuits, time constant, alternating currents in RC, RL and LCR circuits, impedance, power factor, resonance.

P-type and N-type semiconductors, PN-Junction as rectifier, Half wave and Full wave rectifiers (Bridge type), efficiency, ripple factor, use of RC, LC, and filters, working of PNP and NPN transistors, transistor configurations in CE and CB circuits and relation between α and β. JFET, its operation and characteristics of V-Icurve.

Text Books:

1. Properties of Matter D.S. Mathur (S. ChandPublication).
2. Heat and Thermodynamics A.B. Gupta and H.B. Ray (New Central BookAgency).
3. A Text Books book of oscillations, waves and acoustics(5thed.)M. Ghosh and D. Bhattacharya (S. ChandPublication).
4. Electricity and magnetism- R. Murugeshan (S.ChandPublishing)
5. Fundamentals of Electronics-Raskhit and Chattopadhyay (New age InternationalPublication)

Reference Books:

1. Physics of Degree students Vol.I M. Das, P.K. Jena etal (Sri krishna Prakashan).
2. Physics of Degree students Vol.II M. Das, P.K. Jena etal (Sri krishna Prakashan).
3. Waves and Oscillations (2nd ed) N. Subramaniyam and Brij Lal (Vikas Publications)
4. A Text Books book of Sound (2nd ed) - N. Subramaniyam and Brij Lal (S. ChandPublications)

Generic Elective Paper I Lab-

(minimum 6 experiments are to be done)

1. Todeterminethemomentofinertiaofaflywheel.
2. To determine the Youngs modulus Y of a wire by Searlsmethod.
3. TodeterminethemodulusofrigidityofawirebyMaxwellsneedle/Torsion Pendulum (Dynamicmethod).
4. To determine g by barpendulum.
5. To determine the value of Y of a rubber by using travellingmicroscope.
6. To determine the Rigidity of modulus by staticmethod.
7. To determine the frequency of a telescope by usingSonometer.
8. VerificationofLawsofVibrationofastringbyusingSonometer.

TEXT BOOKS:

1. To compare capacitances using DeSautybridge.
2. To determine the Law of resistance by using Fosterbridge.
3. Compare the specific heat of two liquids by method ofCooling.

Reference Books:

1. Advanced Practical Physics for students, B.L.FlintandH.T.Worsnop, 1971, Asia PublishingHouse
2. ALaboratoryManualofPhysicsforUndergraduateClasses,D.P.Khandelwal (1985), VaniPublication
3. ATextBooksbookofPracticalPhysics,InduPrakashAndRamakrishna,11th Edition (2011), Kitab Mahal, NewDelhi

Generic Elective Paper -II

(Optics, Special Theory of Relativity, Atomic Physics, Quantum Mechanics and NuclearPhysics)

UNIT-I

Optics-I: Elementary ideas of monochromatic aberrations and their minimization, chromatic aberration, achromatic combination, Theory of formation of primary and secondary rainbow, condition of interference, coherent sources, Youngs double slit experiment, biprism and measurement of wave length of light of by it, color of thin films and Newtons rings, Fresnel and Fraunhoffer diffraction, diffraction by single slit plane transmissiongrating.

Optics-II : Electromagnetic nature of light, polarized and unpolarized light, polarization by reflection and refraction, Brewsters Law, Mauls Law, Double refraction, Ordinary and extraordinary rays.

UNIT-II Atomic Physics

Inadequacy of classical physics, brief outline of Rayleigh Jeans theory and Plancks quantum theory of radiation, particle nature of electromagnetic radiation photo electric effect, Compton effect, dual nature of radiation, wave nature of particles, de-Broglie hypothesis, matter wave, wave-particle duality, Davisson-Germerexperiment.

Bohrs theory of Hydrogen atom, explanation of Hydrogen Spectra, correction for finite mass of the nucleus, Bohrs correspondence principle, limitations of Bohrs theory, Discrete energy, exchange by atom Frank Hertzexperiment.

UNIT-III

Quantum Mechanics : Heisenbergs Uncertainty relation, Time dependent Schrodingers wave equation in one dimension and three dimensions, The physical interpretation of the wave function, Probability density and probability current

density, Equation of continuity, Normalization of the Wave function, Expectation value of an observable, Ehrenfests theorem. Time independent Schrodingers wave equation in one dimension particle in a box, energy eigen values and eigenfunctions.

UNIT-IV

Nuclear Physics : Properties of the nucleus Charge, Size, Spin, Magnetic Moment, Mass, Mass defect, Binding energy, Packing fraction, Nuclear force and its characteristics features, Radioactive decay laws, average life, half life, nuclear fission, nuclear fusion, Linear accelerators, and cyclotron.

Relativity: Galilean transformation, Newtonian relativity and its limitation, MichelsonMorleyexperimentanditsconsequence,postulatesofspecialtheory of relativity. Lorentz transformation, length contraction, time dilation, relativistic mass and momentum, mass energyrelation.

Text Books:

1. University Physics, H. D. Young, R. A. Freedman(Person)
2. Fundamentals of Physics, Resnick, Halliday, Walker(WIley)

Reference Books :

1. A Text Books book of Optics N.Subrahmanyam and Brij Lal (S.Chand Publishing)
2. Introduction to Special Relativity-R. Resnick (JohnWiley)
3. ConceptsofModernPhysics ArthurBeiser(McGrawHill)
4. Modern Physics H.S. Mani and G.K.Mehta

Generic Elective Paper II LAB

(minimum6experimentsaretobedone):

1. Determination of E.C.E. of a Copper by taking 3readings.
2. DeterminationofRefractiveindexofthematerialofaprismusingSodium light.
3. Todeterminethewavelengthoflightusingplanediffractiongrating.

4. TodeterminethewavelengthoflightusingNewtonsring.
5. Determination of refractive index of (a) glass and (b) liquid by using travellingmicroscope.
6. To plot the I-D curve and to determine the refractive index of aprism
7. Determination of radius of curvature of a convex/concave mirror by using Kohlrauschsmethod.
8. T o determine the magnifying power of a giventelescope.
9. ToObtainthestaticcharacteristicsofa P-N-P/N-P-Ntransistor/ TriodeValve.
10. To determine the reduction factor of a tangentGalvanometer.
11. To study the Variation of magnetic field along the axis of a circular coil carryingcurrent.

Reference Books:

1. Advanced Practical Physics for students, B.L.FlintandH.T.Worsnop, 1971, Asia PublishingHouse
2. ALaboratoryManualofPhysicsforUndergraduateClasses,D.P.Khandelwal (1985), VaniPublication
3. ATextBooksbookofPracticalPhysics,InduPrakashAndRamakrishna, 11th Edition (2011), Kitab Mahal, NewDelhi

Course structure of UG Physics Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Mechanics	04	75
	DSC-I	Practical	02	25
II	DSC-II	Electricity, Magnetism &EMT	04	75
	DSC-II	Practical	02	25
III	DSC-III	Thermal Physics & Statistical Mechanics	04	75
	DSC-III	Practical	02	25
IV	DSC-IV	Waves and Optics	04	75
	DSC-IV	Practical	02	25
V	DSE-I	Digital and Analog Circuits& Instrumentation	04	75
	DSE-I	Practical	02	25
VI	DSE-II	Elements of Modern Physics	04	75
	DSE-II	Practical	02	25
			36	**600**

PHYSICS PAPERS FOR PASS STUDENTS

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper –

Practical paper: Midterm : 15 marks, End term : 60 marks, Practical: 25 marks

For non practical paper: Mid term : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper –

Practical papers:40 hours + 20 hours practical

Non practical papers:50 hours + 10 hours tutorial

Discipline Specific Core Paper 1

MECHANICS

UNIT-I

Rotational Dynamics: Centre of Mass, Motion of CM , Centre of Mass and Laboratory frames. Angular momentum of a particleand system of particles.Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia.Perpendicular and Parallel Axis Theorems, Routh Rule, Calculation of moment of inertia for cylindrical and spherical bodies. Kinetic energy of rotation. Euler's Equations of Rigid Body motion,Motion involving both translation and rotation.Moment of Inertia of a Flywheel

Non Inertial frames and fictitious Forces: Uniformely Rotating frame, laws of Physics in rotatingCoordinate system,centrifugalForces,Coriolis force and its applications.

UNIT-II

Gravitation: Newton'sLaw of gravitation. Gravitational field Intensity and Potential,

. Potential and field Applications.

Central Force:

Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. Differential Equation of motion with central force and its solution.The first Integrals(two),Concept of power Law Potentials, Kepler's Laws of Planetary motion.

Satellites:. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts.

UNIT-III

Elasticity: Relation between Elastic constants. Torsion of a right circularcylinder,torsionalwire,Bending of Beams,External Bending Moment,flexturalrigidity,singleCantilever,double cantilever(weightless cantilever,and with its own weight)

Fluid Properties:

Surface Tension- Express Pressure across a curved membrane, S.T., Quincke's drop, gravity waves and ripple,

Viscocity: Poiseuille's Equation for Flow of a Liquid with corrections.

Unit-IV

Oscillations: Simple Harmonic Oscillations. Kinetic energy, potential energy, total energy andtheir time-average values. Damped oscillation. Equation of motion and solution(,cases of oscillatory,critically damped and overdamped) Forced oscillations: Transient and steady states;

Resonance, sharpness of resonance; power dissipation and Quality Factor. Bar Pendulum, Kater's Pendulum. Composition of two SHMs propagating perpendicularly to each other(with frequency in the ratio 1:1,2:1) Lissajous figures

Text Books:

1. Mechanics, D.S. Mathur (S. Chand Publishing)
2. Introduction to Special Relativity-R. Resnick (John Wiley)

Reference Books :

1. Mechanics, Berkeley Physics, vol.1, C.Kittel, W. Knight, etal (Tata McGraw-Hill)
2. Physics, Resnick-Halliday and Walker (8/e. 2008,Wiley)
3. Theoretical Mechanics-M.R. Spiegel (Tata McGraw Hill).
4. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands (Pearson)
5. Mechanics-M.Das, P.K.Jena and R.N. Mishra (Srikrishna Publications)

Discipline Specific Core Paper I LAB

(minimum 6 experiments are to be done)

1. To study the random error in observations.
2. To determine the height of a building using a Sextant.
3. To study the Motion of Spring and calculate (a) Spring constant, (b) **g** and (c) Modulus of igidity.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine **g** and velocity for a freely falling body using Digital Timing Technique
6. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
7. To determine the Young's Modulus of a Wire by Optical Lever Method.
8. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
9. To determine the elastic Constants of a wire by Searle's method.
10. To determine the value of g using Bar Pendulum.
11. To determine the value of g using Kater's Pendulum.

Reference Books

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, AsiaPublishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

3. A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Edn, 2011, Kitab Mahal

Discipline Specific Core Paper-1I

ELECTRICITY , MAGNETISM AND EMT

UNIT-I

Vector Analysis: Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential.

UNIT-II

Electrostatic Energy Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

UNIT-III

Magnetism:

Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferromagnetic materials.

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self andmutual inductance, L of single coil, M of two coils. Energy stored in magnetic field.

UNIT-IV

Maxwell`s equations and Electromagnetic wave propagation: Equation of continuity

ofcurrent, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric

medium, transverse nature of EM waves, polarization.

Text:

1. Introduction to Electricity and Magnetism – D.C.Tayal (Himalaya Publishing house)

Reference:

1. Electricity, Magnetism & Electromagnetic Theory- S. Mahajan and Choudhury (Tata McGraw Hill)
2. Feynman Lectures Vol.2, R.P.Feynman, R.B.Leighton, M. Sands (Pearson)
3. Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I (Oxford Univ. Press)
4. Foundations of Electromagnetic Theory-Ritz and Milford (Pearson)

Discipline Specific Core Paper 1I LAB

(minimum 6 experiments are to be done)

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.
2. Ballistic Galvanometer:

(i) Measurement of charge and current sensitivity

(ii) Measurement of CDR

(iii) Determine a high resistance by Leakage Method

(iv) To determine Self Inductance of a Coil by Rayleigh's Method.

3. To compare capacitances using De'Sauty's bridge.
4. Measurement of field strength B and its variation in a Solenoid (Determine dB/dx)
5. To study the Characteristics of a Series RC Circuit.
6. To study a series LCR circuit LCR circuit and determine its (a) Resonant frequency, (b) Quality factor
7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and

(b) Quality factor Q

8. To determine a Low Resistance by Carey Foster's Bridge.
9. To verify the Thevenin and Norton theorems
10. To verify the Superposition, and Maximum Power Transfer Theorems

Reference Books

1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Ed.2011, Kitab Mahal

Discipline Specific Core Paper III

THERMAL PHYSICS AND STATISTICAL MECHANICS

UNIT-I

Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Coefficient, Reversible and irreversible processes, Second law and Entropy, Carnot's cycle

&theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero.

Thermodynamical Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energyfunctions, Maxwell's relations and applications - Joule-Thomson Effect, Clausius- Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations.

UNIT-II

Kinetic Theory of Gases: Derivation of Maxwell's law of distribution of velocitiesandits experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.

UNIT-III

Theory of Radiation: Blackbody radiation, Spectral distribution, Concept of Energy Density,Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

UNIT-IV

Classical Statistical Mechanics: Macrostate& Microstate, Elementary Concept ofEnsemble,Microcanonical, Canonical and grand canonical ensemble. Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression,Gibbs Paradox.

Text:

1. Thermal Physics, A. B. Gupta (Books and allied Ltd)
2. Theory and experiments on thermal Physics, P.K.Chakrabarty (New central book agency limited)

Reference:

1. Thermal and Statistical Physics – M.Das, P.K. Jena, S. Mishra, R.N.Mishra (Shri Krishna Publication)
2. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman (McGraw-Hill)
3. Thermal Physics, S. Garg, R. Bansal and Ghosh-(Tata McGraw-Hill)
4. Thermodynamics, Kinetic Theory & Statistical Thermodynamics- Sears & Salinger (Narosa)
5. A Treatise on Heat- Meghnad Saha and B.N.Srivastava (The Indian Press)
6. Heat, Thermodynamics and Statistical Physics-- N.Subrahmanyam and Brij Lal (S.Chand Publishing)

Discipline Specific Core Paper 1II LAB

(minimum 6 experiments are to be done)

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. Measurement of Planck's constant using black body radiation.
3. To determine Stefan's Constant.
4. To determine the coefficient of thermal conductivity of Cu by Searle's Apparatus.
5. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
8. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system
10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off- Balance Bridge

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. A Laboratory Manual of Physics for Undergraduate Classes, D.P.Khandelwal,1985, Vani Publication.

Discipline Specific Core Paper 1V

WAVES AND OPTICS

UNIT-I

Geometrical optics: Fermat's principle, reflection and refraction at plane interface,Matrixformulation of geometrical Optics. Idea of dispersion.

Cardinal Points and cardinal planes of an optical system,location of cardinal points and cardinal planes of (1)thick lens(2) thin lens and (3) co axial combination of two thin lenses using matrix formulation.

Aberrations: Chromatic Aberration and remedy,Monochromatic Aberration :Spherical

Aberration and remedy,Simple idea on Coma,Distortion,Astigmatism and Curvature and their

Remedy,Huygens eyepiece., Ramsden eye piece and their comparison.

UNIT-II

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves.PlaneProgressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves.

Wave Optics: Electromagnetic nature of light. Definition and properties of wavefrontHuygensPrinciple. Temporal and Spatial Coherence

UNIT-III

Interference-I- Division of amplitude and wavefront. Young's double slit experiment.Lloyd'sMirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment

Interference-II:

Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes);Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required),Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and

Visibility of Fringes. Fabry-Perot interferometer.Fabry Perot etalon with theory.Applications-Determination of wavelength (2) Wavelengthdifference of two sodium d-lines.

UNIT-IV

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope.

Doubleslit. Multiple slits. Diffraction grating. Resolving power of grating.

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane

Wave.Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire.

Text:

1. A text book of Optics – N.Subrahmanyam and Brij Lal (S.Chand Publishing)

2. Optics - Ajoy Ghatak (McGraw Hill

Reference:

1. Optics-E.Hecht (Pearson)
2. Fundamentals of Optics- F.A. Jenkins and H.E. White (McGraw-Hill)
3. Geometrical and Physical Optics– R.S. Longhurst(Orient Blackswan)
4. The Physics of Vibrations and Waves- H. J. Pain(John Wiley)
5. Optics – B.K.Mathur
6. Principles of Optics-Max Born and Emil Wolf (Pergamon Press)

Discipline Specific Core Paper 1V LAB

(minimum 6 experiments are to be done)

1. To investigate the motion of coupled oscillators
2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment and to verify $\lambda 2$ – T Law.
3. To study Lissajous Figures
4. Familiarization with Schuster`s focussing; determination of angle of prism.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
6. To determine the Refractive Index of the Material of a Prism using Sodium Light.
7. To determine Dispersive Power of the Material of a Prism using Mercury Light
8. To determine the value of Cauchy Constants.
9. To determine the Resolving Power of a Prism.
10. To determine wavelength of sodium light using Fresnel Biprism.
11. To determine wavelength of sodium light using Newton's Rings.
12. To determine the wavelength of Laser light using Diffraction of Single Slit.
13. To determine wavelength of (1) Sodium and (2) Spectral lines of the Mercury light using plane diffraction Grating
14. To determine the Resolving Power of a Plane Diffraction Grating.
15. To measure the intensity using photosensor and laser in diffraction patterns of single and double slits

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani

Discipline Specific Elective (DSE) - Pass

(two papers are to be selected)

Discipline Specific Elective Paper –I

DIGITAL AND ANALOG CIRCUITSAND INSTRUMENTATION

UNIT-1:

Digital Circuits

Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates.

De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.

UNIT-II

Semiconductor Devices and Amplifiers:

Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell.
Power Supply: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, Zener Diode and Voltage Regulation

UNIT-III

BJT and Amplifiers

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Active, Cutoff, and Saturation Regions. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Class A, B, and C Amplifiers.Class B Push Pull Amplifier.
Feedback in Amplifiers,Positive and Negative feedback,Effects of Feedback
Oscillators:Hartley and Colpitt's Oscillator

UNIT-IV:

Operational Amplifiers (Black Box approach) :

Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop& Closed-loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting

Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Zero Crossing Detector.

Instrumentations:
Introduction to CRO: Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.

Text:

1. Electronics: Fundamentals and applications – D. Chattopadhyay and P.C.Rakshit (New Age international)
2. Digital Principles and Applications - A.P. Malvino, D.P.Leach and Saha (Tata McGraw)
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.

Reference :

1. Principles of Electronics – V.K.Mehta and Rohit Mehta (S.Chand Publishing)
2. Hand book of electronics – Gupta Kumar (Pragati Prakashan)
3. Digital Logic and Computer design – M. Morris Mano (Pearson)
4. Text book of Electronics – B. B. Swain (Kitab Mahal)
5. Concepts of Electronics – D.C.Tayal (Himalaya Publishing house)
6. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.

Discipline Specific Elective Paper –I LAB

DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTS

(minimum 6 experiments are to be done)

1. To measure (a) Voltage, and (b) Frequency of a periodic waveform using a CRO
2. To verify and design AND, OR, NOT and XOR gates using NAND gates.
3. To minimize a given logic circuit.
4. Half adder, Full adder and 4-bit Binary Adder.
5. Adder-Subtractor using Full Adder I.C.

6. To design an astable multivibrator of given specifications using 555 Timer.
7. To design a monostable multivibrator of given specifications using 555 Timer.
8. To study IV characteristics of PN diode, Zener and Light emitting diode
9. To study the characteristics of a Transistor in CE configuration.
10. To design a CE amplifier of a given gain (mid-gain) using voltage divider bias.
11. To design an inverting amplifier of given gain using Op-amp 741 and study its frequency response.
12. To design a non-inverting amplifier of given gain using Op-amp 741 and study its Frequency Response.
13. To study a precision Differential Amplifier of given I/O specification using Opamp.
14. To investigate the use of an op-amp as a Differentiator
15. To design a Wien Bridge Oscillator using an op-amp.

Reference Books:

1. Basic Electronics: A text lab manual, P.B.Zbar, A.P.Malvino, M.A.Miller, 1994,Mc-Graw Hill.
2. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
4. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.

Discipline Specific Elective Paper II

ELEMENTS OF MODERN PHYSICS

UNIT-I

Planck's quantum, Planck's constant and Compton scattering. De Broglie experiment. light as a collection of photons; Photoelectric effect ,wavelength and matter waves; Davisson-Germer Experiment

Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.

UNIT-II

Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle.

Two slit interference experiment with photons, atoms & particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wavefunction, probabilities and normalization; Probability and probability current densities in one dimension.

UNIT-III

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as an example; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier.

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy

UNIT-IV

Radioactivity: stability of nucleus; Law of radioactive decay; Mean life and half-life; α decay; β decay - energy released, spectrum and Pauli's prediction of neutrino; γ-ray emission.

Fission and fusion - mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions.

Text:

1. Concepts of Modern Physics – Arthur Beiser (McGraw Hill)
2. Modern Physics – Murugeshan and Sivaprasad (S.Chand)

Reference:

1. Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, (Macmillan)
2. Introduction to Quantum Mechanics, David J. Griffith (Pearson)
3. Theory and Problems of Modern Physics, Schaum`s outline, R. Gautreau and W.Savin- (Tata McGraw-Hill)
4. Modern Physics-Serway (CENGAGE Learnings)
5. Physics of Atoms and Molecules – Bransden (Pearson India)
6. Quantum Mechanics– Satya Prakash (Pragati Prakashan)

7. Atomic and Nuclear Physics-A.B.Gupta (New Central)

DSE II LAB: ELEMENTS OF MODERN PHYSICS

(minimum 6 experiments are to be done)

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine the ionization potential of mercury.
4. To determine value of Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the absorption lines in the rotational spectrum of Iodine vapour.
7. To study the diffraction patterns of single and double slits using laser and measure its intensityvariation using Photosensor & compare with incoherent source – Na.
8. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energyof photo-electrons versus frequency of light
9. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
10. To setup the Millikan oil drop apparatus and determine the charge of an electron.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia PublishingHouse.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted
3. 1985, Heinemann Educational Publishers
4. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

SKILL ENHANCEMENT COMPULSORY COURSES (SECC)

Optional for SECC II paper

Skill Enhancement Compulsory Courses (SECC Option-I)

APPLIED OPTICS

The quest to understand the 'nature of light' is a favourite inquiry of mankind since ancient times. By the advent of lasers, holography, and optical fibres in twentieth century the optics now-a-days finds application in several branches of science and engineering. This paper provides the conceptual understanding of these branches of modern optics to the students.

Theory includes only qualitative explanation. Minimum **three** experiments should be performed covering minimum three sections.

Unit-I

(i) Photo-sources and Detectors

Lasers: an introduction, Planck's radiation law (qualitative idea), Energy levels, Absorption process, Spontaneous and stimulated emission processes, Theory of laser action, Population of energy levels, Einstein‟s coefficients and optical amplification, properties of laser beam, Ruby laser, He-Ne laser, and semiconductor lasers; Light Emitting Diode (LED) and photo-detectors.

(ii) Elementary ideas of Fourier Optics

Concept of Spatial frequency filtering, Fourier transforming property of a thin lens.

Unit-II

Holography

Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometry, and character recognition.

Photonics: Fibre Optics

(ii) Photonics: Fibre Optics

Optical fibres: Introduction and historical remarks, Total Internal Reflection, Basic characteristics of the optical fibre: Principle of light propagation through a fibre, the coherent bundle, The numerical aperture, Attenuation in optical fibre and attenuation limit; Single mode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating.

Skill Enhancement Compulsory Courses (SECC Option-I) LAB

Minimum **three** experiments should be performed covering minimum two sections.

Experiments on Lasers:

1. To determine the grating radial spacing of the Compact Disc (CD) by reflection using He-Ne or solid state laser.
2. To find the width of the wire or width of the slit using diffraction pattern obtained by a He-Ne or solid state laser.
3. To find the polarization angle of laser light using polarizer and analyzer
4. To determine the wavelength and angular spread of laser light by using plane diffraction grating.

Experiments on Semiconductor Sources and Detectors:

1. V-I characteristics of LED
2. Study the characteristics of solid state laser
3. Study the characteristics of LDR
4. Characteristics of Photovoltaic Cell/ Photodiode.
5. Characteristics of IR sensor

Experiments on Fibre Optics

1. To measure the numerical aperture of an optical fibre
2. To measure the near field intensity profile of a fibre and study its refractive index profile

Reference Books:

1. LASERS: Fundamentals & applications, K.Thyagrajan & A.K.Ghatak, 2010, Tata McGraw Hill
2. Introduction to Fiber Optics, A. Ghatak & K. Thyagarajan, Cambridge University Press.
3. Fibre optics through experiments, M.R.Shenoy, S.K.Khijwania, et.al. 2009, Viva Books
4. Optical Electronics, Ajoy Ghatak and K. Thyagarajan, 2011, Cambridge University Press
5. Optoelectronic Devices and Systems, S.C. Gupta, 2005, PHI Learning Pvt. Ltd.

Skill Enhancement Compulsory Courses (SECC Option-II)

RENEWABLE ENERGY AND ENERGY HARVESTING

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible

Unit-I

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Unit-II

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.

Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.

Geothermal Energy: Geothermal Resources, Geothermal Technologies.

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources.

Skill Enhancement Compulsory Courses (SECC Option-II)-LAB

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into volta geusing thermoelectric modules.

Reference Books:

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, “Renewable Energy, Power for a sustainable future”, 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
7. http://en.wikipedia.org/wiki/Renewable_energy

Faculty Training to be imparted in the following Topics

Computational Physics Lab—C, C++,

Scilab Programming for Core I,C-V,C-VIII,C-XI and C-XIII Practicals.

2. Digital Electronics. Theory and Practicals.

3. Quantum Mechanics Problem Solving

4. Solid State Physics- Elementary Band Theory and Superconductivity

5. Statistical Mechanics.-Quantum Distribution

6. Nanotechnology.

ESSENTIAL LABORATORY EQUIPMENT RECOMMENDED :

Every college must have CRO, Function generator, Laser and Logic Gate packages.

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN CHEMISTRY

(Bachelor of Science Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course structure of UG Chemistry Honours

Semester	Course	Course Name	Credits	Total marks
I	AECC-I	AECC-I	04	100
	C-I	Inorganic Chemistry-I	04	75
	C-I Practical	Inorganic Chemistry-I Lab	02	25
	C-II	Physical Chemistry-I	04	75
	C-II Practical	Physical Chemistry-I Lab	02	25
	GE-I	GE-I	04	75
	GE-I Practical	GE-I Lab	02	25
			22	**400**
II	AECC-II	AECC-II	04	100
	C-III	Organic Chemistry-I	04	75
	C-III Practical	Organic Chemistry-I Lab	02	25
	C-IV	Physical Chemistry-II	04	75
	C-IV Practical	Physical Chemistry-II	02	25
	GE-II	GE-II	04	75
	GE-II Practical	GE-II Lab	02	25
			22	**400**
III	C-V	Inorganic Chemistry-II	04	75
	C-V Practical	Inorganic Chemistry-II Lab	02	25
	C-VI	Organic Chemistry-II	04	75
	C-VI Practical	Organic Chemistry-II Lab	02	25
	C-VII	Physical Chemistry-III	04	75
	C-VII Practical	Physical Chemistry-III Lab	02	25

	GE-III GE-III Practical	GE-III GE-III Lab	04 02	75 25
	SEC-I	SEC-I	04	100
			28	**500**
IV	C-VIII C-VIII Practical	Inorganic Chemistry-III Inorganic Chemistry-III Lab	04 02	75 25
	C-IX C-IX Practical	Organic Chemistry-III Organic Chemistry-III Lab	04 02	75 25
	C-X C-X Practical	Physical Chemistry-IV Physical Chemistry-IV Lab	04 02	75 25
	GE-IV GE-IV Practical	GE-IV (Theory) GE-IV (Practical)	04 02	75 25
	SEC-II	SEC-II	04	100
			28	**500**

Semester	Course	Course Name	Credits	Total marks
V	C-XI C-XI Practical	Organic Chemistry-IV Organic Chemistry-IV	04 02	75 25
	C-XII C-XII Practical	Physical Chemistry-V Physical Chemistry-V	04 02	75 25
	DSE-I DSE-I Practical	DSE-I DSE-I Lab	04 02	75 25
	DSE-II DSE-II Practical	DSE-II DSE-II Lab	04 02	75 25
			24	**400**
VI	C-XIII C-XIII Practical	Inorganic Chemistry- IV Inorganic Chemistry-IV	04 02	75 25

	C-XIV C-XIV Practical	Organic Chemistry-V Organic Chemistry-V	04 02	75 25
	DSE-III DSE-III Practical	DSE-III DSE-III Lab	04 02	75 25
	DSE-IV DSE-IV Practical	DSE-IV DSE-IV Lab	04 02	75 25
	OR			
	DSE-IV	Dissertation	06	100*
			24	**400**
		TOTAL	**148**	**2600**

Discipline Specific Elective Papers: (Credit: 06 each)

(4 papers to be selected by students of Chemistry Honours): DSE (1-IV)

1. Polymer Chemistry
2. Green Chemistry
3. Industrial Chemicals & Environment
4. Inorganic Materials of Industrial Importance
5. *Dissertation (can be opted as alternative of DSE-IV only and of 6 credits. **Dissertation content: 60, Seminar cumViva: 20)**
6. Analytical Methods in Chemistry (Alternative)

CHEMISTRY

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (out of the 6 papers suggested)

Generic Elective for non Chemistry students – 4 papers. Incase the University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm : 15 marks, End term : 60 marks, Practical- 25 marks

Total – 100 marksCredit per paper – 6

Teaching hours per paper – 40 hours Theory classes + 20 hours Practical classes

CORE PAPER1

INORGANIC CHEMISTRY-I

Unit-I

Atomic structure

Bohr's theory, its limitations and atomic spectrum of hydrogen atom, Sommerfeld's modification. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle (time independent) and its significance, Derivation of Schrödinger's wave equation (for hydrogen atom) in Cartesian coordinate, significance of ψ and ψ^2. Normalized and orthogonal wave functions. Sign of wave functions; Setting of Schrödinger's equation in polar coordinates (derivation not required), radial and angular wave functions for hydrogen atom. Radial and angular distribution curves; Shapes of s, p, d and f orbitals; Quantum numbers and their significance. Pauli's Exclusion principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations**.**

Unit-II

Periodicity of elements

Periodicity of Elements: s, p, d, f block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s & p-blocks. (a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. (b) Atomic radii (van der Waals) (c) Ionic and crystal radii. (d) Covalent

radii (octahedral and tetrahedral) (e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy. (f) Electron gain enthalpy, trends of electron gain enthalpy. (g) Electronegativity, Pauling's/ Mulliken's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization. Sanderson's electron density ratio.

Unit-III

Chemical bonding-I

Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals. Born-Landé equation with derivation. Madelung constant, Born-Haber cycle and its application, Solvation energy. (ii) Covalent bond: Valence Bond theory (Heitler-London approach). Hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements, equivalent and non-equivalent hybrid orbitals, Resonance and resonance energy.

Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, C_2, B_2, F_2, CO, NO, and their ions (CO^+, NO^+, NO^-).

Unit-IV

Chemical bonding-II

VSEPR theory, shapes of simple molecules and ions containing lone and bond pairs of electrons, multiple bonding (σ and π bond approach) and bond lengths. Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference.

Metallic Bond: Qualitative idea of valence bond and band theories. Semiconductors and insulators. (ii) *Weak Chemical Forces:* van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment) Effects of chemical force, melting and boiling points, solubility energetics of dissolution process**.**

Oxidation-reduction: Redox equations, standard electrode potential and its applications to inorganic reactions. Principles involved in some volumetric analyses (iron and copper).

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry Wiley India, 5th Edn., 2008.
2. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
3. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017
4. Selected Topic in Inorganic Chemistry, S. Chand, New Delhi, 17th Ed., 2010.

Reference books

5. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. I, CBS Publications, 2nd Ed. 2010.
6. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

CORE PAPER I LAB

Students are required to learn the followings:

i. Calibration and use of apparatus
ii. Preparation of solutions of different Molarity/Normality of titrants.

List of experiments

(A) Acid-Base Titrations

i. Estimation of carbonate and hydroxide present together in mixture.
ii. Estimation of carbonate and bicarbonate present together in a mixture.
iii. Estimation of free alkali present in different soaps/detergents

(B) Oxidation-Reduction Titrimetry

i. Standardization of $KMnO_4$ with standard sodium oxalate and estimation of Fe(II) using standardized $KMnO_4$ solution.
ii. Estimation of percentage of oxalic acid and sodium oxalate in a given mixture.
iii. Estimation of Fe(II) and Fe(III) in a mixture by standard $K_2Cr_2O_7$ solution.

Reference text:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1st Edn., CBS Publishers & Distributors Pvt Ltd., (2017).

CORE PAPER II
PHYSICAL CHEMISTRY- I

Unit-I

Gaseous state-I

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η; variation of viscosity with temperature and pressure.

Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor, Z, and its variation with pressure for different gases. Causes of deviation from ideal behaviour. van der Waal's equation of state, its derivation and application in explaining real gas behaviour. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

Unit-II

Liquid state

Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water.

Ionic equilibria- I

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono- and diprotic acids.

Unit- III: Solid state

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analyses of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals (stoichiometric and non- stoichiometric). Glasses and liquid crystals.

Unit-IV

Ionic equilibria - II

Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of acid–base indicators; selection of indicators and their limitations.

Multistage equilibria in polyelectrolyte systems; hydrolysis and hydrolysis constants.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Puri, Sharma &Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
3. Kapoor K. L., Text Book of Physical Chemistry, McGraw Hill, 3rd Edn. 2017
4. Castellan G. W. Physical Chemistry 4thEdn. Narosa (2004).

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications
2. Mortimer R. G., Physical Chemistry, Elsevier (Academic Press), 3rd Ed (2008).
3. Ball D. W. Physical Chemistry Thomson Press, India (2007).
4. Engel T. & Reid P., Physical Chemistry, 3rd Ed. Pearson (2013)

CORE PAPER II LAB

Surface tension measurements.

a. Determine the surface tension by (i) drop number (ii) drop weight method.

b. Study the variation of surface tension of detergent solutions with concentration.

Viscosity measurement using Ostwald's viscometer.

a. Determination of viscosity of aqueous solutions of (i) polymer (ii) ethanol and (iii) sugar at room temperature.

b. Study the variation of viscosity of sucrose solution with the concentration of solute.

pH-metry

a. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.

b. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid (ii) Ammonium chloride-ammonium hydroxide

c. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.

d. Determination of dissociation constant of a weak acid.

Ionic equilibria

a. Determination of solubility product of PbI_2 by titrimetric method.

Reference Books

1. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
2. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry, 8th Ed.; McGraw-Hill, New York (2003).
3. Viswanathan, B., Raghavan, P.S. Practical Physical Chemistry, Viva Books (2009).

4. Halpern, A. M. &McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co., New York (2003).

CORE PAPER – III

ORGANIC CHEMISTRY I

Unit –I:

Basics of organic chemistry

Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength.

Homolytic and heterolytic fission with suitable examples. Curly arrow rules; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and relative stability of carbocations, carbanions, free radicals and carbenes.

Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

Carbon-carbon sigma bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity.

Unit – II:

Stereochemistry

Fischer Projection, Newmann and Sawhorse Projection formulae; Geometrical isomerism: cis–trans and, syn-anti isomerism E/Z notations with C.I.P rules.

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with one and two chiral-centres, Distereoisomers, meso-structures, Racemic mixture and resolution, inversion. Relative and absolute configuration: D/L and R/S designations.

Unit – III:

Chemistry of aliphatic hydrocarbons

Carbon-Carbon pi bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2- and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

Cycloalkanes and Conformational Analysis

Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformational analysis of alkanes (ethane and n-butane): Relative stability with energy diagrams. Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms.

Unit – IV:

Aromatic hydrocarbons

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups

Recommended Text Books:

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Bhal and Bhal, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
3. Kalsi, P. S., Stereochemistry Conformation and Mechanism; 8thEdn, New Age International, 2015.

Reference Books:

1. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013)
2. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
3. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER III LAB

Students are required to learn the followings:

- Checking the calibration of the thermometer
- Determination of melting point, effect of impurities on the melting point – mixed melting point of two unknown organic compounds
- Determination of boiling point of liquid compounds [boiling point lower than and more than 100°C (up to 160°C) by distillation and capillary method, respectively](**e**.g., ethanol, cyclohexane, ethyl methyl ketone, cyclohexanone, acetylacetone, anisole, crotonaldehyde, mesityl oxide etc.).

List of experiments

1. Functional group tests for alcohols, phenols, carbonyl and carboxylic acid groups and identification of unknown organic compounds of CHO system (without element detection).
2. Separation and purification of any one component of following binary solid mixture based on the solubility in common laboratory reagents like water (cold, hot), dil. HCl, dil. NaOH, dil. $NaHCO_3$, etc. and determination of melting point.

   Benzoic acid/p-Toluidine; p-Nitrobenzoic acid/p-Aminobenzoic acid; p-Nitrotolune/p-Anisidine etc.
3. Chromatography
   - Separation of a mixture of two amino acids by ascending and horizontal paper chromatography
   - Separation of a mixture of two sugars by ascending paper chromatography

     OR
   - Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC)

Reference Books

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
2. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

CORE PAPER IV

PHYSICAL CHEMISTRY II

Unit-I:

Chemical thermodynamics

Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics.

First law: Concept of heat, q, work, w, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.

Thermochemistry: Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions.

Unit-II

Carnot cycle, efficiency of heat engine, Carnot theorem

Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes.

Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.

Free Energy Functions: Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters, inversion temperature, Gibbs-Helmholtz equation, Maxwell relations, thermodynamic equation of state.

Unit-III

Systems of variable composition

Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

Chemical equilibrium

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases, concept of fugacity. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient (vant Hoff's reaction). Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium constants K_p, K_c and K_x. Le Chatelier principle (quantitative treatment) and its applications.

Unit-IV

Solutions and Colligative Properties

Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties: (i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Principles of Physical Chemistry, Puri, Sharma &Pathania, Vishal Publishing Co, 47th Edn., 2017.
3. Text Book of Physical Chemistry, K. L. Kapoor, Mac Grow Hill, 3rdEdn. 2017
4. Castellan G. W. Physical Chemistry 4th Ed. Narosa (2004).

Reference Books:

1. Engel T. & Reid P., Physical Chemistry 3rd Ed. Pearson (2013).
2. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
3. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.

CORE PAPER IV LAB
THERMOCHEMISTRY

a) Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).

b) Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.

c) Calculation of the enthalpy of ionization of ethanoic acid.

d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.

e) Determination of basicity/proticity of a polyprotic acid by the thermochemical method in terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step.

f) Determination of enthalpy of hydration of copper sulphate.

g) Determination of heat of solution (ΔH) of oxalic acid/benzoic acid from solubility measurement.

Reference Books

1. Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
2. Athawale, V. D. & Mathur, P. Experimental Physical Chemistry, New Age International: New Delhi (2001).
3. Viswanathan, B., Raghavan, P.S. Practical Physical Chemistry, Viva Books (2009)

CORE PAPER V

INORGANIC CHEMISTRY-II

UNIT-I

General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agent. Electrolytic Reduction, Hydrometallurgy. Methods of purification of metals: Electrolytic process, Parting process, van Arkel-de Boer process and Mond's process, Zone refining.

Acids and Bases

Brönsted-Lowry concept of acid-base reactions, solvated proton, relative strength of acids, types of acid-base reactions, Lewis acid-base concept, Classification of Lewis acids, Hard and Soft Acids and Bases (HSAB) Application of HSAB principle.

UNIT-II

Chemistry of *s* and *p* Block Elements - I

Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Complex formation tendency of *s* and *p* block elements.

Hydrides and their classification ionic, covalent and interstitial. Basic beryllium acetate and nitrate.

UNIT-III

Chemistry of *s* and *p* Block Elements - II

Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses.

Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes and graphitic compounds, silanes. Oxides and oxoacids of nitrogen, Phosphorus and chlorine. Peroxo acids of sulphur, interhalogen compounds, polyhalide ions, pseudohalogens and basic properties of halogens.

UNIT-IV

Noble Gases

Occurrence and uses, rationalization of inertness of noble gases, clathrates; preparation and properties of XeF_2, XeF_4 and XeF_6; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF_2). Molecular shapes of noble gas compounds (VSEPR theory).

Inorganic Polymers:

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes, and polysulphates.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry Wiley India, 5th Edn., 2008.
2. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
3. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
4. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn. (2010).

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. I, CBS Publications, 2nd Ed. 2010.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

CORE PAPER V LAB

Iodometric / Iodimetric titrations

(i) Standardization of sodium thiosulphate solution by standard of $K_2Cr_2O_7$ solution.

(ii) Estimation of Cu(II) using standard sodium thiosulphate solution (Iodimetrically).

(iii) Estimation of available chlorine in bleaching powder iodometrically.

Inorganic preparations

(i) Cuprous oxide (Cu_2O)

(ii) Cuprous chloride, Cu_2Cl_2

(iii) Manganese(III) phosphate, $MnPO_4.H_2O$

(iv) Aluminium potassium sulphate $K_2SO_4.Al_2(SO_4)_2.24H_2O$ (Potash alum).

(v) Lead chromate ($PbCrO_4$)

Reference Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis, 6th Ed., Pearson, 2009.
2. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
3. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt. Ltd., (2017).

CORE PAPER VI
ORGANIC CHEMISTRY-II

UNIT-I

Chemistry of Halogenated Hydrocarbons

Alkyl halides: Methods of preparation, nucleophilic substitution reactions – S_N1, S_N2 and S_Ni mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.

Aryl halides: Preparation, including preparation from diazonium salts, nucleophilic aromaticsubstitution; SNAr, Benzyne mechanism.

Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

Organometallic compounds of Mg and Li – Use in synthesis of organic compounds.

UNIT-II

Alcohols, Phenols, Ethers and Epoxides

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-BlancReduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement;

Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitutionreactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements with

mechanism;

Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides withalcohols, ammonia derivatives and $LiAlH_4$

UNIT-III

Carbonyl Compounds

Structure, reactivity and preparation:

Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Perkin, Cannizzaro and Wittig reaction, Beckmann rearrangements,α haloform reaction and Baeyer Villiger oxidation, - substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV.; Addition reactions of unsaturated carbonyl compounds: Michael addition.

Active methylene compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

UNIT-IV

Carboxylic Acids and their Derivatives

Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic, lactic, malic, tartaric, citric, maleic and fumaric acids;

Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic sustitution at acyl group -Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann-bromamide degradation and Curtius rearrangement.

Sulphur containing compounds: Preparation and reactions of thiols and thioethers**.**

Recommended Text Books:

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Bhal and Bhal, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
3. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009..

Reference Books:

1. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013)
2. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
3. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER VI LAB

Organic preparations:

i. Acetylation of one of the following compounds: amines (aniline, *o*-, *m*-, *p*-toluidines and *o*-, *m*-, *p*-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) by any one method:
   a. Using conventional method.
   b. Using green approach

ii. Benzolyation of one of the following amines (aniline, *o*-, *m*-, *p*- toluidines and *o*-, *m*-, *p*-anisidine) and one of the following phenols (β-naphthol, resorcinol, p-cresol) by Schotten-Baumann reaction.

iii. Bromination of any one of the following:
   a. Acetanilide by conventional methods
   b. Acetanilide using green approach (Bromate-bromide method)

iv. Nitration of any one of the following:
   a. Acetanilide/nitrobenzene by conventional method
   b. Salicylic acid by green approach (using ceric ammonium nitrate).

The above derivatives should be prepared using 0.5-1g of the organic compound.

Calculate percentage yield, based upon isolated yield (crude) and theoretical yield.

Purification of the crude product by recrystallisation from water/alcohol, or sublimation, whichever is applicable and determination of melting point.

Reference Books

1. Vogel, A. I. Elementary Practical Organic Chemistry, Part 1: Small scale Preparations, Pearson (2011)
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical OrganicChemistry, 5th Ed.,* Pearson (2012)

4. Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry:Preparation and Quantitative Analysis,* University Press (2000).
5. Ahluwalia, V.K. & Dhingra, S. *Comprehensive Practical Organic Chemistry: QualitativeAnalysis,* University Press (2000).

CORE PAPER VII
PHYSICAL CHEMISTRY-III

UNIT-I

Phase Equilibria-I

Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonreactive and reactive systems; Clausius-Clapeyron equation and its applications to solid-liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one component systems, with applications (H_2O and sulphur system).

Phase diagrams for systems of solid-liquid equilibria involving eutectic (Pb-Ag system, desilverisation of lead), congruent (ferric chloride-water) and incongruent (sodium sulphate-water) melting points, completely miscible solid solutions (intermediate, medium, maximum freezing points).

UNIT-II

Phase Equilibria-II

Three component systems, water-chloroform-acetic acid system, triangular plots.

Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications tofractional distillation of binary miscible liquids (ideal and non-ideal), azeotropes, partial miscibility of liquids, CST, miscible pairs, steam distillation.

Nernst distribution law: its derivation and applications.

UNIT-III

Chemical Kinetics

Order and molecularity of a reaction, rate laws in terms of the advancement of a reaction, differential and integrated form of rate expressions up to second order reactions, experimental methods of the determination of orders.

Kinetics of complex reactions (integrated rate expressions up to first order only): (i) Opposing

reactions (ii) parallel reactions (iii) consecutive reactions and their differential rate equations (steady-state approximation in reaction mechanisms) (iv) chain reactions.

Temperature dependence of reaction rates; Arrhenius equation; activation energy. Collision theory of reaction rates, qualitative treatment of the theory of absolute reaction rates.

UNIT-IV

Catalysis

Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces; effect of particle size and efficiency of nanoparticles as catalysts. Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis.

Surface chemistry:

Physical adsorption, chemisorption, adsorption isotherms (Langmuir, Freundlich and Gibb's isotherms), nature of adsorbed state.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Puri, Sharma &Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
3. Kapoor K. L., Text Book of Physical Chemistry, McGraw Hill, 3rd Edn. 2017
4. Castellan G. W. Physical Chemistry 4thEdn. Narosa (2004).

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications
2. Levine, I. N. *Physical Chemistry 6th Ed.,* Tata McGraw-Hill (2011).
3. Ball D. W. Physical Chemistry Thomson Press, India (2007).
4. Engel T. & Reid P., Physical Chemistry 3rd Ed. Pearson (2013)

CORE PAPER VII LAB

1. Determination of distribution coefficients of:
   (a) Iodine between water and carbon tetrachloride.
   (b) Acetic/ benzoic acid between water and cyclohexane.
2. Study the equilibrium of at least one of the following reactions by the distribution

method:

- I_2 (aq) + I^- → I_3^-(aq)
- Cu^{2+}(aq) + nNH_3 → $Cu(NH_3)_n$

3. Study the kinetics of the following reactions.
   (i) Integrated rate method:
      a) Acid hydrolysis of methyl acetate with hydrochloric acid.
      b) Saponification of ethyl acetate.
   (ii) Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate.
4. Verify the Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.

Reference Books:

1. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi (2011).
2. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. *Experiments in Physical Chemistry8th Ed.*; McGraw-Hill: New York (2003).
3. Halpern, A. M. &McBane, G. C. *Experimental Physical Chemistry 3rdEd.;* W.H. Freeman & Co.: New York (2003).

CORE PAPER VIII
INORGANIC CHEMISTRY-III

UNIT-I

Coordination Chemistry

Werner's theory, valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding.

IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, Labile and inert complexes.

Crystal field theory, measurement of CFSE weak and strong fields, pairing energies, factors affecting the magnitude of 10 Dq in octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry, Jahn-Teller theorem, square planar geometry. Qualitative aspect of ligand field and MO Theory.

UNIT-II

Transition Elements-I

General group trends with special reference to electronic configuration, colour, variable valency, magnetic and catalytic properties, and ability to form complexes. Stability of various oxidation states and e.m.f. (Latimer &Bsworth diagrams). Difference between the first, second and third transition series.

UNIT-III

Transition Elements-II

Chemistry of Ti, V, Cr Mn, Fe and Co in various oxidation states (excluding their metallurgy).

Lanthanoids and Actinoids

Electronic configuration, oxidation states, colour, spectral and magnetic properties,lanthanide contraction, separation of lanthanides (ion-exchange method only).

General features of actinoids, separation of Np, Pm, Am from U.

UNIT-IV

Bioinorganic Chemistry

Metal ions present in biological systems, classification of elements according to their action in biological system. Na/K-pump, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine.

Iron and its application in bio-systems, Haemoglobin and myoglobin.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.
2. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
3. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.

4. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn..

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Bioinorganic Chemistry, Asim Kumar Das, Books & Allied (P) Ltd. 1st ed. 2015.
3. Selected Topic in Inorganic Chemistry, Mallick, Madan and Tuli, S. Chand Publisher. 17th Ed. 2010.
4. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

CORE PAPER VIII LAB

Inorganic preparations

Preparation of complexes:

i. Hexamine nickel(II), $[Ni(NH_3)_6]Cl_2$

i. Potassium trioxalatoferrate(III) trihydrate

ii. Tetraamminecopper(II) sulphate, $[Cu(NH_3)_4]SO_4.H_2O$

iii. Tetraamminecarbonatocobalt(III) nitrate

Complexometric titration

i. Estimation of Ca by EDTA

ii. Estimation of Mg by EDTA

Gravimetric Analysis:

i. Estimation of nickel(II) using dimethylglyoxime (DMG).

ii. Estimation of copper as CuSCN

iii. Estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$.

iv. Estimation of Al(III) by precipitating with oxine and weighing as $Al(oxine)_3$ (aluminiumoxinate).

Chromatography of metal ions

Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions:

i. Ni(II) and Co(II)

ii. Fe(III) and Al(III)

Reference Books:

1. Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS (1978).
2. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
3. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1st Edn., CBS Publishers & Distributors Pvt Ltd., (2017).

CORE PAPER IX

ORGANIC CHEMISTRY-III

UNIT-I

Nitrogen Containing Functional Groups

Preparation and important reactions of nitro and compounds, nitriles.

Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction; Distinction between 1°, 2° and 3° amines with Hinsberg reagent and nitrous acid.

UNIT-II

Diazonium Salts

Preparation and their synthetic applications.

Polynuclear Hydrocarbons

Reactions of naphthalene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene. Polynuclear hydrocarbons.

UNIT-III

Heterocyclic Compounds

Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Pyrimidine. Fischer indole synthesis and Madelung synthesis,

Derivatives of furan: Furfural and furoic acid (preparation only).

UNIT-IV

Alkaloids

Natural occurrence, General structural features, Isolation and their physiological action Hoffmann's exhaustive methylation, Emde's modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine.

Terpenes

Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral, Neral and α-terpineol.

Recommended Text Books:

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Advanced Organic Chemistry, 2nd Edition, Arun Bahl & B S Bahl, S. Chand Publisher, 2012.

Reference Books:

1. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013)
2. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
3. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER IX LAB

Qualitative organic analysis of organic compounds

1. Detection of extra elements (N, X, S) in organic compounds by Lassaigne's test.
2. Qualitative analysis of unknown organic compounds containing simple functional groups under CHN system (amine, nitro, amide and imide), determination of melting/boiling point, and preparation of their derivative.

Reference Books

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
2. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical OrganicChemistry, 5th Ed., Pearson (2012)
3. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry:Qualitative Analysis, University Press (2000).
4. Ghoshal, A., Mahapatra, B., Nad, A. K. An Advanced Course in Practical Chemistry, New Central Book Agency (2007).

CORE PAPER X
PHYSICAL CHEMISTRY-IV

UNIT-I

Conductance-I

Arrhenius theory of electrolytic dissociation. Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution. Kohlrausch law of independent migration of ions. Debye-Hückel-Onsager equation, Wien effect, Debye-Falkenhagen effect, Walden's rules.

UNIT-II

Conductance-II

Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance measurement: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts, (iv) conductometric titrations, and (v) hydrolysis constants of salts.

UNIT-III

Electrochemistry-I

Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry.

Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone, glass electrodes.

UNIT-IV

Electrochemistry-II

Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).

Electrical properties of atoms and molecules

Basic ideas of electrostatics, Electrostatics of dielectric media. Clausius-Mosotti equation and Lorenz-Laurentz equation (no derivation), Dipole moment and molecular polarizabilities and their measurements.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Puri, Sharma &Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
3. Kapoor, K. L., Text Book of Physical Chemistry, Mac Grow Hill, 3rdEdn., 2017
4. Castellan G. W. Physical Chemistry 4th Ed. Narosa (2004).

Reference Books:

1. Engel T. & Reid P., Physical Chemistry 3rd Ed. Pearson (2013).
2. Levine, I. N. Physical Chemistry 6thEd., Tata McGraw-Hill (2011).
3. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
4. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications

CORE PAPER X LAB

Conductometry

I. Determination of cell constant.

II. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.

III. Perform the following conductometric titrations:

   i. Strong acid vs. strong base

   ii. Weak acid vs. strong base

   iii. Strong acid vs. weak base

Potentiometry

I Perform the following potentiometric titrations:

   i. Strong acid vs. strong base

   ii. Weak acid vs. strong base

   iii. Dibasic acid vs. strong base

Reference Books:

1. Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand &Co.,New Delhi (2011).
2. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P., Experiments in Physical Chemistry8th Ed.; McGraw-Hill: New York (2003).
3. Halpern, A. M. &McBane, G. C., Experimental Physical Chemistry 3rdEd.; W.H. Freeman & Co., New York (2003).
4. Viswanathan, B., Raghavan, P.S., Practical Physical Chemistry, Viva Books (2009).

CORE PAPER XI

ORGANIC CHEMISTRY-IV

UNIT-I

Organic Spectroscopy-I

UV Spectroscopy: Types of electronic transitions, λ_{max}, Lambert-Beer's law and its limitations, Chromophores and Auxochromes,Bathochromic and Hypsochromic shifts, Intensity of absorption; Application of Woodward rules for calculation of λ_{max} for the following systems: α,β the unsaturated aldehydes: ketones, carboxylic acids and esters; Conjugated dienes: alicyclic, homoannular and heteroannular; Extended conjugated systems (aldehydes, ketones and dienes); distinction between cis and trans isomers.

UNIT-II

Organic Spectroscopy-II

IR Spectroscopy: Fundamental and non-fundamental molecular vibrations; IR absorptionpositions of O and N containing functional groups; Effect of H-bonding, conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in simple functional group analysis.

UNIT-III

Organic Spectroscopy-III

NMR Spectroscopy: Basic principles of Proton Magnetic Resonance, chemical shift andfactors influencing it; Spin-spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics; Interpretation of NMR spectra of simple compounds.

Mass Spectroscopy- Basic principle, Fragmentation pattern, instrumentation, determination of m/e ratio. Application of mass spectroscopy on CH_4, C_2H_6, *n*-butane and *neo*-pentane.

Applications of IR, UV & NMR for identification of simple organic molecules.

UNIT-IV

Carbohydrates

Occurrence, classification and their biological importance.

Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections

and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation;

Disaccharides – Structure elucidation of maltose; Polysaccharides – Elementary treatment of starch, cellulose.

Recommended Text Books:

1. Kemp William, Organic Spectroscopy, 3rd Edition, Palgrave Publisher, 1991.
2. Davis, B. G., Fairbanks, A. J., Carbohydrate Chemistry, Oxford Chemistry Primer, Oxford University Press.
3. J Kalsi P. S., Spectroscopy of Organic Compounds, 5th Edition, , New Age International Publishers, 2016.
4. Advanced Organic Chemistry, 2nd Edition, Arun Bahl & B S Bahl, S. Chand Publisher, 2012.

Reference Books:

1. Y R Sharma, Elementary Organic Spectroscopy, 5th Edition, S. Chand & Company, 2013.
2. Jag Mohan, Organic Spectroscopy and Applications, NarosaPublishrs, 2012.
3. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013).
4. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
5. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER XI LAB

1. Qualitative analysis of carbohydrate: aldoses and ketoses, reducing and non-reducing sugars.
2. Qualitative analysis of unknown organic compounds containing simple bifunctional groups, for e.g. salicylic acid, cinnamic acid, nitrophenols etc.
3. Quantitative estimation of sugars:
   (c) Estimation glucose by titration with Fehling's solution.
   (d) Estimation of sucrose by titration with Fehling's solution.

(e) Estimation glucose and sucrose in a given mixture.

4. Identification of labelled peaks in the ^{1}H NMR spectra of the known organic compounds explaining the relative δ-values and splitting pattern.
5. Identification of labelled peaks in the IR spectrum of the same compound explaining the relative frequencies of the absorptions (CORE PAPERH, O-H, N-H, CORE PAPERO, CORE PAPERN, CORE PAPERX, C=C, C=O, N=O, C≡C, C≡N stretching frequencies; characteristic bending vibrations are included).

Reference Books:

1. Vogel, A.I. *Quantitative Organic Analysis,* Part 3, Pearson (2012).
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical OrganicChemistry, 5th Ed.,* Pearson (2012)
4. Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry:Preparation and Quantitative Analysis,* University Press (2000).
5. Ahluwalia, V.K. & Dhingra, S. *Comprehensive Practical Organic Chemistry:Qualitative Analysis,* University Press (2000).

CORE PAPER XII
PHYSICAL CHEMISTRY V

UNIT-I

Quantum Chemistry-I

Quantum mechanical operators, Postulates of quantum mechanics, Schrödinger equation and its application to particle in one-dimensional box (complete solution) - quantization of energy levels, zero-point energy, normalization of wave functions, probability distribution functions, nodal properties. Extension to three-dimensional boxes, separation of variables, degeneracy.

Qualitative treatment of simple harmonic oscillator model of vibrational motion: Setting up of Schrödinger equation and discussion of solution and wave functions. Vibrational energy of diatomic molecules and zero-point energy.

Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component.

Rigid rotator model of rotation of diatomic molecule: Schrödinger equation, transformation to spherical polar coordinates. Separation of variables (Preliminary treatment).

UNIT-II

Chemical Bonding

Chemical bonding: Covalent bonding, valence bond and molecular orbital approaches, LCAO-MO treatment of H_2^+. Bonding and antibonding orbitals. Qualitative extension to H_2. Comparison of LCAO-MO and VB treatments of H_2 (only wave functions, detailed solution not required) and their limitations. Localized and non-localized molecular orbitals treatment of triatomic (BeH_2, H_2O) molecules. Qualitative MO theory and its application to AH_2 type molecules.

UNIT-III

Molecular Spectroscopy-I

Interaction of electromagnetic radiation with molecules and various types of spectra; Born-Oppenheimer approximation.

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

UNIT-IV

Molecular Spectroscopy-II

Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion.

Electronic spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation.

Photochemistry

Characteristics of electromagnetic radiation, physical significance of absorption coefficients. Laws of photochemistry, quantum yield, actinometry, examples of low and high quantum yields, photochemical equilibrium and the differential rate of photochemical reactions, photosensitised reactions, quenching, chemiluminescence.

Recommended Text Books:

1. McQuarie D., Quantum Chemistry, University Science Publishers, 2007
2. Chandra, A. K. Introductory Quantum Chemistry Tata McGraw-Hill (2001).
3. Banwell, C. N. &McCash, E. M. Fundamentals of Molecular Spectroscopy 4th Ed. Tata McGraw-Hill: New Delhi (2010).
4. Prasad R K., Quantum Chemistry, New Age International Publishers, 4thEdn, 2010.
5. Rohatagi Mukherjee K K., Fundamentals of Photochemistry, Wiley Eastern Ltd., 1992.

Reference Books:

1. Puri, Sharma &Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
2. Kapoor, K. L., Text Book of Physical Chemistry, McGraw Hill, Vol. II, IV
3. Levine, I. N. Quantum Chemistry, PHI

CORE PAPER XII LAB

Spectroscopy/Colorimetry

1. Study of absorption spectra (visible range) of $KMnO_4$ and determine the λ_{max} value. Calculate the energies of the transitions in kJ mol^{-1}, cm^{-1}, and eV.
2. Verify Lambert-Beer's law and determine the concentration of $CuSO_4$/$KMnO_4$/$K_2Cr_2O_7$ in a solution of unknown concentration.
3. Determine the dissociation constant of an indicator (phenolphthalein).

Spectrophotometric titration

1. Determine the concentration of HCl against 0.1 N NaOH spectrophotometrically.

2. To find the strength of given ferric ammonium sulfate solution of (0.05 M) by using EDTA spectrophotometrically.
3. To find out the strength of $CuSO_4$ solution by titrating with EDTA spectrophotometrically.
4. To determine the concentration of Cu(II) and Fe(III) solution photometrically by titrating with EDTA.

Reference Books

1. Khosla, B. D.; Garg, V. C. & Gulati, A., *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi (2011).
2. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. *Experiments in PhysicalChemistry 8th Ed.;* McGraw-Hill: New York (2003).
3. Halpern, A. M. &McBane, G. C. *Experimental Physical Chemistry 3rdEd.;* W.H. Freeman & Co.: New York (2003).
4. J. N. Gurtu, R. Kapoor, Experimental Physical Chemistry.

CORE PAPER XIII
INORGANIC CHEMISTRY-IV

UNIT-I

Organometallic Compounds-I

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands.

Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series. Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π-acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding.

Zeise's salt: Preparation and structure, evidences of synergic effect and comparison of synergic effect with that in carbonyls.

UNIT-II

Organometallic Compounds-II

Metal Alkyls: Important structural features of methyl lithium (tetramer) and trialkyl aluminium (dimer), concept of multicentre bonding in these compounds. Role of triethylaluminium in polymerisation of ethene (Ziegler – Natta Catalyst). Species present in ether solution of Grignard reagent and their structures.

Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation), structure and aromaticity, comparison of aromaticity and reactivity with that of benzene.

UNIT-III

Catalysis by Organometallic Compounds

Study of the following industrial processes and their mechanism:

1. Alkene hydrogenation (Wilkinson's Catalyst)
2. Hydroformylation (Co salts)
3. Wacker Process
4. Synthetic gasoline (Fischer Tropsch reaction)

Theoretical Principles in Qualitative Analysis (H_2S Scheme)

Basic principles involved in analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride and phosphate) and need to remove them after Group II.

UNIT-IV

Thermodynamic & kinetic aspects and reaction mechanism of metal complexes

Thermodynamic and kinetic stability, Stepwise and overall formation constants and their relationship, factors affecting stability. Introduction to inorganic reaction mechanisms-types of

reaction and classification od substitution reaction. Substitution reaction of square planar complexes, Trans effect and its applications, theories of trans-effect (electrostatic polarization and Static π-Bonding Theory). Kinetics of octahedral substitution (classification of metal ions based on water exchange rate), General mechanism of ligand substitution reactions in octahedral complexes (D, I, I_d, I_a).

Recommended Text Books:

1. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
3. Shriver D. E.,Atkins P. W., InorganicChemistry, Oxford UniversityPress,5thEdn..
4. Svehla, G. *Vogel's Qualitative Inorganic Analysis*, 7th Edition, Prentice Hall, 1996-0307.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Selected Topic in Inorganic Chemistry, Mallick, Madan and Tuli, S. Chand Publisher. 17th Ed. 2010.
3. Mehrotra R.C. and Singh, A. *Organometallic Chemistry,* New Age International Publishers, 2ndEdn, 2000.
4. Gupta B. D. and Elias A. J., Basic organometallic Chemistry, 2ndEdn., University Press (2013).

CORE PAPER XIII LAB

- Qualitative analysis of mixtures containing 4 radicals (2 anions and 2 cations). Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

  CO_3^{2-}, NO_2^-, S^{2-}, SO_3^{2-}, F^-, Cl^-, Br^-, I^-, NO_3^-, PO_4^{3-}, NH_4^+, K^+, Pb^{2+}, Cu^{2+}, Cd^{2+}, Bi^{3+}, Sn^{2+}, Sb^{3+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Zn^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}.
- Mixtures may contain one insoluble component ($BaSO_4$, $SrSO_4$, $PbSO_4$, CaF_2 or Al_2O_3)

orcombination of interfering anions e.g. CO_3^{2-} and SO_3^{2-}, NO_2^- and NO_3^-, Cl^- and Br^-, Cl^- and I^-, Br^- and I^-, NO_3^- and Br^- , NO_3^- and I^-.

- Spot tests should be done whenever possible.

Reference Books

1. Vogel's Qualitative Inorganic Analysis, 7th Ed, Revised by G. Svehela, 4th Ed., Person (2007).
2. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt Ltd., (2017).

CORE PAPER XIV
ORGANIC CHEMISTRY-V

UNIT-I

Amino Acids, Peptides and Proteins

Amino acids: Classification; α-Amino acids - Synthesis, ionic properties and reactions.

Zwitterions, pK_a values, isoelectric point and electrophoresis.

Peptides: Classification, determination of their primary structures-end group analysis, methods of peptide synthesis. Synthesis of peptides using N-protecting, CORE PAPERprotecting and CORE PAPERactivating groups -Solid-phase synthesis.

Proteins: Structure of proteins, protein denaturation and renaturation

UNIT-II

Enzymes

Introduction, classification and characteristics of enzymes. Salient features of active site of enzymes. Mechanism of enzyme action (taking trypsin as example), factors affecting enzyme action, coenzymes and cofactors and their role in biological reactions, specificity of enzyme action (including stereo specificity), enzyme inhibitors and their importance, phenomenon of inhibition (competitive, uncompetitive and non-competitive inhibition including allosteric inhibition).

Nucleic Acids

Components of nucleic acids, Nucleosides and nucleotides;

Structure, synthesis and reactions of: Adenine, Guanine, Cytosine, Uracil and Thymine; Structure of polynucleotides.

UNIT-III

Lipids

Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenntion of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity.

Concept of Energy in Biosystems

Cells obtain energy by the oxidation of foodstuff (organic molecules). Introduction to metabolism (catabolism and anabolism).

Overview of catabolic pathways of fat and protein.

Interrelationship in the metabolic pathways of protein, fat and carbohydrate. Caloric value of food, standard caloric content of food types.

UNIT-IV

Pharmaceutical Compounds: Structure and Importance

Classification, structure and therapeutic uses of antipyretics: Paracetamol (with synthesis), Analgesics: Ibuprofen (with synthesis), Antimalarials: Chloroquine (with synthesis). An elementary treatment of Antibiotics and detailed study of chloramphenicol, Medicinal values of curcumin (haldi), azadirachtin (neem), vitamin C and antacid (ranitidine).

Dyes

Classification, colour and constitution; Mordant and Vat dyes; Chemistry of dyeing. Synthesis and applications of: *Azo dyes* – Methyl orange and Congo red (mechanism of Diazo Coupling); *Triphenylmethane dyes* - Malachite Green, and crystal violet; *Phthalein dyes* – Phenolphthalein and Fluorescein.

Recommended Text books

1. Nelson, D.L., Cox, M.M. and Lehninger, A.L. Principles of Biochemistry. 6thEdn. W.H. Freeman and Co. (2013).
2. Kar Ashutosh, Medicinal chemistry, New Age International (P) Ltd., (2007)

3. Debojyoti Das, Biochemistry, (part-I) Academic Publishers (1979)

Reference Books:

1. Talwar, G.P. & Srivastava, M. Textbook of Biochemistry and Human Biology, 3rd Ed. PHI Learning.
2. Berg, J.M., Tymoczko, J.L. &Stryer, L. Biochemistry, W.H. Freeman, 2002.
4. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009) Harper's Illustrated Biochemistry. XXVIII edition. Lange Medical Books/ McGraw-Hill.
5. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2006) Biochemistry, 6th Edition. W.H. Freeman and Co. (2002).
6. Wilson, K. & Walker, J. Practical Biochemistry. Cambridge University Press (2009).
7. The Tools of Biochemistry (1977; Reprint 2011) Cooper, T.G., Wiley India Pvt. Ltd. (New Delhi), ISBN: 978-81-265-3016-8.

CORE PAPER XIV LAB

1. Preparations of the following compounds
    i. Aspirin
    ii. Methyl orange
2. Estimation of phenol and aniline by bromination method.
3. Saponification value of an oil/fat/ester.
4. Estimation of glycine by Sorenson's formalin method.
5. Estimation formaldehyde (formalin).
6. Estimation of ascorbic acid in fruit juices/Vitamin C tablet (Iodometric method)
7. Determination of Iodine number of an oil/ fat.

Reference Books:

1. Arthur, I. Vogel, Elementary Practical Organic Chemistry, Part-1 Small scale preparations, Indian Edition, Pearson (2011).
2. Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.
3. Arthur, I. Vogel, *Quantitative Organic Analysis,* Pearson.
4. Wilson, K. & Walker, J. Practical Biochemistry. Cambridge University Press (2009).

Discipline Specific Elective Paper-1

POLYMER CHEMISTRY

UNIT-I

Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems.

UNIT-II

Mechanism & Kinetics of Polymerization:

Polymerization reactions – addition and condensation, mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

UNIT-III

Molecular weight of polymers and their determination (M_n,M_w, M_v, M_z) by end group analysis,viscometry and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index.

Glass transition temperature (T_g) and it determination: WLFequation, Outlines of factors affecting glass transition temperature (T_g).

UNIT-IVProperties of polymers (physical, thermal and mechanical properties).

Preparation, structure, properties and applications of the following polymers: polyolefins (polyethylene, polypropylene), polystyrene, polyvinyl chloride, polyvinyl acetate, polyacrylamide, fluoro polymers (Teflon), polyamides (nylon-6 and nylon 6,6). Thermosetting polymers - phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, conducting polymers (polyacetylene, polyaniline). Brief outline of biodegradable polymers.

Recommended Text Books:

1. V. R. Gowarikar, Jayadev Sreedhar, N. V. Viswanathan, Polymer Science 1st Edition, New Age International Publishers, 1986.
2. Premamoy Ghosh, Polymer Science and Technology: Plastics, Rubber, Blends and Composites, 3rdEdition, McGraw Hill Education, 2010.
3. P. Bahadur &N.V.Sastry, Principles of polymer science, Narosa Publishing house, New Delhi 2002.
4. Fred W. Billmeyer, Textbook of Polymer Science, 3rd ed. Wiley-Interscience (1984)

Reference books

1. L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005)
2. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)
3. Seymour/Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).
4. Nayak P.L., Polymer Chemistry, Kalyani Publisher (2017).

Discipline Specific Elective Paper I LAB

Polymer synthesis (At least three experiment)

1. Preparation of nylon-6,6 / Polyaniline
2. Preparations of phenol-formaldehyde resin-novalac / phenol-formaldehyde resin resold.
3. Preparation of urea-formaldehyde resin
4. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
   a. Purification of monomer
   b. Polymerization using benzoyl peroxide (BPO) / 2,2'-azo-bis-isobutylonitrile (AIBN)
5. Redox polymerization of acrylamide
6. Precipitation polymerization of acrylonitrile

Polymer characterization/analysis (At least two different experiemtn)

1. Determination of molecular weight by viscometry:
   a. Polyacrylamide / Polystyrene
   b. (Polyvinyl pyrolidine (PVP)
2. Determination of acid value/saponification value of a resin.
3. Determination of hydroxyl number of a polymer using colorimetric method.
4. Estimation of the amount of HCHO in the given solution by sodium sulphite method
5. Analysis of some IR spectra of polymers – Identification of labelled peaks in IR spectra of known polymer.

Reference Books:

1. Hundiwale G.D., Athawale V.D., Kapadi U.R. and Gite V. V., Experiments in Polymer Science, New Age Publications (2009)
2. Malcohm P. Stevens, Polymer Chemistry: An Introduction, 3rd Ed.
3. Joel R. Fried, Polymer Science and Technology, 2nd ed. Prentice-Hall (2003)
4. Petr Munk and Tejraj M. Aminabhavi, Introduction to Macromolecular Science, 2nd ed. John Wiley & Sons (2002)
5. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)

Discipline Specific Elective Paper-1I
GREEN CHEMISTRY

UNIT-I

Introduction to Green Chemistry

What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations/ Obstacles in the pursuit of the goals of Green Chemistry.

Principles of Green Chemistry and Designing a Chemical synthesis-I

Twelve principles of Green Chemistry. Explanations of principle with special emphasis on - Designing green synthesis processes: Prevention of Waste/ by-products; maximize the incorporation of the materials used in the process into the final products (Atom Economy) with reference to rearrangement, addition, substitution and elimination reactions; Prevention/ minimization of hazardous/ toxic products; Designing safer chemicals; Use of safer solvents and

auxiliaries (e.g. separating agent) - green solvents (supercritical CO_2, water, ionic liquids), solventless processes, immobilized solvents.

UNIT-II

Principles of Green Chemistry and Designing a Chemical synthesis-II

Explanation of green chemistry principles with special emphasis on:

Energy efficient processes for synthesis - use of microwaves and ultrasonic energy. Selection of starting materials (use of renewable feedstock); avoidance of unnecessary derivatization (e.g. blocking group, protection groups, deprotection); Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; designing of biodegradable products use of chemically safer substances for prevention of chemical accidents, inherent safer design greener - alternative to Bhopal Gas Tragedy (safer route to carcarbaryl) and Flixiborough accident (safer route to cyclohexanol); real-time, in-process monitoring and control to prevent the formation of hazardous substances; development of green analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes;

UNIT-III

Examples of Green Synthesis/ Reactions and some real world cases-I

Green Synthesis of the following compounds: adipic acid, catechol, methyl methacrylate, urethane, disodium iminodiacetate (alternative to Strecker synthesis), paracetamol, furfural.

Microwave assisted reactions: Applications to reactions (i) in water: Hofmann Elimination, hydrolysis (of benzyl chloride, methyl benzoate to benzoic acid), Oxidation (of toluene, alcohols); (ii) reactions in organic solvents: Diels-Alder reaction and Decarboxylation reaction.

Ultrasound assisted reactions: Applications to esterification, saponification, Simmons-Smith Reaction (Ultrasonic alternative to Iodine).

UNIT-IV

Examples of Green Synthesis/ Reactions and some real world cases-II

Surfactants for carbon dioxide – replacing smog producing and ozone depleting solvents with CO_2 for precision cleaning and dry cleaning of garments; Designing of Environmentally safe marine antifoulant; Rightfit pigment: synthetic azopigments to replace toxic organic and

inorganic pigments; Synthesis of a compostable and widely applicable plastic (poly lactic acid) from corn; Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting

Future Trends in Green Chemistry

Oxidizing and reducing reagents and catalysts; multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; Green chemistry in sustainable development. (Bio-diesel, bio-ethanol and biogas)

Recommended Text Books:

1. Anastas P.T. & Warner J.K.: Green Chemistry- Theory and Practical, Oxford University Press (2000).
2. Ahluwalia V.K. & Kidwai M.: New Trends in Green Chemistry, Anamalaya Publishers, New Delhi (2004).
3. Kumar V., An Introduction to Green Chemistry, Vishal Publishing Co., (2015).

Reference Books:

1. Matlack A.S. Introduction to Green Chemistry, Marcel Dekker (2001).
2. Das Asim K. amd Das Mahua , Environment Chemistry with Green Chemistry, Books and Allied (P) Ltd. (2010)

Discipline Specific Elective Paper II LAB

At least five experiments should be done:

1. Acetylation of primary amine (Aniline to N-phenylacetamide) using Zn dust.
2. Nitration of salicylic acid by green method (Using calcium nitrate and acetic acid).
3. Bromination of acetanilide using ceric ammonium nitrate/KBr.
4. Microwave assisted nitration of Phenols using $Cu(NO_3)_2$.
5. Detection of elements in organic compounds by green method (Sodium carbonate fusion)
6. Base catalyzed Aldol condensation (Synthesis of dibenzalpropanone)
7. Vitamin C clock reaction using vitamin C tablets, tincture of iodine, hydrogen peroxide and liquid laundry starch. Effect of concentration on clock reaction.
8. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

9. Diels Alder reaction in water: Reaction between furan and maleic acid in water and at room temperature rather than in benzene and reflux.
10. Preparation and characterization of nanoparticles (Cu, Ag) using plant extract.
11. Preparation of propene by following two methods or any other reactions like addition, elimination, substitution showing atomic economy can be studied

(I) Triethylamine ion + OH^- → propene + trimethylpropene + water

(II) 1-propanol $\xrightarrow{H_2SO_4/\Delta}$ propene + water

Reference Books:

1. Monograph on Green Chemistry Laboratory Experiments, edited and published by Green Chemistry Task Force Committee, DST Govt. of India, p. 1-79.
2. Kirchoff, M. & Ryan, M.A. *Greener approaches to undergraduate chemistryexperiment*. American Chemical Society, Washington DC (2002).
3. Sharma, R.K.; Sidhwani, I.T. & Chaudhari, M.K. I.K. *Green Chemistry Experiment:A monograph International Publishing House Pvt Ltd. New Delhi*. Bangalore CISBN978-93-81141-55-7 (2013).

Discipline Specific Elective Paper-1II
INDUSTRIAL CHEMICALS AND ENVIRONMENT

UNIT-I

Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production, uses, storage and hazards in handling of thefollowing gases: oxygen, nitrogen, argon, hydrogen, acetylene, carbon monoxide, chlorine, sulphur dioxide.

Inorganic Chemicals: Manufacture, application and hazards in handling thefollowing chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, potassium dichromate and potassium permanganate.

Industrial Metallurgy

Preparation of metals (ferrous and nonferrous) and ultrapure metals for semiconductor technology.

UNIT-II

Environment and its segments

Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulphur.

Air Pollution: Major regions of atmosphere. Chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particle size and chemical nature; Photochemical smog: its constituents and photochemistry. Environmental effects of ozone. Major sources of air pollution.

Pollution by SO_2, CO_2, CO, NO_x, and H_2S and control procedures.

Effects of air pollution on living organisms and vegetation. Greenhouse effect and global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and halogens, removal of sulphur from coal.

UNIT-III

Water Pollution: Hydrological cycle, water resources, aquatic ecosystems, Sources andnature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems.

Water purification methods. Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluents from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, fertilizer. Sludge disposal.

Industrial waste management: incineration of waste. Water treatment and purification (reverse osmosis, ion exchange). Water quality parameters for wastewater, industrial water and domestic water.

UNIT-IV

Energy and Environment

Sources of energy: Coal, petrol and natural gas. Nuclear fusion/fission, solar energy, hydrogen, geothermal, tidal and hydel.

Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management.

Biocatalysis

Introduction to biocatalysis: Importance in green chemistry and chemical industry.

Recommended Text Books:

1. De, A. K. *Environmental Chemistry*: New Age International Pvt., Ltd, New Delhi, 2010.
2. Stocchi E., *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).

Reference Books:

4. Felder R.M. and Rousseau R.W., *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
5. Dara S. S., *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
6. Miller G.T., Environmental Science, 11th edition. Brooks/ Cole (2006).
7. Mishra, Environmental Studies, Selective and Scientific Books, New Delhi (2005).

Discipline Specific Elective Paper III LAB

1. Determination of Dissolved Oxygen (DO) in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method ($AgNO_3$ and potassium chromate).
6. Estimation of total alkalinity of water samples (CO_3^{2-}, HCO_3^-) using double titration method.
7. Measurement of dissolved CO_2.
8. Study of some of the common bio-indicators of pollution.
9. Estimation of SPM in air samples.
10. Preparation of borax/ boric acid.

Reference Books:

1. Dara S. S., A Textbook on Experiments and Calculations in Engineering

ChemistrySChand & Company; 9th Revised edition (2015).
2. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. R.M. Felder, R.W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
4. A. Kent: Riegel's *Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
5. S. M. Khopkar, *Environmental Pollution Analysis*: Wiley Eastern Ltd, New Delhi.

Discipline Specific Elective Paper-1V
INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

Unit 1

Silicate Industries

Glass: Glassy state and its properties, classification (silicate and nonsilicate glasses).Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

Ceramics: Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibre.

Cements: Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

Unit II

Fertilizers: Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate.

Batteries: Primary and secondary batteries, battery components and their role, Characteristics of Battery. Working of following batteries: Pb acid, Li-Battery, Solid state electrolyte battery. Fuel cells, Solar cell and polymer cell.

Unit III

Surface Coatings:

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint,

Vehicle, modified oils, Pigments, toners and lakes pigments, Fillers, Thinners, Enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings, metal spraying and anodizing.

Unit IV

Alloys: Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon, decarbonization, demanganization, desulphurization, dephosphorisation) and surface treatment (argon treatment, heat treatment nitriding, carburizing). Composition and properties of different types of steels.

Chemical explosives: Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX). Introduction to rocket propellants.

Recommended Text Books:

1. Stocchi E., *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
2. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).
3. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.

Reference Books:

1. Felder R.M. and Rousseau R.W., *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
2. Dara S. S., *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
3. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
4. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.

Discipline Specific Elective Paper-IV LAB

List of Practicals

1. Determination of free acidity in ammonium sulphate fertilizer.
2. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Estimation of phosphoric acid in superphosphate fertilizer.
4. Determination of composition of dolomite (by complexometric titration).

5. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples.
6. Analysis of Cement.
7. Estimation of Iron from Cement Volumetrically
8. Preparation of pigment (zinc oxide).

Reference Books

1. Dara S. S., A Textbook on Experiments and Calculations in Engineering ChemistryS Chand & Company; 9th Revised edition (2015).
2. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
3. R. M. Felder, R. W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
4. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi.
5. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
6. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
7. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.

Alternative to DSC CORE PAPERIV

Discipline Specific Elective Paper-V

DISSERTATION

A project work is to be carried out by the student in consultation with the teachers of the department. The report of work (dissertation) in a standard format is to be submitted and presented for evaluation.

Distribution of marks

(a) Project Report/Dissertation (Proper documentation of literature, data, discussion etc. and logical flow of work undertaken): 50 Marks
(b) Seminar/Presentation: 30 marks
(c) Viva voce: 20 marks

A brief Guidelines to Project Work:

1. Students shall undertake the project work (experimental/theoretical) related to any branch of

chemistry/Chemical science under the guidance of teacher(s) from the department or jointly with teachers/research personnel of other institutes.

2. The following activities have been outlined as guidelines (not exhaustive):
    - Physiochemical studies (pH, conductivity, turbidity, etc.) of different wetlands (ponds, lakes, river etc.)
    - Analysis of iron in pond / tube well / river water.
    - Analysis of Hardness of water samples.
    - Adulteration detection activities in food stuff and other edible items.
    - Extraction and preliminary characterization of useful chemicals (as far as possible) from plants.
    - Solubility, surface tension, and viscosity measurements of some solution of practical relevance, (cough syrup, soap solution, pesticides, fertilizers.. etc.)
    - Pollution related activities (Industrial/Agricultural/Municipal etc.)
    - Nutrition related activities, (essential metal detection in food, cereals, pulses, fruits etc.).
    - Small synthetical work (inorganic/Organic/Polymeric compounds)

2. The UG level project work is a group activity, maximum number of students being limited to three. HOD to notify the name of teacher(s) for supervising the project work of each group. A teacher can guide more than one group, if necessary.

4. No two groups in the same institution are permitted to do project work on the same problem.

5. Each student shall prepare and submit the project report separately for evaluation. Two copies of project report are required to be submitted in bound form (spiral/paperback).

6. The project report shall be divided as:

    Chapter I: Introduction (Introduction on the topic, review of literature, objective and scope of the work)

    Chapter II: Materials and methods

    Chapter II: Results and discussion

    Chapter IV: Conclusions and Scope of future studies

    Chapter V: References

Reference Books:

1. M. A. Malati, An Investigative, Integrated Approach to Practical Project Work; Mid-Kent

College of Higher/Further Education, UK (October 1999); Imprint: Woodhead Publishing; ISBN: 978-1-898563-47-1.

2. Dean, J. R., Jones, A. M., Holmes, D., Reed, R., Weyers, J. & Jones, A. (2011) Practical skills in chemistry. 2nd Ed., Prentice-Hall, Harlow.

Alternative for Discipline Specific Elective (DSE) Papers

Discipline Specific Elective Paper-VI

ANALYTICAL METHODS IN CHEMISTRY

Unit I

UV-Visible and IR Spectrometry

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

UV-Visible Spectrometry: Basic principles, instrumentation (choice of source, monochromator and detector) for single and double beam instrument; Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers. Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method.

Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques. Structural illustration through interpretation of data, Effect and importance of isotope substitution.

Unit II

Qualitative and quantitative aspects of analysis

Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution if indeterminate errors, statistical test of data; F, Q and t test, rejection of data, and confidence intervals.

Flame Atomic Absorption Spectrometry

Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

Unit III

Thermal and electro-analytical methods of analysis

Theory of thermo-gravimetry (TG), basic principle of instrumentation. Techniques for quantitative estimation of Ca and Mg from their mixture.

Classification of electro-analytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points.

Unit IV

Separation techniques

Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous and counter current extractions.

Chromatography: Classification, principle and efficiency of the technique. Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms: frontal, elution and displacement methods. Qualitative and quantitative aspects of chromatographic methods of analysis: TLC and HPLC.

Recommended text books:

1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed., The English Language Book Society of Longman.
2. Skoog, Holler and Crouch, Principles of Instrumental Analysis, Cengage Learning, 6th Indian Reprint (2017).
3. Christian, Gary D; Analytical Chemistry, 6th Ed., John Wiley & Sons, New York, 2004.

Reference books

1. Harris, Daniel C: Exploring Chemical Analysis, Ed. New York, W. H. Freeman, 2001.
2. Willard, Hobert H. et al.: Instrumental Methods of Analysis, 7th Ed., Wardsworth Publishing Company, Belmont, California, USA, 1988.
3. Mikes, O. &Chalmes, R.A. Laboratory Hand Book of Chromatographic & Allied Methods, Elles Harwood Ltd. London.
4. Pavia, Lamman, Kriz and Vyvyan, Introduction to Spectroscopy, Cengage Learning, 3rd Indian Reprint (2017).
5. Dash U N , Analytical Chemistry

Discipline Specific Elective Paper -V LAB

1. Paper chromatographic separation of Fe^{3+}, Al^{3+}, and Cr^{3+}.
2. Separation and identification of the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the R_f values.
3. Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their R_f values.
4. Chromatographic separation of the active ingredients of plants, flowers and juices by TLC
5. Determine the pH of the given aerated drinks fruit juices, shampoos and soaps.
6. Determination of Na, Ca, Li in cola drinks and fruit juices using flame photometric techniques.
7. Analysis of soil: determination of pH of soil, total soluble salt, estimation of calcium, magnesium, phosphate, nitrate
8. Separation of metal ions from their binary mixture.
9. Separation of amino acids from organic acids by ion exchange chromatography.
10. Determination of dissolved oxygen in water.
11. Determination of chemical oxygen demand (COD).

Reference Books:

1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G. H. Jeffery and others) 5th Ed., The English Language Book Society of Longman.
2. Willard, Hobert H. et al.: Instrumental Methods of Analysis, 7th Ed., Wardsworth Publishing Company, Belmont, California, USA, 1988.
3. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher, 2009.

GENERIC ELECTIVE (GE)

Generic Elective Paper I (Theory)

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

SECTION A: INORGANIC CHEMISTRY-1

Unit-I

Atomic Structure

Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra.

Quantum mechanics: Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Quantum numbers and their significance, shapes of s, p and d atomic orbitals, nodal planes.

Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.

Unit-II

Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics, energy considerations.Lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules and its applications.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

Concept of resonance and resonating structures in various inorganic and organic compounds.

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s*-*s*, *s*-*p* and *p*-*p* combinations of atomic orbitals, nonbonding combination of

orbitals, MO treatment of homonuclear diatomic molecules (N_2, O_2) and heteronuclear diatomic molecules (CO, NO). Comparison of VB and MO approaches

Section B: Organic Chemistry-1

Unit- III

Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive effect, Electromeric effect, Resonance and hyperconjugation. Cleavage of bonds: Homolysis and heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.

Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Hückel's rule.

Stereochemistry

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (up to two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). D and L; cis-trans nomenclature; CIP Rules: R/ S (for one chiral carbon atoms) and E / Z Nomenclature (for up to two C=C systems).

Unit-IV

Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkanes: (Up to 5 Carbons).*Preparation:*Catalytic hydrogenation, Wurtz reaction,Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation.

Alkenes: (Up to 5 Carbons)*Preparation:*Elimination reactions: Dehydration of alkenesand dehydrohalogenation of alkyl halides (Saytzeff's rule); cis-alkenes (Partial catalytic hydrogenation) and trans-alkenes (Birch reduction). *Reactions:* cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis,

Alkynes: (Up to 5 Carbons)*Preparation:*Acetylene from $CaC_2$and conversion intohigher

alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.

Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$,ozonolysis.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
3. Shriver D. E.,Atkins P. W., InorganicChemistry, Oxford UniversityPress,5th Edn..
4. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
5. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
6. BhalArun & BhalB S , Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
7. Kalsi, P. S. Stereochemistry Conformation and Mechanism; 8thEdn, New Age International, 2015.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.
3. Mallick, Madan and Tuli, S. Chand Selected Topic in Inorganic Chemistry, , 17thEdn. 2010.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Generic Elective Paper I LAB

Section A: Inorganic Chemistry

Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with $KMnO_4$.
3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.
4. Estimation of Fe(II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.

5. Estimation of Cu(II) ions iodometrically using $Na_2S_2O_3$.

Section B:Organic Chemistry

1. Detection of extra elements (N, S, Cl) in organic compounds (containing up to two extra elements)
2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given)
   (f) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography.
   (g) Identify and separate the sugars present in the given mixture by paper chromatography.

Reference Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).

Generic Elective Paper II (Theory)

CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

Section A: Physical Chemistry-I

Unit-I

Chemical Energetics

Review of thermodynamics and the Laws of Thermodynamics.

Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.

Statement of Third Law of thermodynamics

Chemical Equilibrium

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG^{o}, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases

Unit- II

Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Section B: Organic Chemistry-II

Unit- III

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Aromatic hydrocarbons

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (up to 4 carbons on benzene). Side chain oxidation of alkyl benzenes (up to 4 carbons on benzene).

Alkyl and Aryl Halides

Alkyl Halides (Up to 5 Carbons) Types of Nucleophilic Substitution (SN_1, SN_2 and SNi) reactions.

Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile &isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.

Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer &Gattermann reactions.

Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$).

Unit- IV

Alcohols, Phenols and Ethers (Up to 5 Carbons)

Alcohols: Preparation: Preparation of 1°, 2° and 3° alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes and ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation Diols: (Up to 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. ReimerTiemann Reaction, Gattermann-Koch Reaction,

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic): Formaldehyde, acetaldehyde, acetone and benzaldehyde

Preparation: from acid chlorides and from nitriles.

Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6^{th} Ed., (2006).
2. Principles of Physical Chemistry, Puri, Sharma &Pathania, Vishal Publishing Co, 47^{th} Edn., 2017.
3. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3^{rd}Edn. 2017.
4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2^{nd} Edition, S. Chand Publisher, 2012.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Generic Elective Paper II LAB

Section A: Physical Chemistry

Thermochemistry (any three)

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO_3, NH_4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of ΔH.

Ionic equilibria

pH measurements

a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.

b) Preparation of buffer solutions:

- Sodium acetate-acetic acid
- Ammonium chloride-ammonium hydroxide

Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water) and determination of melting.
2. Preparations, recrystallisation, determination of melting point and calculation of quantitative yields of the followings:

(a) Bromination of Phenol/Aniline

(b) Benzoylation of amines/phenols

(c) Oxime and 2,4 dinitrophenylhydrazone of aldehyde/ketone

Reference Books

1. A.I. Vogel: Textbook of Practical Organic Chemistry, 5th edition, Prentice-Hall.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
4. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).

Generic Elective PaperIII (Theory)

CHEMISTRY OF S- AND P-BLOCK ELEMENTS, STATES OFMATTER & CHEMICAL KINETICS

UNIT-I

General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent.

Hydrometallurgy, Methods of purification of metals (Al, Pb, Fe, Cu, Ni): electrolytic, oxidative refining, Parting process, van Arkel-de Boer process and Mond's process.

***s*- and *p*-Block Elements**

Periodicity in *s*- and *p*-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling &Mulliken scales). Allotropy in C, S, and P.

Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.

UNIT-II

Compounds of *s*- and *p*-Block Elements

Hydrides and their classification (ionic, covalent and interstitial), structure and properties with respect to stability of hydrides of p- block elements.

Concept of multicentre bonding (diborane).

Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial, organic and environmental

chemistry.

Hydrides of nitrogen (NH_3, N_2H_4, N_3H, NH_2OH); Oxoacids of P, S and Cl; Halides and oxohalides: PCl_3, PCl_5, $SOCl_2$.

Section B: Physical Chemistry-3

UNIT-III

Kinetic Theory of Gases

Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.

Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation.

Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance.

Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).

Liquids

Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

UNIT-IV

Solids

Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, and CsCl (qualitative treatment only). Defects in crystals.

Chemical Kinetics

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for

zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.

Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
3. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn..
4. Principles of Physical Chemistry, Puri, Sharma &Pathania, Vishal Publishing Co, 47th Edn., 2017.
5. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rd Edn. 2017.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

Generic Elective Paper -III LAB

Section A: Inorganic Chemistry

Qualitative analysis of inorganic slat mixture using H_2S: not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:

Cations : NH_4^+, Pb^{2+}, Ag^+, Bi^{3+}, Cu^{2+}, Cd^{2+}, Sn^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Cr^{3+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, K^+

Anions: CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_3^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}, PO_4^{3-}, F^-

(Spot tests should be carried out wherever feasible)

Section B: Physical Chemistry

Chemical Kinetics

Study the kinetics of the following reactions.

1. Initial rate method: Iodide-persulphate reaction
2. Integrated rate method:

a. Acid hydrolysis of methyl acetate with hydrochloric acid.
b. Saponification of ethyl acetate.
c. Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate

Reference Books:

1. Svehla, G, Vogel's Qualitative Inorganic Analysis, 7th Ed, 4th Ed., Pearson Education (2007).
2. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
3. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt Ltd., (2017).

Generic Elective Paper- IV (Theory)

ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Section A: Inorganic Chemistry-4

UNIT-I

Chemistry of 3d metals

Oxidation states displayed by Cr, Fe, Co, Ni and Co.

A study of the following compounds (including preparation and important properties);

Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.

Organometallic Compounds

Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. π-acceptor behaviour of carbon monoxide. Synergic effects (VB approach).

UNIT-II

Bio-Inorganic Chemistry

A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+, K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, and structural role (bones).

Section B: Organic Chemistry-4

UNIT-III

Polynuclear and heteronuclear aromatic compounds

Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine.

Active methylene compounds

Preparation: Claisen ester condensation. Keto-enol tautomerism.

Reactions: Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules havingup to 6 carbon).

UNIT-IV

Application of Spectroscopy (UV-Visible, IR) to Simple Organic Molecules

Electromagnetic radiations, electronic transitions, λ_{max}&ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating $\lambda_{max}$of conjugated dienes and α, β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Recommended Text Books:

1. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
2. Shriver D. E.,Atkins P. W., InorganicChemistry, Oxford UniversityPress,5thEdn..
3. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.

4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Das Asim K., Bioinorganic Chemistry, Books & Allied (P) Ltd. 1st ed. 2015.
3. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Generic Elective PaperIV LAB

Section A: Inorganic Chemistry

1. Preparation of following compounds (Any two)
    a. Cuprous oxide (Cu_2O)
    b. Cuprous chloride, Cu_2Cl_2
    c. Manganese(III) phosphate, $MnPO_4.H_2O$
    d. Lead chromate ($PbCrO_4$

2. Separation of mixtures by chromatography: Measure the R_f value in each case. (Combination of two ions to be given)

- Paper chromatographic separation of Fe^{3+}, $A1^{3+}$ and Cr^{3+} or
- Paper chromatographic separation of Ni^{2+}, Co^{2+}, Mn^{2+} and Zn^{2+}

Section B: Organic Chemistry

Systematic qualitative organic analysis of organic compounds possessing mono-functional groups (-COOH, phenolic, aldehyde, ketone, amide, nitro, amines) and preparation of one derivative.

Reference Books

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6thEdn, Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
4. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt. Ltd., (2017).

Course structure of UG Chemistry Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Atomic structure, bonding, general organic chemistry &aliphatic hydrocarbons	04	75
	DSC-I Practical		02	25
II	DSC-II	Chemical energetics, equilibria & functional organicchemistry	04	75
	DSC-II Practical		02	25
III	DSC-III	Chemistry of s- and p-block elements, states of matter &chemical kinetics	04	75
	DSC-III Practical		02	25
IV	DSC-IV	Organometallics, bioinorganic chemistry, polynuclear hydrocarbons and UV, IR spectroscopy	04	75
	DSC-IV Practical		02	25
V	DSE-I	Polymer chemistry	04	75
	DSE-I Practical		02	25
VI	DSE-II	Industrial chemicals and Environment	04	75
	DSE-II Practical		02	25
			36	**600**

CHEMISTRY PAPERS FOR PASS STUDENTS

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper - Midterm : 15 marks, End term : 60 marks, Practical: 25 marks

Total – 100 marksCredit per paper – 6

Teaching hours per paper – 40 hours theory classes + 20 hours practical classes

Discipline Specific Core Paper I (Theory)

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

SECTION A: INORGANIC CHEMISTRY-1

Unit-I

Atomic Structure

Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra.

Quantum mechanics: Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Quantum numbers and their significance, shapes of s, p and d atomic orbitals, nodal planes.

Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.

Unit-II

Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics, energy considerations.Lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules and its applications.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

Concept of resonance and resonating structures in various inorganic and organic compounds.

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s*-*s*, *s*-*p* and *p*-*p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules (N_2, O_2) and heteronuclear diatomic molecules (CO, NO). Comparison of VB and MO approaches

Section B: Organic Chemistry-1

Unit- III

Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive effect, Electromeric effect, Resonance and hyperconjugation. Cleavage of bonds: Homolysis and heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.

Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Hückel's rule.

Stereochemistry

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (up to two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). D and L; cis-trans nomenclature; CIP Rules: R/ S (for one chiral carbon atoms) and E / Z Nomenclature (for up to two C=C systems).

Unit-IV

Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkanes: (Up to 5 Carbons).*Preparation:*Catalytic hydrogenation, Wurtz reaction,Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation.

Alkenes: (Up to 5 Carbons)*Preparation:*Elimination reactions: Dehydration of alkenesand dehydrohalogenation of alkyl halides (Saytzeff's rule); cis-alkenes (Partial catalytic hydrogenation) and trans-alkenes (Birch reduction). *Reactions:* cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis,

Alkynes: (Up to 5 Carbons)*Preparation:*Acetylene from $CaC_2$and conversion intohigher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.

Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$,ozonolysis.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
3. Shriver D. E.,Atkins P. W., InorganicChemistry, Oxford UniversityPress,5th Edn..
4. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
5. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
6. BhalArun & BhalB S , Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
7. Kalsi, P. S. Stereochemistry Conformation and Mechanism; 8th Edn, New Age International, 2015.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

3. Mallick, Madan and Tuli, S. Chand Selected Topic in Inorganic Chemistry, , 17th Edn. 2010.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Discipline Specific Core Paper-I LAB

Section A: Inorganic Chemistry

Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with $KMnO_4$.
3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.
4. Estimation of Fe(II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.
5. Estimation of Cu(II) ions iodometrically using $Na_2S_2O_3$.

Section B:Organic Chemistry

1. Detection of extra elements (N, S, Cl) in organic compounds (containing up to two extra elements)
2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given)
   (h) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography.
   (i) Identify and separate the sugars present in the given mixture by paper chromatography.

Reference Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press

Discipline Specific Core Paper II (Theory)

CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

Section A: Physical Chemistry-I

Unit-I

Chemical Energetics

Review of thermodynamics and the Laws of Thermodynamics.

Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.

Statement of Third Law of thermodynamics

Chemical Equilibrium

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG^{o}, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases.

Unit- II

Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle

Section B: Organic Chemistry-II

Unit- III

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Aromatic hydrocarbons

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and

sulphonation. Friedel-Craft's reaction (alkylation and acylation) (up to 4 carbons on benzene). Side chain oxidation of alkyl benzenes (up to 4 carbons on benzene).

Alkyl and Aryl Halides

Alkyl Halides (Up to 5 Carbons) Types of Nucleophilic Substitution (SN_1, SN_2 and SNi) reactions.

Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile &isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.

Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer &Gattermann reactions.

Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$).

Unit- IV

Alcohols, Phenols and Ethers (Up to 5 Carbons)

Alcohols: Preparation: Preparation of 1°, 2° and 3° alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes and ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation Diols: (Up to 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. ReimerTiemann Reaction, Gattermann-Koch Reaction,

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic): Formaldehyde, acetaldehyde, acetone and benzaldehyde

Preparation: from acid chlorides and from nitriles.

Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Principles of Physical Chemistry, Puri, Sharma &Pathania, Vishal Publishing Co, 47th Edn., 2017.
3. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rdEdn. 2017.
4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Discipline Specific Core Paper II LAB

Section A: Physical Chemistry

Thermochemistry (any three)

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO_3, NH_4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of ΔH.

Ionic equilibria

1. pH measurements

   Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.
2. Preparation of buffer solutions:

- Sodium acetate-acetic acid
- Ammonium chloride-ammonium hydroxide

Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water) and determination of melting.
2. Preparations, recrystallisation, determination of melting point and calculation of quantitative yields of the followings:

   (a) Bromination of Phenol/Aniline

   (b) Benzoylation of amines/phenols

   (c) Oxime and 2,4 dinitrophenylhydrazone of aldehyde/ketone

Reference Books

1. A.I. Vogel: Textbook of Practical Organic Chemistry, 5th edition, Prentice-Hall.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
4. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).

Discipline Specific Core Paper III (Theory)

CHEMISTRY OF S- AND P-BLOCK ELEMENTS, STATES OFMATTER & CHEMICAL KINETICS

UNIT-I

General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent.

Hydrometallurgy, Methods of purification of metals (Al, Pb, Fe, Cu, Ni): electrolytic, oxidative refining, Parting process, van Arkel-de Boer process and Mond's process.

s- and *p*-Block Elements

Periodicity in *s*- and *p*-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling &Mulliken scales). Allotropy in C, S, and P.

Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.

UNIT-II

Compounds of *s*- and *p*-Block Elements

Hydrides and their classification (ionic, covalent and interstitial), structure and properties with respect to stability of hydrides of p- block elements.

Concept of multicentre bonding (diborane).

Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial, organic and environmental chemistry.

Hydrides of nitrogen (NH_3, N_2H_4, N_3H, NH_2OH); Oxoacids of P, S and Cl; Halides and oxohalides: PCl_3, PCl_5, $SOCl_2$.

Section B: Physical Chemistry-3

UNIT-III

Kinetic Theory of Gases

Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.

Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation.

Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance.

Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).

Liquids

Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

UNIT-IV

Solids

Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, and CsCl (qualitative treatment only). Defects in crystals.

Chemical Kinetics

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.

Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5thEdn., 2008.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.

3. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn..
4. Principles of Physical Chemistry, Puri, Sharma &Pathania, Vishal Publishing Co, 47th Edn., 2017.
5. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rd Edn. 2017.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

Discipline Specific Core Paper III LAB

Section A: Inorganic Chemistry

Qualitative analysis of inorganic slat mixture using H_2S: not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:

Cations : NH_4^+, Pb^{2+}, Ag^+, Bi^{3+}, Cu^{2+}, Cd^{2+}, Sn^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Cr^{3+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, K^+

Anions: CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_3^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}, PO_4^{3-}, F^-

(Spot tests should be carried out wherever feasible)

Section B: Physical Chemistry

1. Chemical Kinetics
2. Study the kinetics of the following reactions.
3. Initial rate method: Iodide-persulphate reaction
4. Integrated rate method:
    a. Acid hydrolysis of methyl acetate with hydrochloric acid.
    b. Saponification of ethyl acetate.
    c. Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate

Reference Books:

1. Svehla, G, Vogel's Qualitative Inorganic Analysis, 7th Ed, 4th Ed., Pearson Education (2007).
2. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
3. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt Ltd., (2017).

Discipline Specific Core Paper - IV (Theory)

ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Section A: Inorganic Chemistry-4

UNIT-I

Chemistry of 3d metals

Oxidation states displayed by Cr, Fe, Co, Ni and Co.

A study of the following compounds (including preparation and important properties);

Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.

Organometallic Compounds

Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. π-acceptor behaviour of carbon monoxide. Synergic effects (VB approach).

UNIT-II

Bio-Inorganic Chemistry

A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+, K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, and structural role (bones).

Section B: Organic Chemistry-4

UNIT-III

Polynuclear and heteronuclear aromatic compounds

Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine.

Active methylene compounds

Preparation: Claisen ester condensation. Keto-enol tautomerism.

Reactions: Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules havingup to 6 carbon).

UNIT-IV

Application of Spectroscopy (UV-Visible, IR) to Simple Organic Molecules

Electromagnetic radiations, electronic transitions, λ_{max}&ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating $\lambda_{max}$of conjugated dienes and α, β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Recommended Text Books:

1. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
2. Shriver D. E.,Atkins P. W., InorganicChemistry, Oxford UniversityPress,5thEdn..
3. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Das Asim K., Bioinorganic Chemistry, Books & Allied (P) Ltd. 1st ed. 2015.
3. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Discipline Specific Core Paper -IV LAB

Section A: Inorganic Chemistry

3. Preparation of following compounds (Any two)

   a. Cuprous oxide (Cu_2O)

   b. Cuprous chloride, Cu_2Cl_2

   c. Manganese(III) phosphate, $MnPO_4.H_2O$

   d. Lead chromate ($PbCrO_4$)

2. Separation of mixtures by chromatography: Measure the R_f value in each case. (Combination of two ions to be given)

- Paper chromatographic separation of Fe^{3+}, $A1^{3+}$ and Cr^{3+} or
- Paper chromatographic separation of Ni^{2+}, Co^{2+}, Mn^{2+} and Zn^{2+}

Section B: Organic Chemistry

Systematic qualitative organic analysis of organic compounds possessing mono-functional groups (-COOH, phenolic, aldehyde, ketone, amide, nitro, amines) and preparation of one derivative.

Reference Books

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6thEdn, Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
4. Gulati Shikha , Sharma Gulati JL and ManochaShagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt. Ltd., (2017).

Discipline Specific Elective (DSE) - Pass

Discipline Specific Elective Paper –I

POLYMER CHEMISTRY

UNIT-I

Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems.

UNIT-II

Mechanism & Kinetics of Polymerization:

Polymerization reactions – addition and condensation, mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

UNIT-III

Molecular weight of polymers and their determination (M_n,M_w, M_v, M_z) by end group analysis,viscometry and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index.

Glass transition temperature (T_g) and it determination: WLFequation, Outlines of factors affecting glass transition temperature (T_g).

UNIT-IV

Properties of polymers (physical, thermal and mechanical properties).

Preparation, structure, properties and applications of the following polymers: polyolefins (polyethylene, polypropylene), polystyrene, polyvinyl chloride, polyvinyl acetate,

polyacrylamide, fluoro polymers (Teflon), polyamides (nylon-6 and nylon 6,6). Thermosetting polymers - phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, conducting polymers (polyacetylene, polyaniline). Brief outline of biodegradable polymers.

Recommended Text Books:

1. V. R. Gowarikar, Jayadev Sreedhar, N. V. Viswanathan, Polymer Science 1st Edition, New Age International Publishers, 1986.
2. Premamoy Ghosh, Polymer Science and Technology: Plastics, Rubber, Blends and Composites, 3rdEdition, McGraw Hill Education, 2010.
3. P. Bahadur &N.V.Sastry, Principles of polymer science, Narosa Publishing house, New Delhi 2002.
4. Fred W. Billmeyer, Textbook of Polymer Science, 3rd ed. Wiley-Interscience (1984)

Reference books

1. L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005)
2. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)
3. Seymour/Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).
4. Nayak P.L., Polymer Chemistry, Kalyani Publisher (2017).

Discipline Specific Elective Paper -I LAB

Polymer synthesis (Any three)

1. Preparation of nylon-6,6 / Polyaniline
2. Preparations of novalac resin/resold resin.
3. Preparation of urea-formaldehyde resin
4. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
5. Purification of monomer
6. Polymerization using benzoyl peroxide (BPO) / 2,2'-azo-bis-isobutylonitrile (AIBN)
7. Redox polymerization of acrylamide

8. Precipitation polymerization of acrylonitrile

Polymer characterization/analysis

1. Determination of molecular weight by viscometry:
   Polyacrylamide/Polystyrene
   (Poly vinyl pyrolidine (PVP) in water
2. Determination of acid value / saponification value of a resin
3. Determination of hydroxyl number of a polymer using colorimetric method.
4. Estimation of the amount of HCHO in the given solution by sodium sulphite method
5. Analysis of some IR spectra of polymers

Reference Books:

1. Malcohm P. Stevens, Polymer Chemistry: An Introduction, 3rd Ed.
2. Joel R. Fried, Polymer Science and Technology, 2nd ed. Prentice-Hall (2003)
3. Petr Munk and Tejraj M. Aminabhavi, Introduction to Macromolecular Science, 2nd ed. John Wiley & Sons (2002)
4. L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005)
5. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)
6. Seymour/Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).

Discipline Specific Elective Paper –II
INDUSTRIAL CHEMICALS AND ENVIRONMENT

UNIT-I

Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production, uses, storage and hazards in handling of thefollowing gases: oxygen, nitrogen, argon, hydrogen, acetylene, carbon monoxide, chlorine, sulphur dioxide.

Inorganic Chemicals: Manufacture, application and hazards in handling thefollowing chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, bleaching powder,

sodium thiosulphate, hydrogen peroxide, potash alum, potassium dichromate and potassium permanganate.

Industrial Metallurgy

Preparation of metals (ferrous and nonferrous) and ultrapure metals for semiconductor technology.

UNIT-II

Environment and its segments

Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulphur.

Air Pollution: Major regions of atmosphere. Chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particle size and chemical nature; Photochemical smog: its constituents and photochemistry. Environmental effects of ozone. Major sources of air pollution.

Pollution by SO_2, CO_2, CO, NO_x, and H_2S and control procedures.

Effects of air pollution on living organisms and vegetation. Greenhouse effect and global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and halogens, removal of sulphur from coal.

UNIT-III

Water Pollution: Hydrological cycle, water resources, aquatic ecosystems, Sources andnature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems.

Water purification methods. Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluents from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, fertilizer. Sludge disposal.

Industrial waste management: incineration of waste. Water treatment and purification (reverse osmosis, ion exchange). Water quality parameters for wastewater, industrial water and domestic water.

UNIT-IV

Energy and Environment

Sources of energy: Coal, petrol and natural gas. Nuclear fusion/fission, solar energy, hydrogen,

geothermal, tidal and hydel.

Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management.

Biocatalysis

Introduction to biocatalysis: Importance in green chemistry and chemical industry.

Recommended Text Books:

1. De, A. K. *Environmental Chemistry*: New Age International Pvt., Ltd, New Delhi, 2010.
2. Stocchi E., *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).

Reference Books:

1. Felder R.M. and Rousseau R.W., *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
2. Dara S. S., *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
3. Miller G.T., Environmental Science, 11th edition. Brooks/ Cole (2006).
4. Mishra, Environmental Studies, Selective and Scientific Books, New Delhi (2005).

Discipline Specific Elective Paper II LAB

INDUSTRIAL CHEMICALS & ENVIRONMENT

1. Determination of Dissolved Oxygen (DO) in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method ($AgNO_3$ and potassium chromate).
6. Estimation of total alkalinity of water samples (CO_3^{2-}, HCO_3^-) using double titration method.
7. Measurement of dissolved CO_2.
8. Study of some of the common bio-indicators of pollution.

9. Estimation of SPM in air samples.
10. Preparation of borax/ boric acid.

Reference Books:

1. Dara S. S., A Textbook on Experiments and Calculations in Engineering ChemistryS Chand & Company; 9th Revised edition (2015).
2. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. R.M. Felder, R.W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
4. A. Kent: Riegel's *Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
5. S. M. Khopkar, *Environmental Pollution Analysis*: Wiley Eastern Ltd, New Delhi

SKILL ENHANCEMENT COMPULSORY COURSES (SECC)

Optional for SECC II paper

Skill Enhancement Compulsory Courses (SECC Option-I)

PESTICIDE CHEMISTRY

General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship.

Synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

Ecofriendly pesticides.

Safety measures: Environmental aspects and degradability

Reference Books:

1. R. J. W. Cremlyn: *Pesticides:* John Wiley and Sons Ltd (1978)
2. D.S. Reddy, M. Pushpa Latha, Pesticides, New Vishal Publications (2015).
3. Roy N. K., Chemistry of Pesticides. CBS Publisher & Distributors P Ltd; 1st Ed. (2010)

Skill Enhancement Courses (SECC OptionII)

FUEL CHEMISTRY

Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value

Coal:Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization ofcoal. Coal gas, producer gas and water gas—composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.

Petroleum and Petrochemical Industry:Composition of crude petroleum, Refining anddifferent types of petroleum products and their applications.

Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals:

Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.

Lubricants:Classification of lubricants, lubricating oils (conducting and non-conducting)Solid and semisolid lubricants, synthetic lubricants.

Properties of lubricants (viscosity index, cloud point, pore point) and their determination.

Reference Books:

1. E. Stocchi: *Industrial Chemistry*, Vol -I, Ellis Horwood Ltd. UK.
2. P.C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
3. B.K. Sharma: *Industrial Chemistry,* Goel Publishing House, Meerut.

List of topics included in CBCS syllabus requiring training of College Teachers for 21 days

Theory (15 days)

1. Quantum Chemistry
2. Organometallics
3. Coordination Chemistry
4. Polymer Chemistry
5. Green Chemistry
6. Organic Chemistry

Practical (6days)

1. Green chemistry and other new practical's introduced in the new CBCS syllabus

List of minimum instrument required for undertaking practical classes of UG-CBCS in Chemistry (Core and DSC Practicals)

Sl.	Name of the instrument	Numbers
1.	Ostwald's viscometer	02
2.	Tensiometer (Surface tension measurements)	01
3.	Digital pH-meter with accessories	02
4.	Digital Conductivity meter with accessories	02
5.	Potentiometer with accessories	01
6.	Colorimeter	01
7.	Calorimeter with accessories (precision thermometer)	01
8.	Visible spectrophotometer (single beam)	01
9.	Magnetic stirrer (with/without hot plate)	02
10.	Heating mantle	01
11.	Melting point apparatus	02
12.	Vacuum pump for filtration	01
13.	Single distillation units (All glass) 2lit/hr capacity	02

14.	Single pan digital balance with precision 0.01 gm and 0.001 gm	02
15.	Water bath (Electrical)	01
16.	Fume hood	01
17.	Kipp'sapparature (PP)	02
18.	Fire extinguishers	02
19.	Aspirator for chromatographic developer	01
20.	Air oven (up to ^{300oC})	01
21.	Microwave oven (kitchen quality)	01
22.	Small lab accessories like glassware, plastic wares, laboratory wires and other small accessories as per requirement.	

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN MATHEMATICS (Bachelor of Science Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Preamble

Mathematics is an indispensable tool for much of science and engineering. It provides the basic language for understanding the world and lends precision to scientific thought. The mathematics program at Universities of Odisha aims to provide a foundation for pursuing research in Mathematics as well as to provide essential quantitative skills to those interested in related fields. With the maturing of the Indian industry, there is a large demand for people with strong analytical skills and broad-based background in the mathematical sciences.

COURSE STRUCTURE FOR MATHEMATICS HONORS

Semester	Course	Course Name	Credits
I	AECC-I	AECC-I	04
	C-I	Calculus	04
	C-I	Practical	02
	C-II	Discrete Mathematics	05
	C-II	Tutorial	01
	GE-I	GE-I	05
	GE-I	Tutorial	01
			22
II	AECC-II	AECC-II	04
	C-III	Real Analysis	05
	C-III	Tutorial	01
	C-IV	Differential equations	04
	C-IV	Practical	02
	GE-II	GE-II	05
	GE-II	Tutorial	01
			22
III	C-V	Theory of Real functions	05
	C-V	Tutorial	01
	C-VI	Group Theory-I	05
	C-VI	Tutorial	01
	C-VII	Partial differential equations and system of ODEs	04
	C-VII	Practical	02
	GE-III	GE-III	05
	GE-III	Tutorial	01
	SECC-I	SECC-I	04

			28
IV	C-VIII C-VIII	Numerical Methods and Scientific Computing Practical	04 02
	C-IX C-IX	Topology of Metric spaces Tutorial	05 01
	C-X C-X	Ring Theory Tutorial	05 01
	GE-IV GE-IV	GE-IV (Theory) Tutorial	05 01
	SECC-II	SECC-II	04
			28
Semester	Course	Course Name	Credits
V	C-XI C-XI	Multivariable Calculus Tutorial	05 01
	C-XII C-XII	Linear Algebra Tutorial	05 01
	DSE-I DSE-I	Linear Programming Tutorial	05 01
	DSE-II DSE-II	Probability and Statistics Tutorial	05 01
			24
VI	C-XIII C-XIII	Complex analysis Tutorial	05 01
	C-XIV C-XIV	Group Theory-II Tutorial	05 01
	DSE-III DSE-III	Differential Geometry Tutorial	05 01
	DSE-IV	Number Theory/Project	06
			24
		TOTAL	**148**

B.A./B.SC.(HONOURS)-MATHEMATICS

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (out of the 5 papers suggested)

Generic Elective for non Mathematics students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper –

For practical paper: Mid term : 15 marks, End term : 60 marks, Practical- 25 marks

For non practical paper: Mid term : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper –

Practical paper-40 hours theory classes + 20 hours Practical classes

Non Practical paper-50 hours theory classes + 10 hours tutorial

CORE PAPER-1
CALCULUS

Objective: The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of mathematical nature as well as practical problems. More precisely, main target of this course is to explore the different tools for higher order derivatives, to plot the various curves and to solve the problems associated with differentiation and integration of vector functions.

Expected Outcomes: After completing the course, students are expected to be able to use Leibnitz's rule to evaluate derivatives of higher order, able to study the geometry of various types of functions, evaluate the area, volume using the techniques of integrations, able to identify the difference between scalar and vector, acquired knowledge on some the basic properties of vector functions.

UNIT-I

Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of the type $e^{ax+b}sinx, e^{ax+b}cosx, (ax+b)^n sinx, (ax+b)^n cosx$, concavity and inflection points, asymptotes, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, L' Hospitals rule, Application in business ,economics and life sciences.

UNIT-II

Riemann integration as a limit of sum, integration by parts, Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n xdx, \int \cos^n xdx, \int \tan^n xdx, \int sec^n xdx, \int (logx)^n dx, \int \sin^n x \cos^n xdx,$

definite integral, integration by substitution.

UNIT-III

Volumes by slicing, disks and washers methods, volumes by cylindrical shells, parametric equations, parameterizing a curve, arc length, arc length of parametric curves, area of surface of revolution, techniques of sketching conics, reflection properties of conics, rotation of axes and second degree equations, classification into conics using the discriminant, polar equations of conics.

UNIT-IV

Triple product, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions, tangent and normal components of acceleration.

LIST OF PRACTICALS

(Using any software/ MATLAB to be performed on a Computer.)

1. Plotting the graphs of the functions $e^{ax+b}, \log(ax+b), 1/ax+b, \sin(ax+b), \cos(ax+b)$ and $|ax+b|$ to illustrate the effect of a and b on the graph.
2. Plotting the graphs of the polynomial of degree 4 and 5.
3. Sketching parametric curves (E.g. Trochoid, cycloid, hypocycloid).
4. Obtaining surface of revolution of curves.
5. Tracing of conics in Cartesian coordinates /polar coordinates.
6. Sketching ellipsoid, hyperboloid of one and two sheets (using Cartesian co-ordinates).

BOOKS RECOMMENDED:

1. H. Anton, I. Bivens and S. Davis, *Calculus*, 10thEd.,John Wiley and Sons (Asia)P. Ltd., Singapore, 2002.
2. Shanti Narayan, P. K. Mittal, Differential Calculus, S. Chand, 2014.
3. Shanti Narayan, P. K. Mittal, Integral Calculus, S. Chand, 2014.

BOOKS FOR REFERNCE:

1. James Stewart, Single Variable Calculus, Early Transcendentals, Cengage Learning, 2016.

2. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi,2005.

CORE PAPER-II

DISCRETE MATHEMATICS

Objective: This is a preliminary course for the basic courses in mathematics and all its applications. The objective is to acquaint students with basic counting principles, set theory and logic, matrix theory and graph theory.

Expected Outcomes: The acquired knowledge will help students in simple mathematical modeling. They can study advance courses in mathematical modeling, computer science, statistics, physics, chemistry etc.

UNIT-I

Sets, relations, Equivalence relations, partial ordering, well ordering, axiom of choice, Zorn's lemma, Functions, cardinals and ordinals, countable and uncountable sets, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments, Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, modular arithmetic, Chinese remainder theorem, Fermat's little theorem.

UNIT-II

Principles of Mathematical Induction, pigeonhole principle, principle of inclusion and exclusion Fundamental Theorem of Arithmetic, permutation combination circular permutations binomial and multinomial theorem, Recurrence relations, generating functions, generating function from recurrence relations.

UNIT-III

Matrices, algebra of matrices, determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix,

Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems, Eigen values, Eigen vectors of a matrix.

UNIT-IV

Graph terminology, types of graphs, sub-graphs, isomorphic graphs, Adjacency and incidence matrices, Paths, Cycles and connectivity, Eulerian and Hamiltonian paths, Planar graphs.

BOOKS RECOMMENDED:

1. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
2. Kenneth Rosen Discrete mathematics and its applications Mc Graw Hill Education 7th edition.
3. V Krishna Murthy, V. P. Mainra, J. L. Arora, An Introduction to Linear Algebra, Affiliated East-West Press Pvt. Ltd.

BOOKS FOR REFERENCE:

1. J. L. Mott, A. Kendel and T.P. Baker: Discrete mathematics for Computer Scientists and Mathematicians, Prentice Hall of India Pvt Ltd, 2008.

CORE PAPER-III

REAL ANALYSIS

Objective: The objective of the course is to have the knowledge on basic properties of the field of real numbers, studying Bolzano-Weierstrass Theorem , sequences and convergence of sequences, series of real numbers and its convergence etc. This is one of the core courses essential to start doing mathematics.

Expected Outcome: On successful completion of this course, students will be able to handle fundamental properties of the real numbers that lead to the formal development of real analysis and understand limits and their use in sequences, series, differentiation and integration. Students will appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

UNIT-I

Review of Algebraic and Order Properties of *R,* ε-neighborhood of a point in *R,* Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of *R,* The Archimedean Property, Density of Rational (and Irrational) numbers in *R.,* Intervals, Interior point, , Open Sets, Closed sets, , Limit points of a set , Illustrations of Bolzano-Weierstrass theorem for sets, closure, interior and boundary of a set.

UNIT-II

Sequences and Subsequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences,. Divergence Criteria, Bolzano Weierstrass Theorem for Sequences, Cauchy sequence, Cauchy's Convergence Criterion. Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

UNIT-III

Limits of functions (epsilon-delta approach), sequential criterion for limits, divergence criteria. Limit theorems, one sided limits, Infinite limits and limits at infinity, Continuous functions, sequential criterion for continuity & discontinuity. Algebra of continuous functions, Continuous functions on an interval, Boundedness Theorem, Maximum Minimum Theorem, Bolzano's Intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem, Monotone and Inverse Functions.

UNIT-IV

Differentiability of a function at a point & in an interval, Caratheodory's theorem, chain Rule, algebra of differentiable functions, Mean value theorem, interior extremum theorem. Rolle's theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities.

BOOKS RECOMMENDED:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis (3rd Edition), John Wiley

and Sons (Asia) Pvt. Ltd., Singapore,2002.

2. G. Das and S. Pattanayak, Fundamentals of Mathematical Analysis, TMH Publishing Co.

BOOKS FOR REFERENCE:

1. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
2. A.Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014.
3. Brian S. *Thomson*, Andrew. M. *Bruckner*, and Judith B. *Bruckner*, *Elementary Real Analysis,* Prentice Hall,2001.
4. Gerald G. Bilodeau, Paul R. Thie, G.E. Keough, *An Introduction to Analysis,* Jones & Bartlett, Second Edition, 2010.

CORE PAPER-IV

DIFFERENTIAL EQUATIONS

Objective: Differential Equations introduced by Leibnitz in 1676 models almost all Physical, Biological, Chemical systems in nature. The objective of this course is to familiarize the students with various methods of solving differential equations and to have a qualitative applications through models. The students have to solve problems to understand the methods.

Expected Outcomes: A student completing the course is able to solve differential equations and is able to model problems in nature using Ordinary Differential Equations. This is also prerequisite for studying the course in Partial Differential Equations and models dealing with Partial Differential Equations.

UNIT-I

Differential equations and mathematical models, General, Particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equations and Bernoulli's equation, special integrating factors and transformations.

UNIT-II

Introduction to compartmental models, Exponential decay radioactivity (case study of detecting art forgeries), lake pollution model (with case study of Lake Burley Griffin), drug assimilation

into the blood (case study of dull, dizzy and dead), exponential growth of population, Density dependent growth, Limited growth with harvesting.

UNIT-III

General solution of homogeneous equation of second order, principle of superposition, Wronskian, its properties and applications, method of undetermined coefficients, Method of variation of parameters, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation.

UNIT-IV

Equilibrium points, Interpretation of the phase plane, predatory-pray model and its analysis, epidemic model of influenza and its analysis, battle model and its analysis.

Practical / Lab work to be performed on a computer:

Modeling of the following problems using *Matlab / Mathematica / Maple* etc.

1. Plotting of second & third order solution family of differential equations.
2. Growth & Decay model (exponential case only).
3. (a) Lake pollution model (with constant/seasonal flow and pollution concentration)/
   (b) Case of single cold pill and a course of cold pills.
   (c) Limited growth of population (with and without harvesting).
4. (a) Predatory- prey model (basic volterra model, with density dependence, effect of DDT, two prey one predator).
   (b) Epidemic model of influenza (basic epidemic model, contagious for life, disease with carriers).
   (c) Battle model (basic battle model, jungle warfare, long range weapons).
5. Plotting of recursive sequences.

BOOKS RECOMMENDED:

1. J. Sinha Roy and S Padhy: A course of Ordinary and Partial differential equation Kalyani Publishers, New Delhi.

2. Belinda Barnes and Glenn R. Fulford, *Mathematical Modeling with Case Studies, A Differential Equation Approach using Maple and Matlab,* 2ndEd., Taylor and Francis group, London and New York,2009.

BOOKS FOR REFERENCE:

1. Simmons G F, Differential equation, Tata Mc Graw Hill, 1991.
2. Martin Braun, Differential Equations and their Applications, Springer International, Student Ed.
3. S. L. Ross, Differential Equations, 3rd Edition, John Wiley and Sons, India.
4. C.Y. Lin, Theory and Examples of Ordinary Differential Equations, World Scientific, 2011.

CORE PAPER-V
THEORY OF REAL FUNCTIONS

Objective: The objective of the course is to have knowledge on limit theorems on functions, limits of functions, continuity of functions and its properties, uniform continuity, differentiability of functions, algebra of functions and Taylor's theorem and, its applications. The student how to deal with real functions and understands uniform continuity, mean value theorems.

Expected Outcome: On the completion of the course, students will have working knowledge on the concepts and theorems of the elementary calculus of functions of one real variable. They will work out problems involving derivatives of function and their applications. They can use derivatives to analyze and sketch the graph of a function of one variable, can also obtain absolute value and relative extrema of functions. This knowledge is basic and students can take all other analysis courses after learning this course.

UNIT-I

L' Hospital's Rules, other Intermediate forms, Cauchy's mean value theorem, Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, Relative extreme, Taylor's

series and Maclaurin's series, expansions of exponential and trigonometric functions.

UNIT-II

Riemann integration; inequalities of upper and lower sums; Riemann conditions of integrability. Riemann sum and definition of Riemann integral through Riemann sums; equivalence of two definitions; Riemann integrability of monotone and continuous functions; Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals; Fundamental theorems of Calculus.

UNIT-III

Improper integrals: Convergence of Beta and Gamma functions. Pointwise and uniform convergence of sequence of functions, uniform convergence, Theorems on continuity, derivability and integrability of the limit function of a sequence of functions**.**

UNIT-IV

Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test Limit superior and Limit inferior, Power series, radius of convergence, Cauchy Hadamard Theorem, Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.

BOOKS RECOMMENDED:

1. R.G. Bartle & D. R. Sherbert, Introduction to Real Analysis, John Wiley &Sons.
2. G. Das and S. Pattanayak, *Fundamentals of mathematics analysis*, TMH Publishing Co.
3. S. C. Mallik and S. Arora, *Mathematical analysis*, New Age International Ltd., New Delhi.

BOOK FOR REFERENCES:

1. A. Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014
2. K. A. Ross, *Elementary analysis: the theory of calculus*, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004A.Mattuck, Introduction toAnalysis, Prentice Hall

3. Charles G. Denlinger, *Elements of real analysis*, Jones and Bartlett (Student Edition), 2011.

CORE PAPER-VI
GROUP THEORY-I

Objective: Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of group theory and examples of groups and their properties. This course will lead to future basic courses in advanced mathematics, such as Group theory-II and ring theory.

Expected Outcomes: A student learning this course gets idea on concept and examples of groups and their properties . He understands cyclic groups, permutation groups, normal subgroups and related results. After this course he can opt for courses in ring theory, field theory, commutative algebras, linear classical groups etc. and can be apply this knowledge to problems in physics, computer science, economics and engineering.

UNIT-I

Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), elementary properties of groups, Subgroups and examples of subgroups, centralizer, normalizer, center of a group,

UNIT-II

Product of two subgroups, Properties of cyclic groups, classification of subgroups of cyclic groups, Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group,

UNIT-III

Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem, external direct product of a finite number of groups, normal subgroups, factor groups.

UNIT-IV

Cauchy's theorem for finite abelian groups, group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, first, second and third

isomorphism theorems.

BOOKS RECOMMENDED:

1. Joseph A. Gallian, *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi
2. John B. Fraleigh, *A First Course in Abstract Algebra,* 7th Ed., Pearson, 2002.

BOOK FOR REFERENCES:

1. M. *Artin, Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. Joseph 1. Rotman, *An Introduction to the Theory of Groups,* 4th Ed., Springer Verlag, 1995.
3. I. N. Herstein, *Topics in Algebra,* Wiley Eastern Limited, India, 1975.

CORE PAPER-VII

PARTIAL DIFFERENTIAL EQUATIONS AND SYSTEM OF ODEs

Objective: The objective of this course is to understand basic methods for solving Partial Differential Equations of first order and second order. In the process, students will be exposed to Charpit's Method, Jacobi Method and solve wave equation, heat equation, Laplace Equation etc. They will also learn classification of Partial Differential Equations and system of ordinary differential equations.

Expected Outcomes: After completing this course, a student will be able to take more courses on wave equation, heat equation, diffusion equation, gas dynamics, non linear evolution equations etc. All these courses are important in engineering and industrial applications for solving boundary value problem.

UNIT-I

Partial Differential Equations - Basic concepts and Definitions, Mathematical Problems. First-Order Equations: Classification, Construction and Geometrical Interpretation. Method of Characteristics for obtaining General Solution of Quasi Linear Equations. Canonical Forms of First-order Linear Equations. Method of Separation of Variables for solving first order partial differential equations.

UNIT-II

Derivation of Heat equation, Wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order Linear Equations to canonical forms.

UNIT-III

The Cauchy problem, Cauchy problem of an infinite string. Initial Boundary Value Problems, Semi-Infinite String with a fixed end, Semi-Infinite String with a Free end. Equations with non-homogeneous boundary conditions, Non- Homogeneous Wave Equation. Method of separation of variables, Solving the Vibrating String Problem, Solving the Heat Conduction problem

UNIT-IV

Systems of linear differential equations, types of linear systems, differential operators, an operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions, The method of successive approximations.

LIST OF PRACTICALS (USING ANY SOFTWARE)

(i) Solution of Cauchy problem for first order PDE.

(ii) Finding the characteristics for the first order PDE.

(iii) Plot the integral surfaces of a given first order PDE with initial data.

(iv) Solution of wave equation $\frac{\partial^2 u}{\partial t^2} - c\frac{\partial^2 u}{\partial x^2} = 0$ for the following associated conditions

(a) $u(x, 0) = \phi(x)$, $u_t\{(x, 0) = \psi(x)$, $x \in R$, $t > 0$

(b) $u(x,0) = \phi(X)$, $u_t\{(x, 0) = \psi(x)$, $u(0,t) = 0$, $x \in (0,\infty)$, $t > 0$

(c) $u(x, 0) = \phi(x)$, $u_t\{(x, 0) = \psi(x)$, $u_x(0,t) = 0$, $x \in (O,\infty)$, $t > 0$

(d) $u(x, 0) = \phi(x)$, $ut(x, 0) = \psi(x)$, $u(0,t) = 0$, $u(l,t) = 0$, $0 < x < l$, $t > 0$

(v) Solution of wave equation $\frac{\partial u}{\partial t} - \kappa\frac{\partial^2 u}{\partial x^2} = 0$ for the following associated conditions

(a) $u(x, 0) = \phi(x)$, $u(0,t) = a$, $u(l, t) = b$, $0 < x < l$, $t > 0$

(b) $u(x, 0) = \phi(x)$, $x \in R$, $0 < t < T$

(c) $u(x,0) = \phi(x)$, $u(0,t) = a$, $x \in (0,\infty)$, $t \geq 0$

BOOKS RECOMMENDED :

1. Tyn Myint-U and Lokenath Debnath, *Linear Partial Differential Equations for Scientists and Engineers,* 4th edition, Birkhauser, Indian reprint, 2014.
2. S.L. Ross, *Differential equations,* 3rd Ed., John Wiley and Sons, India,

BOOK FOR REFERENCES:

1. J Sinha Roy and S Padhy: A course of Ordinary and Partial differential equation Kalyani Publishers,New Delhi,
2. Martha L Abell, James P Braselton, *Differential equations with MATHEMATICA,* 3rd Ed., Elsevier Academic Press, 2004.
3. Robert C. Mc Owen: Partial Differential Equations, Pearson Education Inc.
4. T Amarnath: An Elementary Course in Partial Differential Equations, Narosa Publications.

CORE PAPER-VIII

NUMERICAL METHODS AND SCIENTIFIC COMPUTING

Use of Scientific Calculator is allowed.

Objective: Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various numerical methods of finding solution of different type of problems, which arises in different branches of science such as locating roots of equations, finding solution of systems of linear equations and differential equations, interpolation, differentiation, evaluating integration.

Expected Outcome: Students can handle physical problems to find an approximate solution. After getting trained a student can opt for advance courses in numerical analysis in higher mathematics. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance.

UNIT-I

Rate of convergence, Algorithms, Errors: Relative, Absolute, Round off, Truncation. Approximations in Scientific computing, Error propagation and amplification, conditioning, stability and accuracy, computer arithmetic mathematical software and libraries, visualisation,

Numerical solution of non-linear equations: Bisection method, Regula- Falsi method, Secant method, Newton- Raphson method, Fixed-point Iteration method.

UNIT-II

Rate of convergence of the above methods. System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. Computing eigen-values and eigenvectors

UNIT-III

Polynomial interpolation: Existence uniqueness of interpolating polynomials. Lagrange and Newtons divided difference interpolation, Error in interpolation, Central difference & averaging operators, Gauss-forward and backward difference interpolation. Hermite and Spline interpolation, piecewise polynomial interpolation.

UNIT-IV

Numerical Integration: Some simple quadrature rules, Newton-Cotes rules, Trapezoidal rule, Simpsons rule, Simpsons *3/8th* rule, Numerical differentiation and integration, Chebyshev differentiation and FFT, Richard-son extrapolation.

PRACTICAL/LAB WORK TO BE PERFORMED ON A COMPUTER:

Use of computer aided software (CAS), for example *Matlab / Mathematica / Maple / Maxima* etc., for developing the following Numerical programs:

(i) Calculate the sum *1/1 + 1/2 + 1/3 + 1/4* + ----------+ 1/*N*.

(ii) To find the absolute value of an integer.

(iii) Enter- 100 integers into an array and sort them in an ascending' order.

(iv) Any two of the following

- (a) Bisection Method
- (b) Newton Raphson Method
- (c) Secant Method
- (d) Regular Falsi Method
- (v) Gauss-Jacobi Method
- (vi) SOR Method or Gauss-Siedel Method
- (vii) Lagrange Interpolation or Newton Interpolation

(viii) Simpson's rule.

Note: For any of the CAS *Matlab / Mathematica / Maple / Maxima* etc., Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations, expression, input/output, relational operators, logical operators and logical expressions, control statements and loop statements, Arrays should be introduced to the students.

BOOKS RECOMMENDED:

1. M. K. Jain, S. R. K. Iyengar and R. K. Jain, *Numerical Methods for Scientific and Engineering Computation,* New age International Publisher, India,
2. Michael Heath: Scientific Computing : An introductory Survey.

BOOK FOR REFERENCES:

1. B. Bradie, *A Friendly Introduction to Numerical Analysis,* Pearson Education, India, 2007.
2. Kendall E. Atkinson: An Introduction to Numerical Analysis
3. C. F. Gerald and P. O. Wheatley, *App.ied Numerical Analysis,* Pearson Education, India, 7th Edition, 2008
4. S. D. Conte & S. de Boor: Elementary Numerical Analysis: An Algorithmic Approach.

CORE PAPER-IX
TOPOLOGY OF METRIC SPACES

Objective: This is an introductory course in topology of metric spaces. The objective of this course is to impart knowledge on open sets, closed sets, continuous functions, connectedness and compactness in metric spaces.

Expected Outcomes: On successful completion of the course students will learn to work with abstract topological spaces. This is a foundation course for all analysis courses in future.

UNIT-I

Metric spaces, sequences in metric spaces, Cauchy sequences, complete metric spaces, open and closed balls, neighborhood, open set, interior of a set, limit point of a set, closed set, diameter of

a set, Cantor's theorem,

UNIT-II

Subspaces, Countability Axioms and Separability, Baire's Category theorem

UNIT-III

Continuity: Continuous mappings, Extension theorems, Real and Complex valued Continuous functions, Uniform continuity, Homeomorphism, Equivalent metrics and isometry, uniform convergence of sequences of functions.

UNIT-IV

Contraction mappings and applications, connectedness, Local connectedness, Bounded sets and compactness, other characterization of compactness, continuous functions on compact spaces,

BOOKS RECOMMENDED:

1. Satish Shirali & Harikishan L. Vasudeva, *Metric Spaces*, Springer Verlag London (2006) (First Indian Reprint 2009)

BOOK FOR REFERENCES:

1. S. Kumaresan, *Topology of Metric Spaces*, Narosa Publishing House, Second Edition 2011.

CORE PAPER-X
RING THEORY

Objective: This is a second course in modern algebra which deals with ring theory. Some basics of ring theory like rings, subrings, ideals, ring homomorphisms and their properties and. This course is an integral part of any course on Modern algebra the ohers being Group theory and Field Theory.

Expected Outcomes: After completing this course, this will help students to continue more courses in advanced Ring theory modules, Galois groups.

UNIT-I

Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring, Ideals, ideal generated by a subset of a ring, factor rings, operations on

ideals.

UNIT-II

Prime and maximal ideals. Ring homomorphisms, properties of ring homomorphisms, Isomorphism theorems I, II and III, field of quotients.

UNIT-III

Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, Unique factorization in Z[x].

UNIT-IV

Divisibility in integral domains, irreducibles, primes, unique factorization domains, Euclidean domains.

BOOKS RECOMMENDED:

1. Joseph A. Gallian, *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi.
2. John B. Fraleigh, *A First Course in Abstract Algebra,* 7th Ed., Pearson, 2002.

BOOK FOR REFERENCES:

1. M. *Artin, Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. Joseph 1. Rotman, *An Introduction to the Theory of Groups,* 4th Ed., Springer Verlag, 1995.
3. I. N. Herstein, *Topics in Algebra,* Wiley Eastern Limited, India, 1975.

CORE PAPER - XI
MULTIVARIATE CALCULUS

Objective: The objective of this course to introduce functions of several variable to a student after he has taken a course in one variable calculus. The course will introduce partial derivatives and several of its consequences and will introduce double and triple integrals along with line integrals which are fundamental to all streams where calculus can be used.

Expected Outcomes: After reading this course a student will be able to calculate partial derivatives, directional derivatives, extreme values and can calculate double, triple and line integrals. He will have idea of basic vector calculus including green's theorem, divergence theorem.and stokes theorem. He can take courses in calculus on manifolds, Differential geometry and can help in numerical computations involving several variables.

UNIT-I

Functions of several variables, limit and continuity of functions of two variables. Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes.

UNIT-II

Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems.

Definition of vector field, divergence and curl, Double integration over rectangular region, double integration over nonrectangular region. Double integrals in polar co-ordinates,

UNIT-III

Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple

integrals, cylindrical and spherical co-ordinates. Change of variables in double integrals and triple integrals.

UNIT-IV

Line integrals, Applications of line integrals: Mass and Work. Fundamental theorem for line integrals, conservativevector fields, independence of path. Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stokes' theorem, The Divergence theorem.

BOOKS RECOMMENDED:

1. M. J, Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
2. S C Mallik and S Arora: Mathematical Analysis, New Age International Publications

BOOK FOR REFERENCES:

1. G.B. Thomas and R.L. Finney, *Calculus,* 9th Ed., Pearson Education, Delhi, 2005.
2. E. Marsden, A.J. Tromba and A. Weinstein, *Basic Multivariable Calculus,* Springer(SIE). Indian reprint, 2005.
3. James Stewart, *Multivariable Calculus, Concepts and Contexts,* 2nd Ed., Brooks/*Cole,* Thomson Learning, USA, 2001.
4. S Ghorpade, B V Limaye, Multivariable calculus, Springer international edition

CORE PAPER –XII
LINEAR ALGEBRA

Objective: Linear algebra is a basic course in almost all branches of science. A full course in undergraduate program will help students in finding real life applications later.. The objective of this course is to introduce a student the basics of linear algebra and some of its application

Expected Outcomes: The student will use this knowledge wherever he/She goes after undergraduate program. It has applications in computer science, finance mathematics, industrial mathematics, bio mathematics and what not.

UNIT-I

Vector spaces, subspaces, examples, algebra of subs paces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Linear transformations, null space, range, rank and nullity of a linear transformation.

UNIT-II

Matrix representation of a linear transformation, Algebra of linear transformations, Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix, Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators, Basics of Fields.

UNIT-III

Eigenspaces of a linear operator, diagonalizability. Invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator, Inner product spaces and norms, Gram-Schmidt orthogonalization process,

UNIT-IV

Orthogonal complements, Bessel's inequality, the adjoint of a linear operator, Least Squares Approximation, minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.

BOOKS RECOMMENDED:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, *Linear Algebra* (4th Edition), Pearson, 2018.

BOOKS FOR REFERENCE:

1. Rao A R and Bhim Sankaram Linear Algebra Hindustan Publishing house.
2. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.

CORE PAPER-XIII
COMPLEX ANALYSIS

Objectives: The objective of the courseis aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity and complex integration are presented. The Cauchy's theorem and its applications, the calculus of residues and its applications are discussed in detail.

Expected Outcomes: Students will be able to handle certain integrals not evaluated earlier and will know a technique for counting the zeros of polynomials. This course is prerequisite to many other advance analysis courses.

UNIT-I

Complex Numbers and Complex plane: Basic properties, convergence, Sets in the Complex plane, Functions on the Complex plane: Continuous functions, holomorphic functions, power series, Integration along curves.

UNIT-II

Cauchy's Theorem and Its Applications: Goursat's theorem, Local existence of primitives and Cauchy's theorem in a disc, Evaluation of some integrals, Cauchy's integral formulas.

UNIT-III

Morera's theorem, Sequences of holomorphic functions, Holomorphic functions defined in terms of integrals, Schwarz reflection principle, Zeros and poles.

UNIT-IV

Meromorphic Functions and the Logarithm: The residue formula, Examples, Singularities and meromorphic functions, The argument principle and applications, The complex logarithm.

BOOKS RECOMMENDED:

1. Elias M. Stein & Rami Shakarchi, Complex Analysis, Princeton University press, Princeton and Oxford, 2003.

BOOKS FOR REFERENCE:

1. James Ward Brown and Ruel V. Churchill, *Complex Variables and Applications* (Eighth Edition), McGraw - Hill International Edition, 2009.
2. G. F. Simmons, *Introduction to Topology and Modern Analysis*, Mcgraw-Hill, Edition 2004.
3. Joseph Bak and Donald 1. Newman, *Complex analysis* (2ndEdition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

CORE PAPER-XIV
GROUP-THEORY-II

Objective: The objective of this course **i**s to be exposed to more advanced results in group theory after completing a basic course. The course introduces results on automorphism, commutator subgroup, group action Sylow theorems etc.

Expected Outcomes: The knowledge of automorphism helps to study more on field theory. Students learn on direct products, group actions, class equations and their applications with proof of all results . This course helps to opt for more advanced courses in algebra and linear classical groups.

UNIT-I

Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups. characteristic subgroups.

UNIT-II

Commutator subgroup and its properties, Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental Theorem of finite abelian groups.

UNIT-III

Group actions, stabilizers and kernels, permutation representation associated with a given group action, Application of group actions: Generalized Cayley's theorem, Index theorem.

UNIT-IV

Groups acting on themselves by conjugation, class equation and consequences, conjugacy in S_n , p - groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of A_n for $n \geq 5$, non-simplicity tests.

BOOKS RECOMMENDED:

1. John B. Fraleigh, *A First Course in Abstract Algebra,* Narosa Publishing House, New Delhi.

2. Joseph A. Gallian *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi.

BOOK FOR REFERENCES:

1. M. Artin, *Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. David S. Dummit and Richard M. Foote, *Abstract Algebra,* 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2004.
3. J.R. Durbin, *Modern Algebra,* John Wiley & Sons, New York Inc., 2000.

Discipline Specific Elective Paper-1

LINEAR PROGRAMMING

Objective: The objective of this course is to familiarize industrial problems to students with various methods of solving Linear Programming Problems, Transportation Problems, Assignment Problems and their applications. Also, students will know the application of linear Programming method in Game Theory.

Expected Outcomes: More knowledge on this topic in higher studies will help students to deal industrial models. This is also prerequisite for studying advanced courses in Nonlinear Programming Problems, Inventory Control Problem and Queuing Theory etc.

UNIT-I

Introduction to linear Programming problem, Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison.

UNIT-II

Duality, formulation of the dual problem, primal-dual relationships, Fundamental Theorem of Duality, economic interpretation of the dual.

UNIT-III

Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem. Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

UNIT-IV

Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.

BOOKS RECOMMENDED:

1. Kanti Swarup, Operations Research, Sultan Chand & Sons, New Delhi. Books.

BOOKS FOR REFERENCE:

1. S. Hillier and G.J. Lieberman, *Introduction to Operations Research- Concepts and Cases* (9th Edition), TataMcGraw Hill, 2010.
2. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, *Linear Programming and Network Flows* (2nd edition), John Wiley and Sons, India, 2004.
3. G. Hadley, *Linear Programming,* Narosa Publishing House, New Delhi, 2002.
4. Hamdy A. Taha, *Operations Research: An Introduction* (10th edition), Pearson, 2017.

Discipline Specific Elective Paper-II

Probability and Statistics

Objective: The objective of the course is to expertise the student to the extensive role of statistics in everyday life and computation, which has made this course a core course in all branches of mathematical and engineering sciences.

Expected Outcome: The students shall learn probability and statistics for various random variables, multivariate distributions, correlations and relations. He shall learn law of large numbers and shall be able to do basic numerical calculations.

UNIT-I

Probability: Introduction, Sample spaces, Events, probability of events, rules of probability, conditional probability, independent events, Bayes's theorem,

Probability distributions and probability densities: random variables, probability distributions, continuous random variables, probability density functions, Multivariate distributions, joint distribution function, joint probability density function, marginal distributions, conditional distributions, conditional density, The theory in practice, data analysis, frequency distribution, class limits, class frequencies, class boundary, class interval, class mark, skewed data, multimodality, graphical representation of the data, measures of location and variability. Population, sample, parameters

UNIT-II

Mathematical Expectation: Introduction, expected value of random variable, moments, Chebyshev's theorem, moment generating functions, product moments, moments of linear combinations of random variables, conditional expectations, the theory in practice, measures of location, dispersion

UNIT-III

Special probability distributions: Discrete Uniform distribution, binomial distribution, Negative binomial, geometric, hypergeometric, poisson, multinomial distribution, multinomial. Special probability densities; Uniform distribution, gamma, exponential, gamma, chi-square, beta distribution, normal, normal approximation to binomial, bivariate normal, Functions of random variables, distribution function technique, transformation technique-one variable, several

variables, moment generating function technique,

UNIT-IV

Sampling distributions: population distribution, random sample, sampling distribution of mean, Central Limit theorem, Sampling distribution of the mean: finite populations, chi-square, t, F distributions, regression and correlation: Bivariate regression, regression equation, Linear regression, method of least squares.

BOOKS RECOMMENDED:

1. Irwin Miller and Marylees Miller, *John E. Freund's Mathematical Statistics with Applications* (8thEdition), Pearson, Asia, 2014.

BOOK FOR REFERENCES:

l. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to Mathematical Statistics,* Pearson Education, Asia, 2007.

2.Alexander M. Mood, Franklin A. Graybill and Duane C. Boes, *Introduction to the Theory of Statistics,* (3rd Edition), Tata McGraw- Hill, Reprint 2007.

3. Sheldon Ross, *Introduction to Probability Models* (9th Edition), Academic Press, Indian Reprint, 2007.

Discipline Specific Elective Paper-III

DIFFERENTIAL GEOMETRY

Objective: After learning methods on curve tracing and Analytic Geometry, the objective of this course is to teach Differential geometry of curves and surfaces which trains a student using tools in calculus to derive intrinsic properties of plain curves and space curves.

Expected Outcome: After completing this course a student will learn on serret-Frenet formulae, relation between tangent, normal and binormals, first and second fundamental forms and ideas on various curvatures. He has scope to take more advanced courses in surface theory and geometry.

UNIT-I

Theory of Space Curves: Space curves, Planer curves, Curvature, torsion and Serret-Frenet formulae. Osculating circles, Osculating circles and spheres. Existence of space curves.

UNIT-II

Evolutes and involutes of curves. Theory of Surfaces: Parametric curves on surfaces, surfaces of revolution, helicoids, Direction coefficients. First and second Fundamental forms.

UNIT-III

Principal and Gaussian curvatures. Lines of curvature, Euler's theorem. Rodrigue's formula,

Conjugate and Asymptotic lines. Developables: Developable associated with space curves and curves on surfaces, Minimal surfaces.

UNIT-IV

Geodesics: Canonical geodesic equations. Nature of geodesics on a surface of revolution. Clairaut's theorem. Normal property of geodesics. Torsion of a geodesic. Geodesic curvature. Gauss-Bonnet theorem. Surfaces of constant curvature.

BOOKS RECOMMENDED:

1. T.J. Willmore, *An Introduction to Differential Geometry,* Dover Publications, 2012.

BOOK FOR REFERENCES:

1. A. Pressley, Elementary Differential Geometry, Springer Internationl Edition, 2014.
2. O'Neill, *Elementary Differential Geometry,* 2nd Ed., Academic Press, 2006.
3. C.E. Weatherburn, *Differential Geometry of Three Dimensions,* Cambridge University Press 2003.
4. D.J. Struik, *Lectures on Classical Differential Geometry,* Dover Publications, 1988.

Discipline Specific Elective Paper-IV
NUMBER THEORY

Objective: The main objective of this course is to build up the basic theory of the integers, prime numbers and their primitive roots, the theory of congruence, quadratic reciprocity law and number theoretic functions, Fermat's last theorem, to acquire knowledge in cryptography specially in RSA encryption and decryption.

Expected Outcomes: Upon successful completion of this course students will able to know the basic definitions and theorems in number theory, to identify order of an integer, primitive roots, Euler's criterion, the Legendre symbol, Jacobi symbol and their properties, to understand modular arithmetic number-theoretic functions and apply them to cryptography.

UNIT- I

Linear Diophantine equation, prime counting function, statement of prime number theorem, Goldbach conjecture, linear congruences, complete set of residues, Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.

UNIT-II

Number theoretic functions, sum and number of divisors, totally multiplicative functions, definition and properties of the Dirichlet product, the Mobius inversion formula, the greatest integer function, Euler's phi-function, Euler's theorem, reduced set of residues, some properties of Euler's phi-function.

UNIT-III

Order of an integer modulo *n,* primitive roots for primes, composite numbers having

primitive roots, Euler's criterion, the Legendre symbol, Jacobi symbol and their properties, quadratic reciprocity, quadratic congruences with composite moduli.

UNIT-IV

Affine ciphers, Hill ciphers, p vgh vg gv ublic key cryptography, RSA encryption and decryption, the equation $x^2+y^2=z^2$, Fermat's Last Theorem.

BOOKS RECOMMENDED:

1. David M.Burton, *Elementary Number Theory* (6thEdition), TataMcGraw-Hill Edition, Indian reprint, 2007.

BOOK FOR REFERENCES:

1. Thomas Koshy, *Elementary Number Theory with Applications (*2nd Edition), Academic Press, 2007.
2. Neville Robinns, *Beginning Number Theory* (2ndEdition), Narosa Publishing House Pvt. Limited, Delhi,2007.

OR

Discipline Specific Elective Paper-IV

PROJECT

Guidelines for +3 (CBCS) Under Graduate(B.A./B.Sc.) Mathematics (Honours) Project

1. Any student registering for doing project is required to inform the HOD, Mathematics the name of his/her project supervisor(s) at the time of pre-registration.
2. By the last date of add and drop, the student must submit the "Project Registration Form'', appended as Annexure-I to this document, to the HOD, Mathematics. This form requires a project title, the signature of the student, signature(s) of the supervisor(s) and the signature of the HOD, Mathematics of the college/university.
3. The project supervisor(s) should normally be a faculty member(s) of the Department of Mathematics and the topic of the project should be relevant to Mathematical Sciences. If a student desires to have a Project Supervisor from another department of the institute, the prior approval for the same should be sought from the HOD, Mathematics.
4. A student may have at the most two Project Supervisors. If a student desires to have two supervisors, at least one of these should be from the Department of Mathematics.
5. The student(s) will be required to submit one progress report and a final report of the Project to the HOD, Mathematics. The progress report is to be submitted in the sixth

week of the semester in which the project is undertaken. The hard copy and an electronic version of the final report of the project should be submitted two weeks before the end semester examination of the sixth semester. In addition the student will be required to make an oral presentation in front of a committee **(**Under Graduate (B.A./ B.Sc.) Mathematics (Honours) Project committee of the college in which supervisor is one of the members) constituted for this purpose by the Department of Mathematics of the college.

6. The student is expected to devote about 100 hours. The project will be evaluated by a committee of faculty members at the end of the sixth semester. The committee will be constituted by the Under Graduate (B.A./B.Sc.) Mathematics (Honours) Project committee of the college keeping in mind the areas of project they will cover.
7. In each semester the grade of a student will be awarded by the committee in consultation with his/her project supervisor(s). The project is evaluated on the basis of the following components: First Progress Reports: 20%; second/Final Report: 30%; Presentation: 30%; Viva: 20%.
8. Project progress reports should normally be no longer than 250 words and final report should not be longer than 40 A4 size pages in double spacing. Each final project report need to contain the following: (i) Abstract (ii) Table of contents (iii) Review of literature (iv) Main text(v) List of references. It may be desirable to arrange the main text as an introduction, the main body and conclusions.

GUIDELINES FOR STRUCTURING CONTENTS

Sequence of Contents:

The following sequence for the thesis organization should be followed:

(i) Preliminaries	Title Page
	Certificate
	Abstract/Synopsis
	Acknowledgement and/ or Dedication
	Table of Contents

	List of Figures, Tables, Illustrations, Symbols, etc (wherever applicable)
(ii) Text of Thesis	Introduction The body of the thesis, summary and conclusions
(iii) Reference Material	List of References, Bibliography
(iv) Appendices	

NOTE:

1. *Synopsis/Abstract* should be self-complete and contain no citations for which the thesis has to be referred.
2. The Text of the Thesis

(a) Introduction:

Introduction may be the first chapter or its first major division. In either case, it should contain a brief statement of the problem investigated. It should outline the scope, aim, general character of the research and the reasons for the student's interest in the problem.

(b) *The body of Thesis*

This is the substance of the dissertation inclusive of all divisions, subdivisions, tables, figures, etc.

(c) *Summary and conclusions*

If required, these are given as the last major division (chapter) of the text. A further and final subdivision titled "*Scope* for Further Work" may follow.

(d) *Reference material*

The list of references should appear as a consolidated list with references listed either alphabetically or sequentially as they appear in the text of the thesis.

For referencing an article in a scientific journal the suggested format should contain the following information: authors, title, name of journal, volume number, page numbers and year. For referencing an article published in a book, the suggested format should contain, authors, the title of the book, editors, publisher, year, page number of the article in the book being referred to. For referencing a thesis the suggested format should contain, author, the title of thesis, where thesis was submitted or awarded, year.

ANNEXURE-I
Department of Mathematics
Project Registration Form

Name of the college/university:

Name of the student:

Roll No. :

e-mail :

Name of the supervisor(s):

Department(s):

e-mail(s):

Title of the Project:

Signature of the Student:

Signature of supervisor(s): (i)

(ii)

Signature of HOD, Mathematics:

GENERIC ELECTIVES (TWO PAPER CHOICE)

Generic Elective Paper I

CALCULUS AND DIFFERENTIAL EQUATIONS

Objective: Calculus invented by Newton and Leibnitz is powerful analytical tool to solve mathematical problems which arise in all branches of science and engineering. The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of a mathematical nature as well as practical problems using calculus and differential equation. The aim should be to expose the students to basic ideas quickly without much theoretical emphasis with importance on applications.

Excepted Outcomes: After completing the course, students are expected to be able to apply knowledge of calculus and differential equations in the areas of their own interest.

UNIT-I

Curvature, Asymptotes, Tracing of Curves (Catenary, Cycloid, Folium of Descartes), Rectification, Quadrature, Elementary ideas about Sphere, Cones, Cylinders and Conicoids.

UNIT-II

Reviewoflimits,continuityanddifferentiabilityoffunctionsofonevariable and their properties, Rolle's theorem, Mean value theorems, Taylor's theorem with Lagrange's theorem and Cauchy's form of remainder, Taylor's series, Maclaurin's series of $sinx, cosx, e^x, \log(1+x), (1+x)^m$, L' Hospital's Rule, other Intermediate forms.

UNIT-III

Limitand Continuity of functions of several variables, Partial derivatives, Partial derivatives of higher orders, Homogeneous functions, Change of variables, Mean value theorem, Taylors theorem and Maclaurin's theorem for functions of two variables(statements &applications), Maxima and Minima of functions of two and three variables, Implicit functions, Lagrange's multipliers (Formulae & its applications), Concepts of Multiple integrals & its applications.

UNIT-IV

Ordinary Differential Equations of order one and degree one (variables separable, homogeneous, exact and linear). Equations of order one but higher degree. Second order linear equations with constant coefficients, homogeneous forms, Second order equations with variable coefficients, Variation of parameters.

BOOKS RECOMMENDED:

1. Shanti Narayan, P. K. Mittal, Differential Calculus, S. Chand, 2014.
2. Shanti Narayan, P. K. Mittal, Integral Calculus, S. Chand, 2014.
3. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
4. J. Sinharoy and S. Padhy: A Course of Ordinary and Partial Differential Equations, Kalyani Publishers.

BOOK FOR REFERENCES:

1. H.Anton,I.Bivens and S.Davis,*Calculus*,10th Ed.,John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
2. Shanti Narayan and P.K. Mittal-Analytical Solid Geometry, S. Chand & Company Pvt. Ltd., New Delhi.
3. Martin Braun-Differential Equations and their Applications-Martin Braun, Springer International.
4. B. P.Acharya and D. C.Sahu: Analytical Geometry of Quadratic Surfaces, Kalyani Publishers.

Generic Elective Paper II

ALGEBRA

Objective: This is a preliminary course for the basic courses in mathematics like, abstract algebra and linear algebra. The objective is to acquaint students with the properties of natural

numbers i.e. Euclidean algorithm, congruence relation, fundamental theorem of arithmetic, etc. The basics of linear algebra i.e. vector spaces, matrices are introduced here.

Expected Outcomes: The acquired knowledge will help students to study further courses in mathematics like, group theory, ring theory and field theory and linear algebra. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

UNIT-I

Sets, relations, Equivalence relations, partial ordering, well ordering, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments

UNIT-II

Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

UNIT-III

Matrices, algebra of matrices, determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix, Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems,.

UNIT-IV

Vector spaces and subspaces, examples, linear independence, linear dependence, basis, dimension, examples, Introduction to linear transformations, matrix representation of a linear transformation, Eigen values, Eigen vectors of amatrix.

BOOKS RECOMMENDED:

1. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
2. V Krishna Murthy, V P Mainra, J L Arora, An Introduction to Linear Algebra ,

Affiliated East-West Press Pvt. Ltd

BOOKS FOR REFERENCE:

1. David C. Lay, Linear Algebra and its Applications,3rd Ed., Pearson Education Asia, Indian Reprint,2007.

2. B S Vatsa and Suchi Vatsa Theory of Matrices New age International third edition 2010.

3. Ward Cheney, David kincaid. Linear algebra theory and applications, Jones and Bartlett , 2010.

OR

GENERIC ELECTIVES (FOUR PAPERS CHOICE)

Generic Elective Paper I

CALCULUS AND DIFFERENTIAL EQUATIONS

Objective: Calculus invented by Newton and Leibnitz is powerful analytical tool to solve mathematical problems which arise in all branches of science and engineering. The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of a mathematical nature as well as practical problems using calculus and differential equation. The aim should be to expose the students to basic ideas quickly without much theoretical emphasis with importance on applications.

Excepted Outcomes: After completing the course, students are expected to be able to apply knowledge of calculus and differential equations in the areas of their own interest.

UNIT-I

Curvature, Asymptotes, Tracing of Curves (Catenary, Cycloid, Folium of Descartes), Rectification, Quadrature, Elementary ideas about Sphere, Cones, Cylinders and Conicoids.

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Reviewoflimits,continuityanddifferentiabilityoffunctionsofonevariable and their properties, Rolle's theorem, Mean value theorems, Taylor's theorem with Lagrange's theorem and Cauchy's form of remainder, Taylor's series, Maclaurin's series of $sinx, cosx, e^x, \log(1+x), (1+x)^m$, L' Hospital's Rule, other Intermediate forms.

UNIT-III

Limitand Continuity of functions of several variables, Partial derivatives, Partial derivatives of higher orders, Homogeneous functions, Change of variables, Mean value theorem, Taylors theorem and Maclaurin's theorem for functions of two variables(statements &applications), Maximas and Minima of functions of two and three variables, Implicit functions, Lagranges multipliers (Formulae & its applications), Concepts of Multiple integrals & its applications.

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Ordinary Differential Equations of order one and degree one (variables separable, homogeneous, exact and linear). Equations of order one but higher degree.Second order linear equations with constant coefficients, homogeneous forms, Second order equations with variable coefficients, Variation of parameters.

BOOKS RECOMMENDED:

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BOOKS FOR REFERENCE:

1. H. Anton, I. Bivens and S.Davis, *Calculus*, 10th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.

2. Shanti Narayan and P.K. Mittal-Analytical Solid Geometry, S. Chand & Company Pvt. Ltd., New Delhi.

3. Martin Braun-Differential Equations and their Applications-Martin Braun, Springer International.

4. B. P.Acharya and D. C. Sahu: Analytical Geometry of Quadratic Surfaces, Kalyani Publishers.

Generic Elective Paper II

ALGEBRA

Objective: This is a preliminary course for the basic courses in mathematics like, abstract algebra and linear algebra. The objective is to acquaint students with the properties of natural numbers i.e. Euclidean algorithm, congruence relation, fundamental theorem of arithmetic, etc. The basics of linear algebra i.e. vector spaces, matrices are introduced here.

Expected Outcomes: The acquired knowledge will help students to study further courses in mathematics like, group theory, ring theory and field theory and linear algebra. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

UNIT-I

Sets ,relations, Equivalence relations, partial ordering, well ordering, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments

UNIT-II

Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

UNIT-III

Matrices, algebra of matrices , determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix,

Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems,.

UNIT-IV

Vector spaces and subspaces, examples, linear independence, linear dependence, basis, dimension, examples, Introduction to linear transformations, ,matrix representation of a linear transformation, Eigen values, Eigen vectors of amatrix.

BOOKS RECOMMENDED:

1 Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.

2 V Krishna Murthy, V P Mainra, J L Arora, An Introduction to Linear Algebra , Affiliated East-West Press Pvt. Ltd

BOOKS FOR REFERENCE:

1. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint,2007.

2. B S Vatsa and Suchi Vatsa Theory of Matrices New age International third edition 2010.

3. Ward Cheney, David Kincaid. Linear algebra theory and applications, Jones and Bartlett ,2010

Generic Elective Paper III

REAL ANALYSIS

Objective: The objective of the course is to have the knowledge on basic properties of the field of real numbers, studying Bolzano-Weiersstrass Theorem , sequences and convergence of sequences, series of real numbers and its convergence etc. This is one of the core courses essential to start doing mathematics.

Expected Outcome: On successful completion of this course, students will be able to handle fundamental properties of the real numbers that lead to the formal development of real

analysis and understand limits and their use in sequences, series, differentiation and integration. Students will appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

UNIT-I

Review of Algebraic and Order Properties of R, ε-neighborhood of a point in R, Idea of countable sets, uncountable sets and uncountability of R, Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of R, The Archimedean Property, Density of Rational (and Irrational) numbers in R.

UNIT-II

Intervals, Interior point, Open Sets, Closed sets, Limit points of a set , Illustrations of Bolzano-Weierstrass theorem for sets, closure, interior and boundary of a set. Sequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only). Bolzano Weierstrass Theorem for Sequences, Cauchy sequence, Cauchy's Convergence Criterion.

UNIT-III

Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

UNIT-IV

Sequence and Series of functions, pointwise and uniform convergences, M_n test, M test, statement of results about uniform convergence, differentiability and integrability of function, power series and radius of convergence.

BOOKS RECOMMENDED:

1. S.C. Mallik and S. Arora- Mathematical Analysis, New Age International Publications.
2. G. Das and S. Pattanayak, Fundamentals of Mathematical Analysis, TMH Publishing Co.

BOOKS FOR REFERENCE:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis (3rd Edition), John Wiley and

Sons (Asia) Pvt. Ltd., Singapore,2002.

2. A. Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014.
3. Brian S. *Thomson*, Andrew. M. *Bruckner*, and Judith B. *Bruckner*, *Elementary Real Analysis,* Prentice Hall,2001.
4. Gerald G. Bilodeau, Paul R. Thie, G.E. Keough, *An Introduction to Analysis,* Jones & Bartlett, Second Edition, 2010.

Generic Elective Paper IV

NUMERICAL METHODS

Objective: Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various numerical methods of finding solution of different type of problems, which arises in different branches of science such as locating roots of equations, finding solution of nonlinear equations, systems of linear equations, differential equations, Interpolation, differentiation, evaluating integration.

Expected Outcome: Students can handle physical problems to find an approximated solution. After getting trained a student can opt for advance courses in Numerical analysis in higher mathematics. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance.

UNIT-I

Algorithms, Convergence, Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method.

Gauss Elimination and Gauss Jordan methods, LU decomposition, Gauss-Jacobi, Gauss-Siedel.

UNIT-II

Lagrange and Newton interpolation: linear and higher order, finite difference operators.

UNIT-III

Numerical differentiation: forward difference, backward difference and central Difference.

UNIT-IV

Integration: trapezoidal rule, Simpson's rule, Euler's method, Runge-Kutta methods of orders two and four.

BOOKS RECOMMENDED:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Ed., New age International Publisher, India, 2007.

BOOKS FOR REFERENCE:

1. S. S. Sastry, Introductory method for Numerical Analysis, PHI New Delhi,2012.
2. S. D. Conte and Carl De Boor, Elementary Numerical Analysis, Mc Graw Hill, 1980.

PROPOSED STRUCTURE OF THE +3 UNDER GRADUATE (B.A/B.SC)

MATHEMATICS (PASS) SYLLABUS

BASED ON CHOICE BASED CREDIT SYSTEM (CBCS)

Semester	Course Number	Title of the Course	Number of credits assigned to the course		Total Credits
			Theory	Practical(P)/ Tutorial((T)	
DSC 4 PAPERS					
	MATH- DSC-1	Calculus and Differential equations	5	1	6
	MATH-DSC2	Algebra	5	1	6
	MATH-DSC-3	Real Analysis	5	1	6
	MATH-DSC-4	Numerical Methods	5	1	6
DSE 2 PAPERS					
	MATH- DSE-1	Group Theory	5	1	6
	MATH-DSE-2	Linear Programming	5	1	6
				TOTAL	36

B.A./B.SC.(PASS)-MATHEMATICS

MATHEMATICS PAPERS FOR PASS STUDENTS

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper –Mid term : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper – 50 hours Theory classes + 10 hours tutorial

Discipline Specific Core Paper I

CALCULUS AND DIFFERENTIAL EQUATIONS

Objective: Calculus invented by Newton and Leibnitz is powerful analytical tool to solve mathematical problems which arise in all branches of science and engineering. The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of a mathematical nature as well as practical problems using calculus and differential equation. The aim should be to expose the students to basic ideas quickly without much theoretical emphasis with importance on applications.

Excepted Outcomes: After completing the course, students are expected to be able to apply knowledge of calculus and differential equations in the areas of their own interest.

UNIT-I

Curvature, Asymptotes, Tracing of Curves (Catenary, Cycloid, Folium of Descartes), Rectification, Quadrature, Elementary ideas about Sphere, Cones, Cylinders and Conicoids.

UNIT-II

Review of limits, continuity and differentiability of functions of one variable and their properties, Rolle's theorem, Mean value theorems, Taylor's theorem with Lagrange's theorem and Cauchy's form of remainder, Taylor's series, Maclaurin's series of $sinx, cosx, e^x, \log(1+x), (1+x)^m$, L' Hospital's Rule, other Intermediate forms.

UNIT-III

Limitand Continuity of functions of several variables, Partial derivatives, Partial derivatives of

higher orders, Homogeneous functions, Change of variables, Mean value theorem, Taylors theorem and Maclaurin's theorem for functions of two variables(statements &applications), Maxima and Minima of functions of two and three variables, Implicit functions, Lagranges multipliers (Formulae & its applications), Concepts of Multiple integrals & its applications.

UNIT-IV

Ordinary Differentia lEquations o order one and degree one (variables separable, homogeneous, exact and linear). Equations of order one but higher degree. Second order linear equations with constant coefficients, homogeneous forms, Second order equations with variable coefficients,V ariationofparameters.

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3. Martin Braun-Differential Equations and their Applications-Martin Braun, Springer International.
4. B. P.Acharya and D. C. Sahu: Analytical Geometry of Quadratic Surfaces, Kalyani Publisher

Discipline Specific Core Paper II

ALGEBRA

Objective: This is a preliminary course for the basic courses in mathematics like, abstract algebra and linear algebra. The objective is to acquaint students with the properties of natural numbers i.e. Euclidean algorithm, congruence relation, fundamental theorem of arithmetic, etc. The basics of linear algebra i.e. vector spaces, matrices are introduced here.

Expected Outcomes: The acquired knowledge will help students to study further courses in mathematics like, group theory, ring theory and field theory and linear algebra. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

UNIT-I

Sets, relations, Equivalence relations, partial ordering, well ordering, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments

UNIT-II

Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

UNIT-III

Matrices, algebra of matrices , determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix, Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems,.

UNIT-IV

Vector spaces and subspaces, examples, linear independence, linear dependence, basis, dimension, examples, Introduction to linear transformations, matrix representation of a linear transformation, Eigen values, Eigen vectors of a matrix.

BOOKS RECOMMENDED:

1. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
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1. David C. Lay, Linear Algebra and its Applications, 3rdEd., Pearson Education Asia, Indian Reprint, 2007.
2. B S Vatsa and Suchi Vatsa Theory of Matrices New age International third edition, 2010.
3. Ward Cheney, David Kincaid. Linear algebra theory and applications, Jones and Bartlett, 2010.

Discipline Specific Core Paper III

REAL ANALYSIS

Objective: The objective of the course isto have the knowledge on basic properties of the field of real numbers, studying Bolzano- Weiersstrass Theorem , sequences and convergence of sequences, series of real numbers and its convergence etc. This is one of the core courses essential to start doing mathematics.

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UNIT-I

Review of Algebraic and Order Properties of R, ε-neighborhood of a point in R, Idea of countable sets, uncountable sets and uncountability of R, Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of R, The Archimedean Property, Density of Rational (and Irrational) numbers in R.

UNIT-II

Intervals, Interior point, Open Sets, Closed sets, Limit points of a set , Illustrations of Bolzano-Weierstrass theorem for sets, closure, interior and boundary of a set. Sequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only). Bolzano Weierstrass Theorem for Sequences, Cauchy sequence, Cauchy's Convergence Criterion.

UNIT-III

Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

UNIT-IV

Sequence and Series of functions, pointwise and uniform convergences, M_n test, M test, statement of results about uniform convergence, differentiability and integrability of function, power series and radius of convergence.

BOOKS RECOMMENDED:

1. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
2. G. Das and S. Pattanayak, Fundamentals of Mathematical Analysis, TMH Publishing Co.

BOOKS FOR REFERENCE:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis (3rd Edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore,2002.
2. A.Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014.
3. BrianS.*Thomson*,Andrew. M.*Bruckner*, and JudithB. *Bruckner*, *ElementaryReal Analysis,* Prentice Hall,2001.
4. Gerald G. Bilodeau , Paul R. Thie, G.E. Keough, *An Introductionto Analysis,* Jones & Bartlett, Second Edition, 2010.

Discipline Specific Core Paper IV

NUMERICAL METHODS

Objective: Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various numerical methods of finding solution of different type of problems, which arises in different branches of science such as locating roots of equations, finding solution of nonlinear equations, systems of linear equations, differential equations, Interpolation, differentiation, evaluating integration.

Expected Outcome: Students can handle physical problems to find an approximated solution. After getting trained a student can opt for advance courses in numerical analysis in higher mathematics. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance.

UNIT-I

Algorithms, Convergence, Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method.

Gauss Elimination and Gauss Jordan methods, LU decomposition, Gauss-Jacobi, Gauss-Siedel.

UNIT-II

Lagrange and Newton interpolation: linear and higher order, finite difference operators.

UNIT-III

Numerical differentiation: forward difference, backward difference and central Difference.

UNIT-IV

Integration: trapezoidal rule, Simpson's rule, Euler'smethod, Runge-Kutta methods of orders two and four.

BOOKS RECOMMENDED:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Ed., New age International Publisher, India, 2007.

BOOKS FOR REFERENCE:

1. S. S. Sastry, Introductory method for Numerical Analysis, PHI New Delhi, 2012.

2. S. D. Conte and Carl De Boor, Elementary Numerical Analysis, Mc Graw Hill, 1980.

Discipline Specific Elective Paper –I
GROUP THEORY

Objective: Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of group theory and examples of groups and their properties. This course will lead to future basic courses in advanced mathematics, such as Group theory-II and ring theory.

Expected Outcomes: A student learning this course gets idea on concept and examples of groups and their properties. He understands cyclic groups, permutation groups, normal subgroups and related results. After this course he can opt for courses in ring theory, field theory, commutative algebras, linear classical groups etc. and can be apply this knowledge to problems in physics, computer science, economics and engineering.

UNIT-I

Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), elementary properties of groups, Subgroups and examples of subgroups, centralizer, normalizer, center of a group,

UNIT-II

Product of two subgroups, Properties of cyclic groups, classification of subgroups of cyclic groups, Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group,

UNIT-III

Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem, external direct product of a finite number of groups, normal subgroups, factor groups.

UNIT-IV

Cauchy's theorem for finite abelian groups, group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, first, second and third isomorphism theorems.

BOOKS RECOMMENDED:

1. Joseph A. Gallian, *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi,
2. John B. Fraleigh, *A First Course in Abstract Algebra,* 7th Ed., Pearson, 2002.

BOOK FOR REFERENCES:

1. M. Artin*, Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. Joseph 1. Rotman, *An Introduction to the Theory of Groups,* 4th Ed., Springer Verlag, 1995.
3. I. N. Herstein, *Topics in Algebra,* Wiley Eastern Limited, India, 1975.

Discipline Specific Elective Paper –II
LINEAR PROGRAMMING

Objective: The objective of this course is to familiarize industrial problems to students with various methods of solving Linear Programming Problems, Transportation Problems, Assignment Problems and their applications. Also, students will know the application of linear Programming method in Game Theory.

Expected Outcomes: More knowledge on this topic in higher studies will help students to deal industrial models. This is also prerequisite for studying advanced courses in Nonlinear Programming Problems, Inventory Control Problem and Queuing Theory etc.

UNIT-I

Introduction to linear Programming problem, Theory of simplex method, optimality and unboundedness, the simplex alorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison.

UNIT-II

Duality, formulation of the dual problem, primal-dual relationships, Fundamental Theorem of Duality, economic interpretation of the dual.

UNIT-III

Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem. Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

UNIT-IV

Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.

BOOKS RECOMMENDED:

1. Kanti Swarup, Operations Research, Sultan Chand & Sons, New Delhi. Books.

BOOKS FOR REFERENCE:

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, *Linear Programming and Network Flows* (2nd edition), John Wiley and Sons, India, 2004.
2. Hillier and G.J. Lieberman, *Introduction to Operations Research- Concepts and Cases* (9th Edition), TataMcGraw Hill, 2010.
3. G. Hadley, *Linear Programming,* Narosa Publishing House, New Delhi, 2002.
4. Hamdy A. Taha, *Operations Research: An Introduction* (10th edition), Pearson, 2017

SKILL ENHANCEMENT COMPULSORY COURSES (SECC)

Optional for SECC II paper

Skill Enhancement Compulsory Courses (Option1)

COMPUTER GRAPHICS

Development of computer Graphics: Raster Scan and Random Scan graphics storages, displays processors and character generators, colour display techniques, interactive input/output devices. Points, lines and curves: Scan conversion, line-drawing algorithms, circle and ellipse generation, conic-section generation, polygon filling anti aliasing. Two-dimensional viewing: Coordinate systems, linear transformations, line and polygon clipping algorithms.

Books Recommended:

1. D. Hearn and M.P. Baker-Computer Graphics, 2nd Ed., PrenticeHall of India, 2004.
2. J. D. Foley, A van Dam, S.K. Feiner and J.F. Hughes-Computer Graphics: Principals and Practices, 2nd Ed., Addison-Wesley, MA, 1990.
3. D. F. Rogers-Procedural Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 2001.
4. D. F. Rogers and A. J. Admas-Mathematical Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 1990.

SKILL ENHANCEMENT COURSES (Option2)-

INFORMATION SECURITY

Overview of Security: Protection versus security; aspects of security data integrity, data availability, privacy; security problems, user authentication, Orange Book. Security Threats: Program threats, worms, viruses, Trojan horse, trap door, stack and buffer over flow; system threats- intruders; communication threats- tapping and piracy. Security Mechanisms: Intrusion detection, auditing and logging, tripwire, system-call monitoring.

Books Recommended:

1. C. Pfleeger and S. L. Pfleeger-Security in Computing, 3rd Ed., Prentice-Hall of India, 2007.
2. D. Gollmann-Computer Security, John Wiley and Sons, NY, 2002.
3. J. Piwprzyk, T. Hardjono and J. Seberry-Fundamentals of Computer Security, Springer-Verlag Berlin, 2003. 335
4. J.M. Kizza-Computer Network Security, Springer, 2007.
5. M. Merkow and J. Breithaupt-Information Security: Principles and Practices, Pearson Education, 2006.

Training Programmes to be Imparted

1. There should be training programs in MATLAB/ PYTHON/ R/ MATHEMATICA software for all college teachers to acquaint the teachers on state of the art. Experts from Indian Statistical Institute Kolkata and nearby IIT's should be invited for the programs to add to quality.

2. The faculty members in colleges/universities should be trained in the following courses at University or any Institute of Higher Learning.

a) Advanced Group Theory
b) Advanced Ring Theory
c) Differential Equations & Mathematical Modeling
d) Mathematical Finance
e) Object Oriented Programming in C++
f) Computer Graphics
g) Information Security

3. Emphasis may be given for implementation of the programs as listed in the courses with Practical.

4. College/universities should be provided with the recommended set of books in adequate numbers.

5. There should be frequent visits to colleges/universities offering crash courses to initiate some of the new courses.

Required Equipment/Technical Experts

The following equipments/softwares shall be provided to colleges/universities for smooth running of practical/project:

1. There should be funding to Computer Lab with minimum of 15 computer systems for 30 students with licensed MATLAB/ PYTHON/R/MATHEMATICA software.
2. At least one computer programmer must be assigned in computer labs during practical sessions.

STATE MODEL SYLLABUS FOR UNDERGRADUATE COURSE IN BOTANY

(Bachelor of Science Examination)

UNDER
CHOICE BASED CREDIT SYSTEM

Course Structure of U.G. Botany Honours				
Semester	**Course**	**Course Name**	**Credit**	**Total marks**
Semester-I	AECC-I		4	100
	C-1 (Theory)	Microbiology and Phycology	4	75
	C-1 (Practical)	Microbiology and Phycology	2	25
	C-2 (Theory)	Biomolecules and Cell Biology	4	75
	C-2 (Practical)	Biomolecules and Cell Biology	2	25
	GE -1A (Theory)	Biodiversity (Microbes, Algae, Fungi & Archegoniate)	4	75
	GE -1A(Practical)	Biodiversity (Microbes, Algae, Fungi & Archegoniate)	2	25
Semester-II	AECC-II		4	100
	C-3 (Theory)	Mycology and Phytopathology	4	75
	C-3 (Practical)	Mycology and Phytopathology	2	25
	C-4 (Theory)	Archegoniate	4	75
	C-4 (Practical)	Archegoniate	2	25
	GE -2A (Theory)	Plant Physiology &Metabolism	4	75
	GE -2A(Practical)	Plant Physiology &Metabolism	2	25
Semester-III	C-5 (Theory)	Anatomy of Angiosperms	4	75
	C-5 (Practical)	Anatomy of Angiosperms	2	25
	C-6 (Theory)	Economic Botany	4	75
	C-6 (Practical)	Economic Botany	2	25
	C-7 (Theory)	Genetics	4	75
	C-7 (Practical)	Genetics	2	25
	SEC-1		4	100
	GE -1B (Theory)	Plant Ecology & Taxonomy	4	75
	GE -1B (Practical)	Plant Ecology & Taxonomy	2	25
Semester-IV	C-8 (Theory)	Molecular Biology	4	75
	C-8 (Practical)	Molecular Biology	2	25
	C-9 (Theory)	Plant Ecology & Phytogeography	4	75

	C-9 (Practical)	Plant Ecology & Phytogeography	2	25
	C-10 (Theory)	Plant Systematics	4	75
	C-10 (Practical)	Plant Systematics	2	25
	SEC II		4	100
	GE-2B (Theory)	Plant Anatomy , Embryology & Biotechnology	4	75
	GE-2B(Practical)	Plant Anatomy , Embryology & Biotechnology	2	25
Semester-V	C-11 (Theory)	Reproductive Biology of Angiosperms	4	75
	C-11 (Practical)	Reproductive Biology of Angiosperms	2	25
	C-12 (Theory)	Plant Physiology	4	75
	C-12 (Practical)	Plant Physiology	2	25
	DSE - 1 (Theory)	Analytical Techniques in Plants Sciences	4	75
	DSE - 1 (Practical)	Analytical Techniques in Plants Sciences	2	25
	DSE - 2 (Theory)	Natural Resource Management	4	75
	DSE - 2 (Practical)	Natural Resource Management	2	25
Semester-VI	C-13 (Theory)	Plant Metabolism	4	75
	C-13 (Practical)	Plant Metabolism	2	25
	C-14 (Theory)	Plant Biotechnology	4	75
	C-14 (Practical)	Plant Biotechnology	2	25
	DSE - 3 (Theory)	Horticulture Practices & Post Harvest Technology	4	75
	DSE-3 (Practical)	Horticulture Practices & Post Harvest Technology	2	25
	DSE – 4 (Theory+Practical) /Project work**	Industrial & Environmental Microbiology /Project Work** Dissertation	6	100
		Total	**148**	**2600**

BOTANY

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for Non Botany students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm: 15 marks, End term: 60 marks (Theory) + 25 marks (Practical), Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 40 hours (theory) + 10 hours (practical)

Core Paper I

MICROBIOLOGY AND PHYCOLOGY

Unit-I

Introduction to microbial world, microbial nutrition, growth and metabolism. **Viruses:-** Discovery, physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV). Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases.

Unit–II

(i) Bacteria: - Discovery, general characteristics, types- archaebacteria, eubacteria, wall-less forms (mycoplasma and spheroplasts), cell structure, nutritional types, reproduction-vegetative, asexual and recombination (conjugation, transformation and transduction). Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).

(ii) Cyanobacteria:-Ecology and occurrence, cell structure, heterocyst, reproduction, economic importance; role in biotechnology. Morphology and life-cycle of Nostoc. General characteristics of prochlorophyceae, Evolutionary significance of Prochloron.

Unit–III

(i) Algae:- General characteristics; Ecology and distribution; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella; and methods of reproduction, classification; criteria, system of Fritsch, and evolutionary classification of Lee (only upto groups); Role of algae in the environment, agriculture, biotechnology and industry.

(ii) Chlorophyta:- General characteristics, occurrence, range of thallus organization, cell structure and reproduction. Morphology and life-cycles of Chlamydomonas, Volvox, Oedogonium and Coleochaete.

Unit-IV

(i) Charophyta:- General characteristics; occurrence, morphology, cell structure and life-cycle of Chara; evolutionary significance.

(ii) Xanthophyta:- General characteristics; Occurrence, morphology and life- cycle of Vaucheria.

(iii) Phaeophyta:-Characteristics, occurrence, cell structure and reproduction. Morphology and life-cycles of Ectocarpus and Fucus.

(iv) Rhodophyta:-General characteristics, occurrence, cell structure and

(v) reproduction. Morphology and life-cycle of Polysiphonia.

PRACTICAL

Microbiology

(i) Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle.

(ii) Types of Bacteria to be observed from temporary/permanent slides/photographs.

(iii) Examination of bacteria from natural habitat(curd) by simple staining

(iv) Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule (live materials and photographs).

(v) Gram staining.

Phycology

Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Volvox, Oedogonium,Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus and Polysiphonia,Procholoron, Diatoms through electron micrographs, temporary preparations and permanent slides (based on availability of materials).

Text Books:

1. Singh, Pandey and Jain (2017). Microbiology and Phycology, Rastogi Publication, Meerut.

Reference Books:

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Prescott, L.M., Harley J.P., Klein D. A. (2010). Microbiology, McGraw-Hill, India. 8th edition.
3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
4. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.
5. Pelczar et al. (2011) Microbiology, 8th edition, Tata McGraw-Hill Co, New Delhi.
6. Willey, Sherwood and Christopher. Laboratory exercises in Microbiology. McGraw-Hill, India. 9th edition.
7. P. R. Vasista (2017) Botany for Degree student, Algae, S. Chand Publication, New Delhi.
8. B. K. Mishra (2018)Microbiology and Phycology, Kalynai Publishers, New Delhi.

Core Paper II

BIOMOLECULES AND CELL BIOLOGY

Unit-I

(i) Biomolecules and Bioenergenetics: Types and significance of chemical bonds; Structure and properties of water; pH and buffers. Laws of thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions.

(ii) Enzymes: Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; Classification of enzymes; Features of active site, substrate specificity, mechanism of action (activation energy, lock and key hypothesis, induced - fit theory), Michaelis – Menten equation, enzyme inhibition and factors affecting enzyme activity.

(iii) Carbohydrates: Nomenclature, classification and function of Monosaccharides; Disaccharides, Oligosaccharides and polysaccharides

Unit –II

(i) Lipids: Definition and major classes of storage and structural lipids. Fatty acids structure and functions. Essential fatty acids. Triacyl glycerols structure, functions and properties.

(ii) Proteins: Structure of amino acids; Peptide bonds; Levels of protein structure-primary, secondary, tertiary and quarternary; Isoelectric point; Protein denaturation and biological roles of proteins.

(iii) Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of A, B, Z types of DNA; Types of RNA; Structure of tRNA.

Unit –III

(i) The cell: Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory).

(ii) Cell division: Eukaryotic cell cycle, different stages of mitosis and meiosis. Cell cycle, Regulation of cell cycle.

(iii) Cell wall and plasma membrane: Chemistry, structure and function of Plant Cell Wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.

Unit-IV

(i) Cell organelles: Nucleus; Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus.

(ii) Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament.

(iii) Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endoplasmic Reticulum, Golgi Apparatus, Lysosomes,

PRACTICAL

(i) Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins.

(ii) Study of plant cell structure with the help of epidermal peel mount of Onion/*Rhoeo*

(iii) Demonstration of the phenomenon of protoplasmic streaming in *Hydrilla* leaf.

(iv) Counting the cells per unit volume with the help of haemocytometer. (Yeast/pollen grains).

(v) Study the phenomenon of plasmolysis and deplasmolysis.

(vi) Study different stages of mitosis and meiosis using aceto carmine and aceto orcine method.

Text Books:

1. V. B. Rastogi (2016). Introductory Cytology, KedarNath & RamNath, Meerut
2. P. K. Gupta (2017). Biomolecules and Cell Biology, Rastogi Publication, Meerut.

Reference Books:

1. K. Sahoo (2017)Biomolecules and Cell Biology, Kalynai Publishers, New Delhi.
2. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
3. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
4. Cooper, G.M. and Hausman, R.E. 2009 The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
5. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco

Core Paper III

MYCOLOGY AND PHYTOPATHOLOGY

Unit-I

(i) Introduction to true fungi: Definition, General characteristics; Affinities with plants and animals; Thallus organization; Cell wall composition; Nutrition; Classification.

(ii) Zygomycota: General characteristics; Ecology; Thallus organisation; Life cycle with reference to *Rhizopus*.

(iii) Ascomycota: General characteristics (asexual and sexual fruiting bodies); Ecology; Life cycle, Heterokaryosis and parasexuality; life cycle and classification with reference to *Saccharomyces, Aspergillus*, *Penicillium,* and *Neurospora.*

(iv) Basidiomycota: General characteristics; Ecology and Classification; Life cycle of *Puccinia* and *Agaricus*.

Unit-II

(i) Allied Fungi: General characteristics; Status of Slime molds, Classification; Occurrence; Types of plasmodia; Types of fruiting bodies.

(ii) Oomycota: General characteristic; Ecology; Life cycle and classification with reference to *Phytophthora,* and *Albugo.*

(iii) Symbiotic associations: Lichen – Occurrence; General characteristics; Growth forms and range of thallus organization; Nature of associations of algal and fungal partners; Reproduction. Mycorrhiza-Ectomycorrhiza, Endomycorrhiza and their significance.

Unit-III

Applied Mycology: Role of fungi in biotechnology, Mushroom cultivation, Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.

Unit-IV

Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; etiology; symptomology; Host- Pathogen relationships;disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine. Bacterial diseases – Citrus canker and angular leaf spot disease of Cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Loose and covered smut.

PRACTICAL

(i) Introduction to the world of fungi (Unicellular, coenocytic/septate mycelium, asocarps & basidiocarps).

(ii) *Rhizopus*: study of asexual stage from temporary mounts and sexual structures through permanent slides.

(iii) *Aspergillus* and *Penicillium*: study of asexual stage from temporary mounts. Study of Sexual stage from permanent slides/photographs.

(iv) *Agaricus*: Specimens of button stage and full grown mushroom; sectioning of gills of *Agaricus*, and fairy rings are to be shown.

(v) *Albugo:* Study of symptoms of plants infected with *Albugo*; asexual phase study throughsection/ temporary mounts and sexual structures through permanent slides.

(vi) Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Viral diseases: Mosaic disease of ladies finger, papaya, cucurbits, moong, black gram, Fungal diseases: Blast of rice, Tikka disease of ground nut, powdery mildew of locally available plants and White rust of crucifers.

Text Books:

1. B. K. Mishra (2017), Mycology and Phytopathology, Kalynai Publishers, New Delhi.

Reference Books:

1. Sharma, P. D. (2017). Mycology and Phytopathology Rastogi Publication, Meerut.
2. Agrios, G.N. 1997 Plant Pathology, 4th edition, Academic Press, U.K.
3. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley &Sons (Asia) Singapore. 4th edition.
4. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition.
5. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan PublishersIndia Ltd.
6. Mehrotra, R. S.(2011). Plant Pathology. Tata McGraw-Hill Publishing Company Limited, New Delhi

Core Paper IV

ARCHEGONIATE

Unit-I

(i) Introduction: Unifying features of archegoniates; Transition to land habit; Alternation of generations. General characteristics; Origin of land plants and Adaptations to land habit;

(ii) Bryophytes : Origin and Classification; Range of thallus organization.Classification (up to family). Reproduction and evolutionary trends in *Riccia*, *Marchantia*, *Anthoceros* and *Funaria* (developmental stages not included). Ecological and economic importance of bryophytes.

Unit-II

Pteridophytes: General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Psilotum*, *Selaginella*, *Equisetum* and *Pteris*. Apogamy, and apospory, heterospory and seed habit, telome theory, stellar evolution and economic importance.

Unit-III

Gymnosperms: General characteristics, classification (up to family), morphology, anatomy and reproduction of *Cycas*, *Pinus, Ginkgo*and *Gnetum*.(Developmental details not to be included).Ecological and economic importance.

Unit-IV

Palaeobotany: Geological time scale,fossilsand fossilization process. Morphology, anatomy and affinities of Rhynia, Calamites, Lepidodendron, Lyginopteris, Cycadeoidea and Williamsonnia.

PRACTICAL

(i) Morphology of thallus and anatomy of *Riccia, Marchantia*, *Anthoceros, Funaria*-

(ii) *Psilotum*- Study of specimen, transverse section of synangium (permanent slide).

(iii) *Selaginella*- Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll

(temporary slides), longitudinal section of strobilus (permanent slide).

(iv) *Equisetum*- Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide).

(v) Study from permanent slides of *Ophioglossum* (L.S. of spike), *Marselia* (L.S. of sporocarp) and *Lycopodium* (L.S. of strobilus).

(vi) *Pteris*- Morphology, transverse section of rachis, vertical section of sporophyll, whole mount of sporangium, whole mount of spores (temporary slides), transverse section of rhizome, whole mount of prothallus with sex organs and young sporophyte (permanent slide).

(vii) *Cycas*- Morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll and meghaspore, T.S root, leaflet

(viii)Pinus- Morphology (long and dwarf shoots, whole mount of dwarf shoot, male and femalecones), T.S. Needle, stem, L.S. male cone, whole mount of microsporophyll, whole mount of Microspores (temporary slides), L.S.of female cone

(ix) *Gnetum*- Morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slide)

(x) Study of some fossil slides / photographs as per theory.

(xi) Botanical excursion/study tour.

Text Books:

1. P. R. Vasista (2017) Botany for Degree student, Bryophyta, S. Chand Publication, New Delhi.
2. Singh, Pandey and Jain (2017). Archegoniate, Rastogi Publication, Meerut.

Reference Books:

1. B. S. Acharya (2017), Archegoniate, Kalynai Publishers, New Delhi.
2. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. New Delhi, India.
3. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers,New Delhi, India.
4. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.

Core Paper V

ANATOMY OF ANGIOSPERMS

Unit-I

(i) Introduction and scope of Plant Anatomy: Applications in systematics, forensics and pharmacognosy.

(ii) Tissues: Classification of tissues; Simple and complex tissues (no phylogeny); cyto-differentiation of tracheary elements and sieve elements; Pits and plasmodesmata; Cell wall ingrowths and transfer cells, adcrustation and incrustation, Ergastic substances.

Unit-II

(i) Stem: Organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory, continuing meristematic residue, cyto-histological zonation); Types of vascular bundles; Anatomy of dicot and monocot stem. Vascular Cambium: Structure, function and seasonal activity of cambium; secondary growth in stem (normal and anomalous).

(ii) Leaf: Anatomy of dicot and monocot leaf, Kranz anatomy.

Unit-III

(i) Root: Organization of root apex (Apical cell theory, Histogen theory, Korper-Kappe theory); Quiescentcentre; Root cap; Anatomy of dicot and monocot root; Endodermis, exodermis and origin of lateral root. Secondary growth in roots.

(ii) Wood: Axially and radially oriented elements; Types of rays and axial parenchyma; Cyclic aspects and reaction wood; Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood, tyloses; Dendrochronology.

(iii)Periderm: Development and composition of periderm, rhytidome and lenticels.

Unit –IV

(i) Adaptive and Protective Systems Epidermal tissue system, cuticle, epicuticular waxes, trichomes (uni-and multicellular, glandular and nonglandular: two examples of each), stomata (classification); Anatomical adaptations of xerophytes and hydrophytes.

(ii) Secretory System: Hydathodes, cavities, lithocysts and laticifers.

PRACTICAL

1. Study of distribution and types of parenchyma, collenchyma and sclerenchyma, Xylem: Tracheary elements-tracheids, vessel elements; thickenings; perforation plates; xylem fibres, Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres.
2. Wood: ring porous; diffuse porous; tyloses; heart- and sapwood.
3. Epidermal system: cell types, stomata types; trichomes: non-glandular and glandular.
4. Root: monocot, dicot, secondary growth.
5. Stem: monocot, dicot - primary and secondary growth; periderm; lenticels.
6. Leaf: isobilateral, dorsiventral, C_4 leaves (Kranz anatomy).

Text Books:

1. Singh, Pandey and Jain (2017). Anatomy of Angiosperms, Rastogi Publication, Meerut.

Reference Books:

1. Eames and Mc Daniels ( ). An introduction to plant anatomy, Tata Mc Grow Hills, New Delhi
2. Esau, K. (1977). Anatomy of Seed Plants. John Wiley & Sons, Inc., Delhi.
3. M. S. Tayal (2012) Rajpal and Sons, New Delhi
4. B. K. Mishra (2017). Anatomy of Angiosperms, Kalynai Publishers, New Delhi.
5. B. P. Pandey (2017) Plant Anatomy, S. Chand Publication, New Delhi.

Core Paper VI

ECONOMIC BOTANY

Unit-I

(i) Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of newcrops/varieties, importance of germplasm diversity.

(ii) Cereals: Brief account of Wheat, Rice and millets.

(iii) Legumes: General account, importance to man and ecosystem.

(iv) Sugars & Starches: Morphology and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, propagation & uses.

Unit-II

(i) Spices: Listing of important spices, their family and part used, economic importance with special reference to fennel, saffron, clove and black pepper Beverages: Tea, Coffee (morphology, processing & uses)

(ii) Drug-yielding plants: Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Papaver and Cannabis.

(iii) Tobacco: Tobacco (Morphology, processing, uses and health hazards)

Unit-III

(i) Oils & Fats: General description, classification, extraction, their uses and health implications groundnut, coconut, linseed and *Brassica* (Botanical name, family & uses)

(ii) Essential Oils: General account, extraction methods, comparison with fatty oils & their uses.

Unit-IV

(i) Natural Rubber: Para-rubber: tapping, processing and uses.

(ii) Timber plants: General account with special reference to teak and pine. Fibers: Classification based on the origin of fibers, Cotton and Jute (morphology, extraction and uses).

PRACTICAL

(i) Cereals: Rice (habit sketch, study of paddy and grain, starch grains).
(ii) Legumes: Soya bean/moong bean/black gram, Groundnut, (habit, fruit, seed structure, micro-chemical tests).
(iii) Sugars & Starches: Sugarcane (habit sketch; cane juice- micro-chemical tests), Potato (habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, starch grains, micro-chemical tests).
(iv) Spice and Beverages: clove, black pepper ,Tea (plant specimen, tea leaves), Coffee (plant specimen, beans).
(v) Oils & Fats: Groundnut, Mustard–plant specimen, seeds; tests for fats in crushedseeds.
(vi) Drug-yielding plants: Specimens of *Digitalis, Papaver* and *Cannabis.*
(vii) Woods: *Tectona*, *Pinus/*Sal: Specimen, Section of young stem.

(viii) Fiber-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fiber and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).

Text Books:

1. B. P. Pandey (2017) Economic Botany. S. Chand Publication, New Delhi.

Reference Books:

1. Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
2. Samba Murty and Subrahmanyam (2011). Text Book of Modern Economic Botany, CBS Publishers and Distributors, New Delhi.
3. Hill, Albert F. Economic Botany, Tata Mc Grow Hill Publishing Company, Ltd. New Delhi.
4. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
5. Singh, Pandey and Jain (2017). Economic Botany, Rastogi Publication, Meerut.
6. B. Baruah (2017). Economic Botany, Kalyani Publishers, New Delhi.

Core Paper VII

GENETICS

Unit-I

(i) Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominanttraits, Polygenic inheritance.

(ii) Extrachromosomal Inheritance:Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast; Maternal effects-shell coiling in snail; Infective heredity- Kappa particles in Paramecium.

Unit-II

Linkage, crossing over and chromosome mapping: Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.

Unit-III

(i) Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy

(ii) Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation. DNA repair mechanisms.

Unit-IV

(i) Fine structure of gene: Classical vs. molecular concepts of gene; Cis-Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.

(ii) Population and Evolutionary Genetics: Gene pool, Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.

PRACTICAL

1. Meiosis through temporary squash preparation.
2. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square analysis.
3. Chromosome mapping using test cross data.
4. Pedigree analysis for dominant and recessive autosomal and sex linked traits.
5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
6. Blood Typing: ABO groups & Rh factor.
7. Chromosome anomaly : Translocation Ring, Laggards and Inversion Bridge, break etc.

Text Books:

1. B. D. Singh (2017). Fundamental of Genetics, Kalyani Publishers, New Delhi.
2. P. K. Gupta (2017). Genetics, Rastogi Publication, Meerut.

Reference Books:

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & Sons,India. 8th edition.
2. Sinnot, Dunn and Dobzhansky (1985) Principles of Genetics, Tata Mc Grow Hill, New Delhi
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. BenjaminCummings, U.S.A. 10th edition.
4. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to GeneticAnalysis. W.H. Freeman and Co., U.S.A. 10th edition.
5. Strickberger, Monroe, W. Genetics, Pearson Publishers, 3rd Edition
6. V. B. Rastogi (2017). Genetics, KedarNath & RamNath, Meerut

Core Paper VIII

MOLECULAR BIOLOGY

Unit-I

Nucleic acids : Carriers of genetic information: Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey & Chase, Avery, McLeod & McCarty), Types of genetic material, denaturation and renaturation, cot curves. Organization of DNA and structure of RNA- Prokaryotes, Viruses, Eukaryotes, Fraenkel-Conrat's experiment. Organelle DNA - mitochondria and chloroplast DNA. The Nucleosome -Chromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.

Unit-II

(i) The replication of DNA: Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semi-conservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5′ end of linear chromosome; Enzymes involved in DNA replication.

(ii) Central dogma and genetic code: Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)

(iii) Processing and modification of RNA: Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I & group II intron splicing, alternative splicing eukaryotic mRNA processing (5′ cap, 3′ polyA tail); Ribozymes, exon shuffling; RNA editing and mRNA transport.

Unit-III

Mechanism of Transcription: Transcription in prokaryotes and eukaryotes;
Regulation of transcription in prokaryotes and eukaryotes: Principles of transcriptional regulation; Prokaryotes: Operon concept- Regulation of lactose metabolism and tryptophan synthesis in *E.coli.* Eukaryotes: transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing

Unit-IV

Translation (Prokaryotes and eukaryotes): Ribosome structure and assembly; Charging of tRNA, aminoacyl tRNA synthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.

PRACTICAL

1. Preparation of LB medium and raising E. coli.
2. Isolation of genomic DNA from E. coli./onion roots
3. RNA estimation by orcinol method.
4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.
5. Photographs establishing nucleic acid as genetic material (Messelson and Stahl's, Avery et al, Griffith's, Hershey & Chase's and Fraenkel & Conrat's experiments)
6. Study of Barr body from buccal smear preparation.

Text Books:

1. P. K. Gupta (2017). Molecular Biology, Rastogi Publication, Meerut.

Reference Books:

1. Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). MolecularBiology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.
2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons Inc.,U.S.A. 5th edition.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. BenjaminCummings.U.S.A. 9th edition.

4. Sheelar and Bianchi (2009) Molecular Biology of the Cell, Willey Publisher, New Delhi
5. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to GeneticAnalysis. W.H. Freeman and Co., U.S.A. 10th edition.
6. Bruce Alberts et al. 2014. Molecular Biology of the cell Garland Science. 6 th Edition
7. C. B. Power (2017) Cell Biology, Himalaya Publishing House, New Delhi
8. AC. Sahu (2017). Essentials of Molecular Biology, Kalynai Publishers, New Delhi.

Core Paper IX

PLANT ECOLOGY & PHYTOGEOGRAPHY

Unit-I

(i) Introduction Concept of ecology, Autoecology, Synecology, system ecology, Levels of organization. Inter-relationships between the living world and the environment, the components of environment, concept of hydrosphere and lithosphere and dynamism, homeostasis.

(ii) Light, temperature, wind and fire: Variations; adaptations of plants to their variation.

Unit-II

(i) Soil: Formation; Composition; Physical; Chemical and Biological components; Soil profile; Role of climate in soil development.

(ii) Water: Importance: States of water in the environment; Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew); Hydrological Cycle; Water in soil; Water table.

Unit-III

Biotic interactions and Population ecology: Characteristics and Dynamics.

Plant communities: Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession – processes, types; climax concepts.

Unit-IV

(i) Ecosystems: Structure; Processes; Trophic organisation; Food chains and Food webs; Ecological pyramids.

(ii) Functional aspects of ecosystem: Principles and models of energy flow; Production and productivity; Ecological efficiencies; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus.

(iii)Phytogeography: Principles; Continental drift; Theory of tolerance; Endemism; Phytogeographical division of India; Local Vegetation.

PRACTICAL

1. Determination of pH of various soil and water samples (pH meter, universal indicator/Lovibond comparator and pH paper)
2. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.
3. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
4. Study of morphological adaptations of hydrophytes, xerophytes, halophyles (two each).
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
6. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.
7. Field visit to familiarize students with ecology of different sites.

Text Books:

1. Sharma, P.D. (2017). Fundamentals of Ecology. Rastogi Publications, Meerut, India.

Reference Books:

1. Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5th edition.
2. Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation.Anamaya Publications, New Delhi, India.
3. Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach.Oxford University Press. U.S.A.
4. Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.
5. Santra, S. C. (2015) Environmental Science. New Central Book Agency (P) Ltd. Kolkata.
6. M. C. Das and S. P. Das (2009). Fundamental of Ecology.Tata MGrow Hill, New Delhi.
7. Shukla and Chandel (2016). A text book of Plant Ecology. S Chand Publication, New Delhi

Core Paper X

PLANT SYSTEMATICS

Unit-I

Plant identification, Classification, Nomenclature; Biosystematics. Identification: Field inventory; Functions of Herbarium; Important herbaria and botanical gardens of the world and India; Virtual herbarium; E-flora; Documentation: Flora, Monographs, Journals; Keys: Single access and Multi-access

Unit-II

Taxonomic hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary).

Botanical nomenclature: Principles and rules (ICN); Ranks and names; Typification, author citation, valid publication, rejection of names, principle of priority and its limitations; Names of hybrids.

Unit-III

(i) Systematics- an interdisciplinary science: Evidence from palynology, cytology, phytochemistry and molecular data.

(ii) Systems of classification: Major contributions of Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey, Hutchinson, Takhtajan and Cronquist; Classification systems of Bentham and Hooker (up to series) and Hutchinson (up to series); Brief reference of Angiosperm Phylogeny Group (APG III) classification.

Unit-IV

Phylogeny of Angiosperms: Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly and clades). Origin& evolution of angiosperms; co- evolution of angiosperms and animals; methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).

Families of Angiosperms : Descriptive studies of Magnoliaceae, Rosaceae, Rubiacae, Liliaceae, Poaceae, and Orchidaceae

PRACTICAL

(i) Study of vegetative and floral characters of available materials of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): Magnoliaceae, Rosaceae, Rubiacae, Liliaceae, Poaceae, and Orchidaceae as per theory syllabus.

(ii) Field visit, plant collection and herbarium preparation and submission. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book)

Text Books:

1. O. P. Sharma (2009) Plant Taxonomy, Tata Mc Grow Hill, New Delhi

Reference Books:

1. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi.3rdedition.
2. Jeffrey, C. (1982). An Introduction to *Plant Taxonomy*. Cambridge University Press, Cambridge.
3. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics- APhylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.
4. Saxena, H. O. and Brahman, M..The Flora of Orissa, CSIR Publication.
5. T. K. Bose (2009). Trees of the World, Regional Plant Resource Centre, Bhubaneswar, Odisha, India
6. Radford, A.E. (1986). Fundamentals of *Plant Systematics*. Harper and Row, New York.
7. Hanes, H. H. (2009). Botany of Bihar and Orissa,

8. C. R. Mohanty (2017). Text Book of Plant Systematics, Kalynai Publisher, New Delhi.
9. M. S. Subrahmainayam (2011) Modern Plant Taxonomy, Vikash Publishing House, New Delhi
10. B. P. Pandey (2017). Taxonomy of Angiosperm. S. Chand Publication.

Core Paper XI

REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

Unit-I

(i) Introduction: History and scope.

(ii) Anther: Anther wall: Structure and functions, micro-sporogenesis, callose deposition and its significance.

(iii) Pollen biology: Micro-gametogenesis; Pollen wall structure, MGU (male germ unit) structure, NPC system; Palynology and scope (a brief account); Pollen wall proteins; Pollen viability, storage and germination; Abnormal features: Pseudomonads, polyads, massulae, pollinia.

Unit-II

Ovule: Structure; Types; Special structures–endothelium, obturator, aril, caruncle and hypostase; Female gametophyte– mega-sporogenesis and mega-gametogenesis; Types and ultra structure of mature embryo sac (Details of Polygonum type).

Unit-III

(i) Pollination and fertilization: Pollination types and significance; adaptations; structure of stigma and style; path of pollen tube in pistil; double fertilization.

(ii) Self incompatibility: Basic concepts; Methods to overcome self- incompatibility: mixed pollination, bud pollination, stub pollination; Intraovarian and *in vitro* pollination; Modification of stigma surface.

Unit-IV

(i) Endosperm: development, structure and functions

(ii) Embryo: Types of embryogeny; General pattern of development of dicot and monocot embryo; Suspensor: structure and functions; Embryo- endosperm relationship; Nutrition of embryo; Embryo development in *Paeonia*.

(iii) Seed: Structure, importance and dispersal mechanisms

(iv) Polyembryony and apomixes: Introduction; Classification; Causes and applications.

PRACTICAL

(i) Anther: Wall and its ontogeny; Tapetum (amoeboid and glandular); MMC, spore tetrads, uninucleate, bicelled and dehisced anther stages through slides/micrographs, male germ unit (MGU) through photographs and schematic representation.

(ii) Pollen grains: Fresh and acetolyzed showing ornamentation and aperture, psuedomonads, polyads, pollinia (slides/photographs,fresh material), ultrastructure of pollen wall (micrograph); Pollen viability: Tetrazolium test, Germination: Calculation of percentage germination in different media using hanging drop method.

(iii) Ovule:Types-anatropous, orthotropous, amphitropous/campylotropous, circinotropous, unitegmic, bitegmic; Tenuinucellate and crassinucellate; Special structures: Endothelium, obturator, hypostase, caruncle and aril (permanent slides/specimens/photographs). Female gametophyte through permanent slides/ photographs: Types, ultrastructure of mature egg apparatus.

(iv) Embryogenesis: Study of development of dicot embryo through permanent slides; dissection of developing seeds for embryos at various developmental stages; Study of suspensor through electron micrographs.

Text Books:

1. Singh, Pandy and Jain (2017). Reproductive Biology of Angiosperms, Rastogi Publications, Meerut

Reference Books:

1. P Maheswari (2009). Embryology of Angiosperms.
2. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt.Ltd. Delhi.
3. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
4. Johri, B.M. l (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.
5. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
6. B. K. Mishra (2017). Reproductive Biology of Angiosperms Kalynai Publishers, New Delhi.

Core Paper XII

PLANT PHYSIOLOGY

Unit-I

(i) Plant water relationship: Water Potential and its components, water absorption by roots, aquaporins, pathway of water movement, symplast, apoplast, trans-membrane pathways, root pressure, guttation. Ascent of sap– cohesion-tension theory. Transpiration and factors affecting transpiration, anti-transpirants, mechanism of stomatal movement.

(ii) Translocation in the phloem: Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.

Unit-II

(i) Mineral nutrition: Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.

(ii) Nutrient Uptake: Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems,proton ATPase pump and ion flux, uniport, co-transport, symport, and antiport.

Unit-III

Plant growth regulators: Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene. Brassinosteroids and Jasmonic acid.

Unit-IV

(i) Physiology of flowering: Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy.

(ii) Phytochrome: Discovery, chemical nature, role of phytochrome in photo-morphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. 2. Determination of water potential of given tissue (potato tuber) by weight method.
3. 3.Study of the effect of wind velocity and light on the rate of transpiration in excised twig/leaf.
4. 4. Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte and xerophyte.
5. 5. To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and xerophyte (both surfaces).
6. To study the phenomenon of seed germination (effect of light).
7. To study the induction of amylase activity in germinating barley grains
8. To demonstrate suction due to transpiration.

Text Books:

1. R. K. Sinha, (2015). Modern Plant Physiology, Narosa Publishing House, New Delhi.

Reference Books:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons.U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development.Sinauer Associates Inc. USA. 6th edition.
3. Bajracharya D. (1999). Experiments in Plant Physiology-A Laboratory Manual. NarosaPublishing House, New Delhi.
4. Salisbury, F. B. and Ross, C. W. Plant Physiology Wadsworth Publishing Company, California
5. A. C. Sahoo (2018). Outlines of Plant Physiology Kalynai Publishers, New Delhi.
6. N. K.. Srivatava (2017). Plant Physiology, Rastogi Publications, Meerut.
7. Pandey and Sinha (2011). Plant Physiology, Vikash Publishing House, New Delhi

Core Paper XIII

PLANT METABOLISM

Unit-I

(i) Concept of metabolism: Introduction, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosteric ,covalent modulation and Isozymes).

(ii) Mechanisms of signal transduction: Calcium, phospholipids, cGMP, NO.

Unit-II

Carbon assimilation: Historical background, photosynthetic pigments, role of photosynthetic pigments, antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, C_3, C_4pathways; Crassulacean acid metabolism; Factors affecting CO_2 reduction. Photorespiration

Unit-III

(i) Carbon Oxidation: Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle,amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration.

(ii) ATP-Synthesis: Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photo- phosphorylation), ATP synthase, Boyers conformational model, Racker's experiment, Jagendorf's experiment; role of uncouplers.

Unit-IV

(i) Lipid metabolism: Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluco-neogenesis and its role in mobilisation of lipids during seed germination, α oxidation.

(ii) Nitrogen metabolism: Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and trans-amination.

PRACTICAL

1. Isolation and quantitization of photosynthetic pigments.
2. Experimental demonstration of Hill's reaction.
3. To study the effect of light intensity on the rate of photosynthesis.
4. Effect of carbon dioxide on the rate of photosynthesis.
5. To compare the rate of respiration in different parts of a plant.
6. Demonstration of absorption spectrum of photosynthetic pigments.

Text Books:

1. S, K. Gupta (2017). Plant Metabolism, Rastogi Publication, Meerut.

Reference Books:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons.U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development.Sinauer Associates Inc. USA. 6th edition.
3. Harborne, J.B. (1973). Phytochemical Methods. John Wiley & Sons. New York.
4. A. C. Sahoo (2018). Outlines of Plant Metabolism, Kalynai Publishers, New Delhi.

Core Paper XIV

PLANT BIOTECHNOLOGY

Unit-I

Plant Tissue Culture: Historical perspective; Aseptic tissue culture techniques, Composition of media; Nutrient and hormone requirements (role of vitamins and hormones). Totipotency; Organogenesis; Embryogenesis (somatic and zygotic); Protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids; Cryopreservation; Germplasm Conservation).

Unit-II

Recombinant DNA technology-I: Restriction Endonucleases (History, Types I-IV, biological role and application); Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC and briefly PAC, MAC, HAC).Gene Cloning (Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCR-mediated gene cloning).

Unit-III

Recombinant DNA technology-II: Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; Probes-oligonucleotide, heterologous, Methods of gene transfer- *Agrobacterium*-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

Unit-IV

Applications of Biotechnology: Pest resistant (Bt-cotton); herbicide resistant plants (RoundUp Ready soybean); Transgenic crops with improved quality traits (Flavr Savr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Gentically Engineered Products–Human Growth Hormone; Humulin; Biosafety concerns.

PRACTICAL

1. a) Preparation of tissue culture (MS) medium.
   (b) Demonstration of *in vitro* sterilization and inoculation methods using leaf and nodal explants of tobacco, *Datura*, *Brassica* etc.
2. Study of anther culture.
3. Preparation of artificial seeds.
4. Testing and study of Bt cotton.
5. Isolation of plasmid DNA.
6. Gel electrophoresis (demonstration).

Text Books:

1. H. S. Chawla (2010). Introduction to Plant Biotechnology.Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.

Reference Books:

1. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
2. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
3. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.
4. Y. P. S. Bajaj Series, Springer Verlag
5. B. D. Singh (2018). Plant Biotechnology Kalynai Publishers, New Delhi.
6. P. K. Gupta (2017). Plant Biotechnology, Rastogi Publication, Meerut.
7. R. C. Dubey (2017). Advanced Biotechnology, S, Chand Publication, New Delhi

Discipline Specific Elective Paper-1

ANALYTICAL TECNIQUES IN PLANT SCIENCES

Unit-I

Imaging and related techniques: Principles of microscopy; Light microscopy; Fluorescence microscopy; Flow cytometry (FACS); Transmission and Scanning electron microscopy – sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.

Unit-II

Cell fractionation: Centrifugation: Differential and density gradient centrifugation, sucrosedensity gradient, $CsCl_2$gradient, analytical centrifugation, ultracentrifugation. Radioisotopes: Use in biological research, auto-radiography, pulse chase experiment. Spectrophotometry: Principle and its application in biological research.

Unit-III

Chromatography: Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography. Characterization of proteins and nucleic acids: Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteins and nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE

Unit-IV

Biostatistics: Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean deviation, variation, standard deviation; Chi-square test for goodness of fit. T-Test and correlation.

PRACTICAL

1. Study of different microscopic techniques for chromosome study
2. Study of PCR Demonstration.
3. To separate chlorophyll by paper chromatography.
4. To separate phytochemicals by thin layer chromatography.
5. To estimate protein concentration through Lowry's methods.
6. To separate proteins using PAGE.
7. To separate DNA (marker) using AGE.
8. Estimation of plant pigments.

Text Books:

1. C. S. Patil (2017). Advanced Analytical Techniques, ABE Books, New Delhi.

Reference Books:

1. Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-HillPublishing Co. Ltd. New Delhi. 3rd edition.
2. Ruzin, S.E. (1999). Plant Microtechnique and Microscopy, Oxford UniversityPress, New York. U.S.A.
3. Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl,K. (1995). Short Protocols in Molecular Biology. John Wiley & Sons. 3rd edition.
4. Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th edition.
5. K. R. Aneja (2014). Laboratory manual of microbiology and biotechnology, Medtech, New Delhi

Discipline Specific Elective Paper-1I

NATURAL RESOURCE MANAGEMENT

Unit-I

(i) Natural resources: Definition and types.
(ii) Sustainable utilization :Concept, approaches (economic, ecological and socio-cultural).
(iii) Land: Utilization (agricultural, horticultural, silvicultural); Soil degradation and management.
(iv) Water: Fresh water (rivers, lakes, groundwater, water harvesting technology, rain water storage and utilization.

Unit-II

Biological Resources: Biodiversity-definition and types; Significance; Threats; Management strategies; Bioprospecting; IPR; CBD; National Biodiversity Action Plan).

Forests: Definition, Cover and its significance (with special reference to India); Major and minor forest products; Depletion; Management.

Unit-III

(i) Energy: Renewable and non-renewable sources of energy-solar, wind, tidal, geothermal and bioenergy resources.

(ii) Contemporary practices in resource management: EIA, GIS, Participatory Resource Appraisal, Ecological Footprint with emphasis on carbon footprint.

Unit-IV

Resource Accounting; Waste management. National and international efforts in resource management and conservation

PRACTICAL

(i) Estimation of solid waste generated by a domestic system (biodegradable and non-biodegradable) and its impact on land degradation.

(ii) Collections of data on forest cover of specific area.

(iii) Measurement of dominance of woody species by DBH (diameter at breast height) method.

(iv) Calculation and analysis of ecological footprint.

(v) Ecological modeling.

Text Books:

1. B. W. Pandey. 2005. Natural Resource Management. Mittal Publication, New Delhi

Reference Books:

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House,New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and ResourceConservation. Anamaya Publications, New Delhi.
3. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Discipline Specific Elective Paper-1II

HORTICULTURAL PRACTICES AND POST-HARVEST TECHNOLOGY

Unit-I

(i) Introduction: Scope and importance, Branches of horticulture; Role in rural economy and employment generation; Importance in food and nutritional security; Urban horticulture and ecotourism.

(ii) Ornamental plants: Types, classification (annuals, perennials, climbers and trees); Identification and salient features of some ornamental plants [rose, marigold, gladiolus, carnations, orchids, poppies, gerberas, tuberose, sages, cacti and succulents (*Opuntia*, *Agave* and spurges)]

Unit-II

(i) Fruit and vegetable crops: Production, origin and distribution; Description of plants and their economic products; Management and marketing of vegetable and fruit crops.

(ii) Horticultural techniques: Application of manure, fertilizers, nutrients and PGRs; Weed control; Biofertilizers, biopesticides; Irrigation methods (drip irrigation, surface irrigation, furrow and border irrigation); Hydroponics; Propagation Methods: asexual (grafting, cutting, layering, budding), sexual (seed propagation), Scope and limitations.

(iii)Landscaping and garden design :Planning and layout (parks and avenues); gardening traditions - Ancient Indian, European, Mughal and Japanese Gardens; Urban forestry; policies and practices.

Unit-III

(i) Post-harvest technology: Importance of post harvest technology in horticultural crops; Evaluation of quality traits; Harvesting and handling of fruits, vegetables and cut flowers; Principles, methods of preservation and processing; Methods of minimizing loses during storage and transportation;

(ii) Disease control and management: Field and post-harvest diseases; Identification of deficiency symptoms; remedial measures and nutritional management practices; Crop sanitation; IPM strategies (genetic, biological and chemical methods for pest control); Quarantine practices;

Unit-III

(i) Post-harvest technology: Importance of post harvest technology in horticultural crops; Evaluation of quality traits; Harvesting and handling of fruits, vegetables and cut flowers; Principles, methods of preservation and processing; Methods of minimizing loses during storage and transportation;

(ii) Disease control and management : Field and post-harvest diseases; Identification of deficiency symptoms; remedial measures and nutritional management practices; Crop sanitation; IPM strategies (genetic, biological and chemical methods for pest control); Quarantine practices;

Unit-IV

Horticultural crops - conservation and management: Documentation and conservation of germplasm; Role of micropropagation and tissue culture techniques; Varieties and cultivars of various horticultural crops; IPR issues; National, international and professional societies and sources of information on horticulture.

PRACTICAL

Practical related to theory

Text Books:

1. K. V. Peter. (2009). Basics of Horticulture, Kalyani Publishers, New Delhi.

Reference Books:

1. Singh, D. & Manivannan, S. (2009). Genetic Resources of Horticultural Crops. Ridhi International, Delhi, India.

2. Swaminathan, M.S. and Kochhar, S.L. (2007). Groves of Beauty and Plenty: An Atlas of Major Flowering Trees in India. Macmillan Publishers, India.

3. NIIR Board (2005). Cultivation of Fruits, Vegetables and Floriculture. National Institute of Industrial Research Board, Delhi.

4. Kader, A.A. (2002). Post-Harvest Technology of Horticultural Crops. UCANR Publications, USA.

5. Capon, B. (2010). Botany for Gardeners. 3rd Edition. Timber Press, Portland, Oregon.

6. P. H. Pandey (2007). Principles and Practices of Post Harvest Technology, Kalyani Publishers, New Delhi.

Discipline Specific Elective Paper-1V

INDUSTRIAL AND ENVIRONMENTAL MICROBIOLOG

Unit-I

(i) Scope of microbes in industry and environment: Bioreactors/Fermenters and fermentation processes: Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations. Components of a typical bioreactor, Types of bioreactors- laboratory.

(ii) Microbial production of industrial products: Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying.

Unit-II

Microbial enzymes of industrial interest and enzyme immobilization: Microorganisms for industrial applications and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).

Unit-III

Microbes and quality of environment: Distribution of microbes in air; Isolation of microorganisms from soil, air and water.

Microbial flora of water: Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality.

Unit-IV

Microbes in agriculture and remediation of contaminated soils: Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.

PRACTICAL

1.Principles and functioning of instruments in microbiology laboratory
2.Hands on sterilization techniques and preparation of culture media
3. Screening microorganisms for industrial use.
4. Mycorrhiza, arbuscular mycorrhizal colonization in plant roots
5. Determination of BOD, COD, TDS and TOC of water samples;
6.Microorganisms as indicators of water quality

Text Books:

1. P. D. Sharma. (2017) Environmental Microbiology. Rastogi Publications, Meerut.

Suggested Readings

1. Pelzar, M.J. Jr., Chen E.C. S., Krieg, N.R. (2010). Microbiology: An application based approach. Tata McGraw Hill Education Pvt. Ltd., Delhi.

2. Tortora, G.J., Funke, B.R., Case. C.L. (2007). Microbiology. Pearson Benjamin Cummings, San Francisco, U.S.A. 9th edition.

3.Pradipta K. Mohapatra (2008). Text Book of Environmental Microbiology, I. K. International Publishing House, New Delhi

4. A. K. Rath (2018). Industrial and Environmental Microbiology, Kalyani Publishers, New Delhi.

OR

DISSERTATION / PROJECT WORK**

Identification of problem	Review of Literature	Methodology	Findings	Analysis	Viva-Voce	Total
10	10	10	25	25	20	100

** = Students who score more than ≥60% in aggregate are eligible for project work

Generic Elective Paper I

BIODIVERSITY (MICROBES, ALGAE, FUNGI AND ARCHEGONIATE)

Unit-I

Microbes :Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.

Unit-II

(i) Algae: General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Morphology and life- cycles of the following: *Chlamydomonas, Oedogonium*, *Nostoc and Fucus, Vaucheria, Polysiphonia,* Economic importance of algae.

(ii) Fungi : Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of *Rhizopus* (Zygomycota) *Penicillium* (Ascomycota), *Agaricus* Basidiomycota); Symbiotic Associations-Lichens:

Unit-III

(i) **Bryophytes :**General characteristics, adaptations to land habit, Classification, Range of thallus organization, Classification (up to family), morphology, anatomy and reproduction of *Marchantia* and *Funaria* (Developmental details not to be included).Ecology and economic importance of bryophytes.

(ii) **Pteridophytes :** General characteristics, classification, Early land plants (*Cooksonia* and *Rhynia*). Classification (up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris* (Developmental details not to be included).Heterospory and seed habit, stellar evolution. Ecological and economical importance of Pteridophytes.

Unit-IV

Gymnosperms: General characteristics, classification.Classification (up to family), morphology, anatomy and reproduction of Cycas, Pinus and Gnetum. (Developmental details not to be included).Ecological and economical importance.

PRACTICAL

1. Gram staining
2. Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs)*, Oedogonium, Vaucheria, and Polysiphonia* through temporary preparations and permanent slides.
3. *Rhizopus and Penicillium*: Asexual stage from temporary ounts and sexual structuresthrough permanent slides.
4. *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.
5. *Marchantia*- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).

6. *Selaginella*- morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m.microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).

7. *Equisetum*- morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore,w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).

8. *Cycas*- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet,v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).

9. *Pinus*- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m.dwarf shoot, t.s. needle, t.s. stem, , l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. &r.l.s. stem (permanent slide).

Text Books:

1. Mitra, Mitra and Choudhury. Studies in Botany Volume 1. Moulik Publisher, Kolkata. Ninth Revised Edition

Reference Books:

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, Mac Millan Publishers Pvt. Ltd., Delhi.
4. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, JohnWiley and Sons (Asia), Singapore. 4th edition.
5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
6. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
7. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) LtdPublishers, New Delhi, India.
8. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.
9. B. P. Pandey (2017), Botany for degree studies (as per CBCS). S.Chand
10. B. S. Acharya and B. K. Mishra (2018). Plant Biodiversity, Kalyani Publishers, New Delhi.

Generic Elective Paper II

PLANT ECOLOGY AND TAXONOMY

Unit-I

(i) Ecological factors: Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes

(ii) Plant communities : Characters; Ecotone and edge effect; Succession; Processes and types

Unit-II

(i) Ecosystem : Structure; Biotic and abiotic components, energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

(ii) Phytogeography: Principle biogeographical zones; Endemism

Unit-III

(i) Introductionto plant taxonomy: Identification, Classification, Nomenclature.

(ii) Identification : Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access

Unit-IV

(i) Taxonomic hierarchy: Ranks, categories and taxonomic groups

(ii) Botanical nomenclature: Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

(iii) Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Hutchinson (upto series).

(iv) Taxonomic description of the families : Malvaceae, Fabaceae, Asteraceae and Poaceae.

PRACTICAL

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats.
4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each).
5. (b)Study of biotic interactions of the following: Stem parasite (*Cuscuta)*, Root parasite (*Orobanche*), Epiphytes, Predation (Insectivorous plants)
6. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)

7. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law .
8. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): Malvaceae, Caesalpiniaceae, Fabaceae, Apocynaceae, Asteraceae and Poaceae as in theory syllabus.
9. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

Text Books:

1. Sharma, P.D. (2017). Fundamentals of Ecology. Rastogi Publications, Meerut, India.

Reference Books:

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego, CA, U.S.A.
4. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.
5. A. C. Sahu (2017). Plant Ecology and Phytogeography, Kalyani Publishers, New Delhi.
6. M. C. Das and S. P. Das (2009). Fundamental of Ecology.Tata MGrow Hill, New Delhi.
7. Shukla and Chandel (2016). A text book of Plant Ecology. S Chand Publication, New Delhi
8. C. R. Mohanty (2017). Text Book of Plant Systematics, Kalynai Publisher, New Delhi.

Generic Elective Paper III

PLANT PHYSIOLOGY AND METABOLISM

Unit-I

(i) Plant-water relations: Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.

(ii) Mineral nutrition: Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps.

(iii)Translocation in phloem.: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading

Unit-II

(i) Photosynthesis: Photosynthetic Pigments (*Chl* a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C_3, C_4 and CAM pathways of carbon fixation.

(ii) Respiration: Glycolysis, anaerobic respiration, TCA cycle; Oxidative Phosphorylation.

Unit-III

(i) Enzymes: Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition.

(ii) Nitrogen metabolism :Biological nitrogen fixation; Nitrate and ammonia assimilation.

Unit-IV

(i) Plant growth regulators :Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.

(ii) Plant response to light and temperature: Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on hotomorphogenesis;Vernalization.

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.
6. To study the effect of light intensity and bicarbonate concentration on O_2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.

Text Books:

1. A. C. Sahu (2018). Plant Physiology and Metabolism. Kalyani Publishers, New Delhi.

Reference Books:

1. Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
4. H. S. Srivatava. Plant Physiology, Rastogi Publications, New Delhi

Generic Elective Paper IV

PLANT ANATOMY AND EMBRYOLOGY

Unit-I

(i) Meristematic and permanent tissues : Root and shoot apical meristems; Simple and complex tissues

(ii) Organs :Anatomy of dicot and monocot root stem and leaf.

Unit-II

(i) Secondary Growth :Vascular cambium – structure and function, seasonal activity. Secondary growth in and stem, Wood (heartwood and sapwood)

(ii) Adaptive and protective systems: Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit-III

(i) Structural organization of flower :Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs,organization and ultrastructure of mature embryo sac.

(ii) Pollination and fertilization : Pollination mechanisms and adaptations; Double fertilization;

Unit-IV

(i) Endosperm :Endosperm types, structure and functions.

(ii) Embryo :Dicot and monocot embryo; Structure and development, Embryo endosperm relationship.

(iii)Seed-structure and development, appendages anddispersal mechanisms.

PRACTICAL

1. Study of meristems through permanent slides and photographs.
2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: *Zea mays;* Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
4. Root: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous**.**

Text Books:

1. Singh, Pandey and Jain (2017). Anatomy of Angiosperms, Rastogi Publication, Meerut.

Reference Books:

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.
3. C. R. Mohanty (2018). Plant Anatomy and Embryology. Kalyani Publishers, New Delhi.

BOTANY Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers

Marks per paper - Midterm: 15 marks, End term: 60 marks, Practical: 25 marks,
Total – 100 marks

Credit per paper – 6
Teaching hours per paper – 40 hours (theory) + 20 hours (practical)

Semester	Course Opted	Course Name	Credit	Marks
Semester-I	DSC-1(Theory),	Paper-I, Biodiversity (Microbes, Algae, Fungi and Archegoniate)	4	75
	DSC-1 (Practical)	Paper –I, Biodiversity (Microbes, Algae, Fungi and Archegoniate)	2	25
Semester -II	DSC-2(Theory),	Paper-II, Plant Ecology and Taxonomy	4	75
	DSC-2 (Practical),	Paper-II,Plant Ecology and Taxonomy	2	25
Semester-III	DSC-3(Theory),	Paper-III, Plant Anatomy and Embryology	4	75
	DSC-3 (Practical),	Paper-III, Plant Anatomy and Embryology	2	25
Semester-IV	DSC-4(Theory),	Paper-IV, Plant Physiology and Metabolism	4	75
	DSC-4 (Practical)	Paper-IV, Plant Physiology and Metabolism	2	25
Semester-V	DSE-1(Theory),	Botany Paper-I – Economic Botany and Biotechnology	4	75
	DSE-1 (Practical),	Botany paper-I – Economic Botany and Biotechnology	2	25
Semester-VI	DSE-2(Theory),	Botany paper-II – Cell and Molecular Biology	4	75
	DSE-2 (Practical),	Botany paper-II – Cell and Molecular Biology	2	25
		Total:	36	600

Discipline Specific Core Paper I

Biodiversity (Microbes, Algae, Fungi and Archegoniate)

THEORY

Unit 1: Microbes:
Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination, Economic importance. **Algae :**General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: *Nostoc*, *Chlamydomonas, Oedogonium*, *Fucus*. Economic importance of algae.

Unit 2: Fungi
General characteristics of fungi, ecology and significance, range of thallus organization, cell wall composition, nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of *Rhizopus* (Zygomycota) *Penicillium, Alternaria* (Ascomycota), *Puccinia, Agaricus* (Basidiomycota); Symbiotic Associations- Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance.

Unit 3: Archegoniate and Bryophyte
Unifying features of archegoniates, Transition to land habit, Alternation of generations.
General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of *Marchantia* and *Funaria*. (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of *Sphagnum*.

Unit 5: Pteridophytes & Gymnosperms
General characteristics, classification, Early land plants (*Cooksonia* and *Rhynia*). Classification (up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris*. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes.
General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Cycas* and *Pinus*. (Developmental details not to be included). Ecological and economical importance.

PRACTICAL

1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium, Gram staining
3. Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs)*, Oedogonium, Fucus** (* *Fucus* - Specimen and permanent slides)
4. ***Penicillium***: Asexual stage from temporary mounts and sexual structures through permanent slides.

5. ***Puccinia***: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
6. ***Agaricus***: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.
7. **Mycorrhiza**: ecto mycorrhiza and endo mycorrhiza (Photographs)
8. ***Marchantia*** & ***Funaria***- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. of reproductive organ l.s. sporophyte .
9. ***Selaginella &Equisetum***- morphology, w.m. leaf with ligule, t.s. stem, ts/l.s of reproductive organ
10. ***Cycas & Pinus*** - morphology (roots, bulbil, leaf), t.s. root, v.s. leaflet, whole mount or v.s. of reproductive organs

Text Books

1. Singh, Pandey and Jain (2017). Microbiology and Phycology, Rastogi Publication, Meerut.
2. B. K. Mishra (2017), Mycology and Phytopathology, Kalynai Publishers, New Delhi.
3. Singh, Pandey and Jain (2017). Archegoniate, Rastogi Publication, Meerut.

Suggested Readings

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
6. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
7. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
8. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

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Discipline Specific Core Paper II

Plant Ecology and Taxonomy

THEORY

Unit 1: Ecological factors
Introduction to plant ecology and taxonomy. Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.

Unit 2: Plant communities and Ecosystems
Characters; Ecotone and edge effect; Succession; Processes and types. Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

Unit 3: Phytogeography and Plant Taxonomy
Principle biogeographical zones; Endemism. Identification, Classification, Nomenclature. Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access, Taxonomic evidences from palynology, cytology, phytochemistry and molecular data. Taxonomic hierarchy: Ranks, categories and taxonomic groups

Unit 4: Classification & Botanical nomenclature
Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series). Biometrics, numerical taxonomy and cladistics: cluster analysis; phenograms, cladograms (definitions and differences).

PRACTICAL

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (*Cuscuta)*, Root parasite (Orobanche), Epiphytes, Predation (Insectivorous plants)
4. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
5. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law
6. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): Brassicaceae, Asteraceae, Solanaceae, Lamiaceae, Liliaceae
7. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

Text Books

1. Sharma, P.D. (2017). Fundamentals of Ecology. Rastogi Publications, Meerut, India.
2. O. P. Sharma (2009) Plant Taxonomy, Tata MGrow Hill, New Delhi

Suggested Readings

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego, CA, U.S.A.
4. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.

Discipline Specific Core Paper III

Plant Anatomy and Embryology

THEORY

Unit 1: Tissues, Organs and special tissues

Root and shoot apical meristems; Simple and complex tissues. Structure of dicot and monocot root stem and leaf. Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood). Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit 2: Structural organization of flower

Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.

Unit 3: Pollination and fertilization

Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms. Apomixis and polyembryony**:** Definition, types and practical applications.

Unit 4: Embryo and endosperm

Endosperm types, structure and functions; Dicot and monocot embryo; Embryoendosperm relationship.

PRACTICAL

1. Study on different types of tissues : parenchyma, collenchymas, sclerenchyma,Xylary elements, Phloem
3. Stem, root and leaf anatomy: Monocot, Dicot, Secondary growth.
4. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
5. Structure of anther (young and mature), tapetum (amoeboid and secretory).
6. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
7. Female gametophyte: *Polygonum* (monosporic) type of Embryo sac Development.
8. Calculation of percentage of germinated pollen in a given medium.

Text Books

1. Singh, Pandey and Jain (2017). Anatomy of Angiosperms, Rastogi Publication, Meerut.
2. Singh, Pandy and Jain (2017). Reproductive Biology of Angiosperms, Rastogi Publications,Meerut

Suggested Readings

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.

Discipline Specific Core Paper IV

Plant Physiology and Metabolism

THEORY

Unit 1: Plant-water relations and nitrogen metabolism

Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation. Biological nitrogen fixation; Nitrate and ammonia assimilation.

U nit 2: Mineral nutrition and Phloem translocation

Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps. Translocation in phloem: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.

Unit 3: Photosynthesis and respiration

Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3 and C4. Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation.

Unit 4: Enzyme, Plant growth regulators and Plant response

Enzymes: Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition. Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.Plant response to light and temperature: Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. Suction due to transpiration.

Text Books

1. R. K. Sinha, (2015). Modern Plant Physiology, Narosa Publishing House, New Delhi.
2. S, K. Gupta (2017). Plant Metabolism, Rastogi Publication, Meerut.

Suggested Readings

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

Discipline Specific Elective Paper I

Economic Botany and Biotechnology

THEORY

Unit 1: Origin of Cultivated Plants, Cereals and Legumes

Concept of centres of origin, their importance with reference to Vavilov's work. Rice cultivation process, Economic importance. Cereals:- Wheat -Origin, morphology, uses. Legumes: General account with special reference to Gram and soybean

U nit 2: Spices and Beverages

General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses). Tea (morphology, processing, uses)

U nit 3: Oils and Fats and Fibre Yielding Plants

General description with special reference to groundnut. General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

U nit 4: Plant tissue culture and molecular techniques

Introduction to biotechnology. Micropropagation; Anther culture, haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications. Protoplast culture, Hybrid and Cybrids. DNA Fingerprinting; Molecular DNA markers i.e. PCR, RAPD, RFLP.

PRACTICAL

1. Study of economically important plants: Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests
2. Familiarization with basic equipments in tissue culture.
3. Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.
4. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.

Text Books:

1. B. P. Pandey (2017) Economic Botany. S. Chand Publication, New Delhi.
2. H. S. Chawla (2010). Introduction to Plant Biotechnology.Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.

Suggested Readings

1. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
2. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

Discipline Specific Elective Paper II

Cell and Molecular Biology

THEORY

Unit 1: Techniques in Biology

Principles of microscopy; Light Microscopy; Phase contrast microscopy; Fluorescence microscopy; Confocal microscopy; Sample Preparation for light microscopy; Electron microscopy (EM)- Scanning EM and Scanning Transmission EM (STEM); Sample Preparation for electron microscopy.

Unit 2: Cell and Cell Organelles

The Cell Theory; Prokaryotic and eukaryotic cells; Cell size and shape; Eukaryotic Cell components. Mitochondria: Structure, marker enzymes, composition; Semiautonomous nature; Symbiont hypothesis; Proteins synthesized within mitochondria; mitochondrial DNA. Chloroplast - Structure, marker enzymes, composition; semiautonomous nature, chloroplast DNA. ER, Golgi body & Lysosomes: Structures and roles. Peroxisomes and Glyoxisomes:_Structures, composition, functions in animals and plants and biogenesis. Nucleus:_Nuclear Envelope- structure of nuclear pore complex; chromatin; molecular organization.

Unit 3: Cell Membrane, Cell Wall and Cell Cycle

The functions of membranes; Models of membrane structure; The fluidity of membranes; Membrane proteins and their functions; Carbohydrates in the membrane; Faces of the membranes; Selective permeability of the membranes; Cell wall.

Unit 4: Genetic material, transcription, gene expression and **Cell Cycle**

DNA: Miescher to Watson and Crick- historic perspective, DNA structure, types of DNA, types of genetic material. DNA replication (Prokaryotes and eukaryotes), Types of structures of RNA (mRNA, tRNA, rRNA), RNA polymerase- various types; Translation (Prokaryotes and eukaryotes), genetic code. Regulation of gene expression: Prokaryotes: Lac operon and Tryptophan operon; and in Eukaryotes. Overview of Cell cycle, Mitosis and Meiosis; Molecular controls.

PRACTICAL

1. To study prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs.
2. Study of the photomicrographs of cell organelles
3. To study the structure of plant cell through temporary mounts.
4. To study the structure of animal cells by temporary mounts-squamous epithelial cell and nerve cell.
5. Preparation of temporary mounts of striated muscle fiber
6. Study of mitosis and meiosis (temporary mounts and permanent slides).
7. Study of plasmolysis and deplasmolysis on *Rhoeo* leaf.
8. Measure the cell size (either length or breadth/diameter) by micrometry.
9. Study the structure of nuclear pore complex by photograph (from Gerald Karp)
10. Study of special chromosomes (polytene & lampbrush) either by slides or photographs.
11. Study DNA packaging by micrographs.
12. Preparation of the karyotype and ideogram from given photograph of somatic metaphase chromosome.

Text Books

1. B. D. Singh (2017). Fundamental of Genetics, Kalynai Publishers, New Delhi.
2. H. S. Chawla (2010). Introduction to Plant Biotechnology. Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.

Suggested Readings

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

OPTIONAL FOR SECC II PAPER

SKILL ENHANCEMENT COURSE (SECC II Option I)

BIO-FERTILIZERS

Unit-I

General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis. Azospirillum: isolation and mass multiplication, Azotobacter: classification, characteristics – crop response to Azotobacter inoculums, maintenance and mass multiplication.

Unit-II

Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Unit-III

Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

Unit-IV

Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.

Text Books:

1. Mahendra Rai, (2006). Hand book of Microbial Biofertilizers. CRC Press.

Reference Books:

1. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay _Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New -Delhi.
6. Vayas,S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic. Farming Akta Prakashan, Nadiad
7. Pravin Chandra Dwivedi.(2008). Biofertilizers. Pointer Publishers.

SKILL ENHANCEMENT COURSE (SECC II Option II)

NURSERY AND GARDENING

Unit-I

Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion – Seed production technology - seed testing and certification.

Unit-II

Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants – green house - mist chamber, shed root, shade house and glass house.

Unit-III

Gardening: definition, objectives and scope - different types of gardening – landscape and home gardening - parks and its components - plant materials and design – computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

Unit-IV

Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures.

Text Books:

1. Saidaiah Pidigam, Sindhuja S., Geetha Amarapalli. (2018)Text Book of Nursery, Gardening and Floriculture, Kalyani Publishers, New Delhi.

Reference Books:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co.,New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co.,New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National - Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

SKILL ENHANCEMENT COURSE (SECC II Option III)

ETHNOBOTANY

Unit-I

(i) Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.

(ii) Methodology of Ethnobotanical studies a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places.

Unit-II
Role of ethnobotany in modern Medicine Medico-ethnobotanical sources in India;Significance of the following plants in ethno botanicalpractices (along with their habitat and morphology) a) Azadiractha indica b) Ocimum sanctumc) Vitex negundo. d) Gloriosa superba e) Tribulus terrestris f) Pongamia pinnata g) Cassia auriculata h) Indigofera tinctoria. Role of ethnobotany in modern medicine with special example Rauvolfia sepentina, Trichopus zeylanicus, Artemisia,Withania.

Unit-III
Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management (participatory forest management).

Unit-IV
Ethnobotany and legal aspects Ethnobotany as a tool to protect interests of ethnic groups. Sharing of wealth concept with few examples from India. Biopiracy, Intellectual Property Rights and Traditional Knowledge.

Text Books:

1. Faulks, P.J. 1958.An introduction to Ethnobotany, Moredale pub. Ltd

Reference Books:

1. S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2. S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981
3. Lone et al,. Palaeoethnobotany
4. S.K. Jain (ed.) 1989. Methods and approaches in Ethnobotany. Society of Ethnobotanists, Lucknow, India.
5. S.K. Jain, 1990. Contributions of Indian ethnobotny.Scientific publishers, Jodhpur.
6. Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – Chichester
7. Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in AndhraPradesh, India.Botanical Survey of India. Howrah.
8. Rajiv K. Sinha – Ethnobotany The Renaissance of Traditional Herbal Medicine – INA –SHREE Publishers, Jaipur-1996
9. Rath, A. K. and Mishra, S. R. (2017). Ethnobotany, Kalyani Publishers, New Delhi..

SKILL ENHANCEMENT COURSE (SECC II Option IV)
MUSHROM CULTIVATION

Unit-I
Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms.Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus*. Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.

Unit-II

Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.

Unit-III

Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fiber content - Vitamins.

Unit-IV

Food Preparation: Types of foods prepared from mushroom. Research Centers - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

Text Books:

1. B. C. Suman and V. P. Sharma. (2007). Mushroom Cultivation in India. Daya Publishing House, New Delhi.

Reference Books:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu AgriculturalUniversity, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications,Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.
5. 5.Anon. (2010).The Cultivation of Mushrooms - An Outline of Mushroom Culture, Read Book Design, New Delhi

CAPACITY BUILDING OF FACULTY

Following modules have been proposed for training of faculties:

- Isolation and quantification of nucleic acids following spectrophotometric and gel electrophoresis techniques
- Techniques of Chromatography
- Micrometry and Haemocytometry
- Tissue Culture Techniques
- PCR techniques
- Chromosome techniques

The above module may be of 3-4 weeks duration with 30 participants.

LIST OF EQUIPMENTS

Sl. No.	List of Equipments	Quantity
01	Dissecting Microscope (Indian Make)	2 no.
02	Compound Microscope (Indian Make) with photographic attachment	2 no.
03	Occular and Stage Micrometer (Indian Make)	1 no.
04	Uv Spectrophotometer (Indian Make)	1 no.
05	Cold Centrifuge (Indian Make)	1 no.
06	Refrigerator (Indian Make)	1 no.
07	Soil Thermometer (Indian Make)	1 no.
08	Anemometer (Indian Make)	1 no.
09	Psychrometer (Indian Make)	1 no.
10	Rain gauge (Indian Make)	1 no.
11	pH meter (Indian Make)	1 no.
12	Herbarium Press (Indian Make)	1 set
13	Hot air Oven (Indian Make)	1 no.
14	Electronic Balance (Indian Make)	1no.
15	Gel Electrophoresis (Indian Make) Vertical and submarine	1 no.
16.	Power Pack for electrophoresis	1 no.
17	Blood Testing Kit (Indian Make)	1 no.
18	Laminar Flow (Indian Make)	1 no.
19	BOD Incubator (Indian Make)	1 no.
20	Autoclave (Indian Make)	1 no.

SYLLABUS FOR UNDERGRADUATE COURSE IN ZOOLOGY

(Bachelor of Science Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course Structure of U.G. Zoology Honours				
Semester	**Course**	**Course Name**	**Credit**	**Total marks**
Semester-I	AECC I	AECC I	4	100
	Core I (Theory)	Non-chordates I: Protista to Pseudocoelomates	4	75
	Core I (Practical)	Non-chordates I: Protista to Pseudocoelomates	2	25
	Core II (Theory)	Principles of Ecology	4	75
	Core II (Practical)	Principles of Ecology	2	25
	GE 1 (Theory)	GE 1 (Theory)	4	75
	GE I (Practical)	GE I (Practical)	2	25
Semester-II	AECC 2	AECC 2	4	100
	Core III (Theory)	Non chordates II: Coelomates	4	75
	Core III (Practical)	Non chordates II: Coelomates	2	25
	Core IV (Theory)	Cell biology	4	75
	Core IV (Practical)	Cell biology	2	25
	GE II (Theory)	GE II (Theory)	4	75
	GE II (Practical)	GE II (Practical)	2	25
Semester-III	Core V (Theory)	Diversity of Chordates	4	75
	Core V (Practical)	Diversity of Chordates	2	25
	Core VI (Theory)	Physiology: Controlling and Coordinating systems	4	75
	Core VI (Practical)	Physiology: Controlling and Coordinating systems	2	25
	Core VII (Theory)	Fundamentals of Biochemistry and microbiology	4	75
	Core VII (Practical)	Fundamentals of Biochemistry and microbiology	2	25
	SEC 1	SEC 1	4	100
	GE III (Theory)	GE III (Theory)	4	75
	GE III (Practical)	GE III (Practical)	2	25
Semester-IV	Core VIII (Theory)	Comparative anatomy of Vertebrates	4	75

	Core VIII (Practical)	Comparative anatomy of Vertebrates	2	25
	Core IX (Theory)	Physiology: Life Sustaining Systems	4	75
	Core IX (Practical)	Physiology: Life Sustaining Systems	2	25
	Core X (Theory)	Biochemistry of Metabolic Processes	4	75
	Core X (Practical)	Biochemistry of Metabolic Processes	2	25
	SEC 2	SEC 2	4	100
	GE IV (Theory)	GE IV (Theory)	4	75
	GE IV (Practical)	GE IV (Practical)	2	25
Semester-V	Core XI (Theory)	Molecular Biology	4	75
	Core XI (Practical)	Molecular Biology	2	25
	Core XII (Theory)	Principles of Genetics	4	75
	Core XII (Practical)	Principles of Genetics	2	25
	DSE I (Theory)	DSE 1	4	75
	DSE I (Practical)	DSE 1	2	25
	DSE II (Theory)	DSE II	4	75
	DSE II (Practical)	DSE II	2	25
Semester-VI	Core XIII (Theory)	Developmental Biology	4	75
	Core XIII (Practical)	Developmental Biology	2	25
	Core XIV (Theory)	Evolutionary Biology	4	75
	Core XIV (Practical)	Evolutionary Biology	2	25
	DSE III (Theory)	DSE III	4	75
	DSE III (Practical)	DSE III	2	25
	DSE IV (Theory with Practical /Project)	Project/ Economic Zoology	6	100
		Total	**148**	**2600**

ZOOLOGY

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (Out of 9 suggested papers)

Generic Elective for Non Zoology students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm: 15 marks, End term: 60 marks (Theory) + 25 marks (Practical), Total – 100 marks

Credit per paper – 6

Teaching hours per paper – 40 hours (theory) + 10 hours (practical)

Core Paper I

Non-Chordates I: Protista to Pseudocoelomates

Unit 1: Protista, Parazoa, Metazoa and Porifera

General characteristics and Classification up to classes. Study of *Euglena*, *Amoeba*. Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica*. Locomotion and Reproduction in Protista.General characteristics and Classification up to classes, Canal system and spicules in sponges.

Unit 2: Cnidaria & Ctenophora

General characteristics and Classification up to classes, Metagenesis in *Obelia*, Polymorphism in Cnidaria, Corals and coral reefs. General characteristics and Evolutionary significance of Ctenophora.

Unit 3: Platyhelminthes

General characteristics and Classification up to classes. Life cycle and pathogenicity of *Fasciola hepatica* and *Taenia solium.*

Unit 4: Nemathelminthes

General characteristics and Classification up to classes. Life cycle, and pathogenicity of *Ascaris lumbricoides* and *Wuchereria bancrofti*. Parasitic adaptations in helminthes.

Note: Classification to be followed from "Barnes, R.D. (1982). Invertebrate Zoology, V Edition"

PRACTICAL

1. Study of whole mount of *Euglena*, *Amoeba* and *Paramecium*, Binary fission and Conjugation in *Paramecium*.
2. Examination of pond water collected from different places for diversity in protista.
3. Study of *Sycon* (T.S. and L.S.), *Hyalonema*, *Euplectella*, *Spongilla*.
4. Study of *Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia,*

Metridium, Pennatula, Fungia, Meandrina, Madrepora.

5. One specimen/slide of any ctenophore.

6. Study of adult *Fasciola hepatica*, *Taenia solium* and their life cycles (Slides/microphotographs).

7. Study of adult *Ascaris lumbricoides* and its life stages (Slides/micro-photographs).

8. To submit a Project Report on any related topic on life cycles/coral/ coral reefs.

Note: Classification to be followed from "Ruppert and Barnes (2006) Invertebrate Zoology, 8th edition, Holt Saunders International Edition"

TEXT BOOKS

1. Kotpal RL; Modern Textbook of Zoology – Invertebrates; Rastogi Publications - Meerut; 2016 edition
2. Richard Busca, W. Moore, Stephen M. Shuster. Invertebrates; OUP USA; 3rd edition (19 January 2016)

SUGGESTED READINGS

1. Richard Fox , Robert D. Barnes, Edward E. Ruppert, Invertebrate Zoology: A Functional Evolutionary Approach, Brooks/Cole; 7th edition 2003
2. Barrington, E.J.W.Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson.
3. Hyman, L.H. Invertebrate Series (Recent edition)
4. Verma P. S. A Manual of Practical Zoology: Invertebrates. S Chand Publication
5. Parker JJ and WA Haswel Textbook of Zoology. Vol I and II

Core Paper II

Principles of Ecology

Unit 1: Ecosystem and Applied Ecology

Ecology: Autecology and synecology, Types of ecosystems with one example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids Nutrient and biogeochemical cycle with one example of Nitrogen cycle. Ecology in Wildlife Conservation and Management. Laws of limiting factors, Study of physical factors- (Light, temperature).

Unit 2: Population

Attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies. Population regulation - density-dependent and independent factors, Population interactions, Gause's Principle with laboratory and field examples.

Unit 3: Community

Community characteristics: species richness, dominance, diversity, abundance,vertical stratification, Ecotone and edge effect; Ecological succession with one example. Theories pertaining to climax community.

Unit – 4: Biometry

Biological data, graphical representation of data (frequency polygon and histogram), sampling techniques, measures of central tendency (Mean, median and mode), Measures of dispersion (range, quartile deviation, mean deviation and standard deviation), Hypothesis and hypothesis testing (Chi-square test, t- test)

PRACTICAL

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton collection, preservation and mounting, Measurement of temperature, turbidity/penetration of light, determination of pH, Dissolved Oxygen content (Winkler's method), BOD, COD, Free CO_2, Hardness, TDS.
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary.
5. Chi-square analysis using seeds/beads/*Drosophila*.
6. Problems on standard deviation.
7. Graphical representation of data (Frequency polygon and Histogram).

Text Book

1. Odum, E.P. and Barrett, G.W., (2018). Fundamentals of Ecology, 5th Edition
2. Smith and Smith, Elements of Ecology, Global Edition; Pearson Education India; ninth edition (14 May 2015)
3. Myra Samuels, J. Witmer,A. Schaffner, Statistics for the life sciences, Prentice Halls, Boston, 4th edition, 2012

Suggested Readings

1. Kormondy, (2017). Concepts of Ecology, Updated 4/e, Pearson
2. Colinvaux, P. A. (1993). Ecology. II Edition. Wiley, John and Sons, Inc. Krebs, C. J. (2001). Ecology. VI Edition. Benjamin Cummings.
3. Ricklefs, R.E., (2000). Ecology. 5th Edition. Chiron Press
4. Dash M.C., Fundamentals of Ecology. Mc GrawHill
5. Smith TM and Smith RL, Elements of Ecology, 8th Edition,Pearson education INC, USA
6. Miller, G.T. and Spoolman, S.E. (2017) Environmental Science, 14th Edition. Cengage Publication, New Delhi.
7. Baneerjee Pranab Kumar, Introduction to biostatistics, S Chand & Company; 3rd Rev. Edn. 2006 edition
8. Chainy GBN, Mishra G, Mohanty PK, 2016, Basic Biostatistics, Kalyani Publisher 3rd edition

Core Paper III

Non- Chordates II: Coelomates

Unit 1: Coelomates and Annelids
Evolution of coelom and metamerism. General characteristics and Classification up to classes; Excretion in Annelida.

Unit 2: Arthropoda and Onychophora
General characteristics and Classification up to classes. Vision and Respiration in Arthropoda. Metamorphosis in Insects. Social life in bees and termites. Onychophora: General characteristics and Evolutionary significance.

Unit 3: Mollusca
General characteristics and Classification up to classes. Respiration in Mollusca. Torsion and detorsion in Gastropoda. Evolutionary significance of trochophore larva.

Unit 4: Echinodermata
General characteristics and Classification up to classes. Water-vascular system in Asteroidea, Larval forms in Echinodermata, Affinities with Chordates.

Note: Classification to be followed from "Ruppert and Barnes (2006)Invertebrate Zoology,8th edition, Holt Saunders International Edition"

PRACTICAL

1. Study of following specimens:
2. Annelids - *Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria*
3. Arthropods – *Tachypleus,Carcinoscorpious, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina*, Cancer, *Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta*, termites and honey bees
4. Onychophora –*Peripatus*
5. Molluscs - *Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus*
6. Echinodermates - *Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon*
7. Study of digestive system, nephridia of earthworm (Virtual).
8. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm.
9. Mount of mouth parts and dissection of digestive system and nervous system of *Periplaneta*.
10. To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm)

Text Books

1. Kotpal RL (2014) Text book of Zoology, Invertebrate, Rastogi Publication
2. Jordan and Verma PS (2009) Invertebrate Zoology. S Chand publication.

Suggested Readings

1. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson.
2. Barnes, R.S.K., Calow, P., Olive, P. J. W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
3. Verma P S. (2010) A Manual of Practical Zoology: Non-chordates. S Chand Publication

Core Paper IV

Cell biology

Unit 1: Overview of cells and plasma membrane

Prokaryotic and Eukaryotic cells, Virus, Viroids, Mycoplasma, Prions, Various models of plasma membrane structure. Transport across membranes: Active and Passive transport, Facilitated transport. Cell junctions: Tight junctions, Desmosomes, Gap junctions.

Unit 2: Cytoskeleton & Endomembrane System

Structure and Functions: Microtubules, Microfilaments and Intermediate filaments; Structure and Functions: Endoplasmic Reticulum, Golgi apparatus, Lysosomes.

Unit 3: Mitochondria and Peroxisomes

Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis; Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis. Peroxisomes.

Unit 4: Nucleus, Cell Division and Cell signalling

Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus; Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome); Mitosis, Meiosis, Cell cycle and its regulation; GPCR and Role of second messenger (cAMP)

Practical

1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis.
2. Study of various stages of meiosis.
3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.
4. Preparation of permanent slide to demonstrate:

i. DNA by Feulgen reaction
ii. DNA and RNA by MGP
iii. Mucopolysaccharides by PAS reaction
iv. Proteins by Mercuric bromophenol blue/Fast Green

5. Demonstration of osmosis (RBC/ Egg etc.).

Text Books

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. S Harisha (2007) Biotechnology procedures and experiments handbook., Infinity Science Press, Hingham

Suggested Readings

1. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008). MolecularBiology of the Cell, V Edition, Garland publishing Inc., New York and London.
2. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
3. Suvarna S, Lyton C, Bancroft JD (2013) Theory and practice of histological techniques, Churchill Livingstone, Elsevier, UK
4. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.

Core Paper V

Diversity and distribution of Chordates

Unit 1: Protochordates and Origin of Chordates

Protochordata: General characteristics of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata.
General characteristics and outline classification Chordata. Dipleurula concept and the Echinoderm theory of origin of chordates.

Unit 2: Agnantha, Pisces & Amphibia

General characteristics of Agnatha: General characteristics and classification of cyclostomes up to class Chondrichthyes and Osteichthyes: classification up to order, Migration, Parental care in fishes, Accessory respiratory organs in pisces, Evolutionary significance of Dipnoi.
Amphibian: Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characteristics and classification up to order. Parental care in Amphibia.

Unit 3: Reptilia& Aves

General characteristics and classification up to order in reptiles; Affinities of *Sphenodon*; Poison apparatus and Biting mechanism in snakes. General characteristics and classification up to order in Aves *Archaeopteryx* - a connecting link; Flight adaptations and Migration in birds.

Unit 4: Mammals & Zoogeography

General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages. Zoogeographical realms, Theories pertaining to distribution of animals, Plate tectonic and Continental drift theory, distribution of vertebrates in different realms.

PRACTICAL

1. Protochordata: *Balanoglossus, Herdmania, Branchiostoma,* Colonial Urochordata, Sections of *Balanoglossus* through proboscis and branchio-genital regions, Sections of *Amphioxus* through pharyngeal, intestinal and caudal regions. Permanent slides of Herdmania spicules.
2. Agnatha: *Petromyzon* and *Myxine*.
3. Fishes*: Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon, Anabas,* Flat fish.

4. Amphibia*: Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamander.*
5. Reptilia: *Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus*. Key for Identification of poisonous and non-poisonous snakes
6. Aves: Study of six common birds from different orders. Types of beaks and claws. Study of feathers.
7. Mammalia: *Sorex*, Bat (Insectivorous and Frugivorous), *Funambulus*, Loris, *Herpestes, Erinaceous*.
8. Power point presentation on study of any two animals from two different classes by students. Submission of album of local species.

TEXT BOOKS

1. Kotpal RL; Modern Textbook of Zoology –Vertebrates; Rastogi Publications - Meerut; 2016 edition
2. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford University Press.
3. Tiwari SK (2006) Fundamentals of World Zoogeography, Sarup & Sons

SUGGESTED READINGS

1. Pough H. Vertebrate life, VIII Edition, 2007 Pearson International.
2. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.
3. Hickman CP, Roberts LS, Keen S, Larson A, I'AnsonH, Isenhour DJIntegrated Principle of Zoology, 14th edition, 2008, McGrawHill publication
4. Verma PS and Srivastava PC. (2011)Advanced Practical Zoology. S Chand Publication.

Core Paper VI

Physiology: Controlling and Coordinating Systems

Unit 1: Tissues & Tissue system

Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue. Structure and types of bones and cartilages, Ossification, bone growth and resorption.

Unit 2: Muscle & Nervous System

Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction. Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and, Neuromuscular junction; Reflex action and its types - reflex arc; Physiology of hearing and vision.

Unit 3: Reproductive System

Histology of testis and ovary; Physiology of male and female reproduction; Hypothalamus-Pituitary & Gonadal axis. Puberty, Ovarian Cycle, Methods of contraception in male and female, Placental hormones.

Unit 4: Endocrine System

Histology of endocrine glands – Hypothalamus (Neuroendocrine gland) pineal, pituitary, thyroid, parathyroid, pancreas, adrenal; hormones secreted by them and their mechanism of action; Classification of hormones and mechanism of hormone action, (steroidal and non-steroidal hormones).

PRACTICAL

1. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex).
2. Study of permanent slides- Squamous epithelium, Striated muscle fibres and nerve cells.
3. Study of permanent slides-Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid.
4. Microtomy: Preparation of permanent slides/photographs/computer models of any five types of mammalian (Goat/rat,etc) tissues

TEXT BOOKS

1. Marieb EN and Hoehn K, Human Physiology,(2013), 9th edition, Pearson Education, USA.
2. Endocrinology, Hadley ME and Levine JE (2009), Pearson Education India; 6 edition
3. Textbook of Medical Physiology, Guyton & Hall, Elsevier, 12th edition, 2016

SUGGESTED BOOKS

1. Victor P. Eroschenko. (2008). diFiore's Atlas of Histology with Functional correlations. XII Edition., Lippincott W. & Wilkins
2. Martini F H, Nath J L and Bartholomew E F.(2015) Fundamentals of Anatomy and Physiology. Pearson Education Publication,
3. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. /W.B.Saunders Company.
4. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley & sons.

Core Paper VII

Fundamentals of Biochemistry and microbiology

Unit 1: Carbohydrates & Lipids

Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides andGlycoconjugates; Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids.

Unit 2: Proteins

Amino acids: Structure, Classification and General properties of α-amino acids; Physiological importance of essential and non-essential α-amino acids.

Proteins: Bonds stabilizing protein structure; Levels of organization in proteins; Renaturation, Denaturation; Introduction to simple and conjugate proteins

Immunoglobulins: Basic Structure, Classes and Function, Antigenic Determinants.

Unit 3: Enzymes

Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Derivation of Michaelis-Menten equation, Concept of Km and Vmax, Lineweaver-Burk plot; Multi-substrate reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Regulation of enzyme action.

Unit 4: Microbiology

Bacteria: Classification, structure and reproduction

Virus: classification, structure and reproduction, bacteriophages, viriods, prions, microbes of food, agriculture and industry

Bacterial (typhoid, cholera and tuberculosis) and viral (swine flu, zika fever and AIDS) diseases of human

PRACTICAL

1. Qualitative tests of functional groups in carbohydrates, proteins and lipids.
2. Paper chromatography of amino acids.
3. Action of salivary amylase under optimum conditions.
4. Effect of pH, temperature and inhibitors on the action of salivary amylase./Urease/acid or alkaline phosphatase
5. Demonstration of proteins separation by SDS-PAGE.
6. Identification of different bacteria and viruses through slide/photographs

TEXT BOOKS

1. Satyanarayan and Chakrapani , (2017) Biochemistry, Elsevier; Fifth edition
2. Cox, M.M and Nelson, D.L. (2008). Lehninger's Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York.
3. Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto, Biochemistry, 8th edition, 2015.
4. Victor W., Rodwell, David A., Bender, Kathleen M., Botham, Peter J., Kennelly, P. Anthony,Harper's Illustrated Biochemistry, 31st edition.
5. Tortora GJ, Funke BR and Case CL (2016) Microbiology: An introduction, Pearson India Education Services Pvt.Ltd.11th edition

SUGGESTED READING

1. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009). Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw- Hill Companies Inc.
2. Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R. (2008). Molecular Biology of the Gene, VI Edition, Cold Spring Harbor Lab. Press, Pearson Publication.
3. Hames, B.D. and Hooper, N.M. (2000). Instant Notes in Biochemistry, II Edition, BIOS Scientific Publishers Ltd., U.K.
4. Devasena T. (2010). EnzymologyOxford University Press; 1 edition
5. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007). Biochemistry, VI Edition, W.H. Freeman and Co., New York.
6. Pelezar Jr.MJ,Chan E.C.S. and Krieg NR (2001) Microbiology, Mc-Graw Hill Education

Core Paper VIII

Comparative Anatomy of Vertebrates

Unit 1: Integumentary & Skeletal System

Structure, functions and derivatives of integument (Scale, claw, nail, hair, feather and

dentition). Axial and appendicular skeleton, Jaw suspensorium, Visceral arches.

Unit 2: Digestive & Respiratory System
Alimentary canal and associated glands; Respiration through skin, gills, lungs and air sacs; Accessory respiratory organs.

Unit 3: Circulatory and Urinogenital system
General plan of circulation, evolution of heart and aortic arches; Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri.

Unit 4: Nervous System & Sense Organs
Comparative account of brain;Nervous system, Spinal cord, Cranial nerves in mammals. Classification of receptors: Brief account of visual and auditory receptors in man. Chemo and mechano receptors

PRACTICAL
1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs
2. Disarticulated skeleton of Frog, *Varanus*, Fowl, Rabbit.
3. Carapace and plastron of turtle /tortoise (Photographs, charts etc).
4. Mammalian skulls: One herbivorous and one carnivorous animal.
5. Study of structure of any two organs (heart, lung, kidney, eye and ear) from video recording (may be included if dissection not permitted).
6. Project on skeletal modifications in vertebrates (may be included if dissection not permitted).

TEXT BOOKS

1. Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education
2. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies
3. R. K. Saxena and Sumitra Saxena (2016). Comparative Anatomy of Vertebrates 2nd edition.

SUGGESTED READINGS

1. Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate tructure, John Wiley and Sons
2. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House

Core Paper IX

Physiology: Life Sustaining Systems

Unit 1: Physiology of Digestion
Structural organization and functions of gastrointestinal tract and associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Hormonal control of secretion of enzymes in gastrointestinal tract.

Unit 2: Physiology of Respiration
Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood; Respiratory

pigments, Dissociation curves and the factors influencing it; Carbon monoxide poisoning; Control of respiration.

Unit 3: Renal Physiology and Blood

Structure of kidney and its functional unit; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance. Components of blood and their functions; Structure and functions of haemoglobin haemostasis: Haemopoiesis, Blood clotting system, Blood groups: Rh factor, ABO and MN.

Unit 4: Physiology of Heart

Structure of mammalian heart; Coronary circulation; Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses Cardiac cycle; Cardiac output and its regulation, Frank-Starling Law of the heart, nervous and chemical regulation of heart rate. Electrocardiogram, Blood pressure and its regulation.

PRACTICAL

1. Determination of ABO Blood group
2. Enumeration of red blood cells and white blood cells using haemocytometer
3. Estimation of haemoglobin using Sahli's haemoglobinometer
4. Preparation of haemin and haemochromogen crystals
5. Recording of blood pressure using a sphygmomanometer
6. Examination of sections of mammalian slides: oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney.

TEXT BOOKS

1. Marieb E.N. and Hoehn K.N. (2009) Human Physiology. Pearson Education Publication , 9th edition
2. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley & sons.
3. Guyton & Hall, (2016) Textbook of Medical Physiology. Elsevier, 12th edition,

SUGGESTED READINGS

1. Victor P. Eroschenko. (2008). diFiore's Atlas of Histology with Functional correlations. XII Edition. Lippincott W. & Wilkins.
2. Vander A, Sherman J. and Luciano D. (2014). Vander's Human Physiology: The Mechanism of Body Function. XIII Edition, McGraw Hills.
3. Moyes C.D., Schulte PM (2016), Principles of physiology, 2nd edition, Pearson education, 3rd.
4. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. W.B. Saunders Company.

Core Paper X

Biochemistry of Metabolic Processes

Unit 1: Overview of Metabolism
Catabolism vs Anabolism, Stages of catabolism, Compartmentalization of metabolic pathways, Shuttle systems and membrane transporters; ATP as "Energy Currency of cell"; coupled reactions; Use of reducing equivalents and cofactors; Intermediary metabolism and regulatory mechanisms.

Unit 2: Carbohydrate Metabolism
Sequence of reactions and regulation of glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis.

Unit 3: Lipid and protein Metabolism
β-oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis
Catabolism of amino acids: Transamination, Deamination, Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids.

Unit 4: Oxidative Phosphorylation
Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System

PRACTICAL
1. Estimation of total protein in given solutions
2. Detection of SGOT and SGPT or GST and GSH in serum/ tissue
3. To study the enzymatic activity of Trypsin/ Lipase.
4. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.
5. Dry Lab (Virtual): To trace the labelled C atoms of Acetyl-CoA till they evolve as CO_2 in the TCA cycle.

TEXT BOOKS

1. Satyanarayan and Chakrapani , (2017) Biochemistry, Elsevier; Fifth edition.
2. Cox, M.M and Nelson, D.L. (2008). Lehninger Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York.

SUGGESTED READINGS

1. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009). Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw-Hill Companies Inc.
2. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007).Biochemistry, VI Edition, W.H. Freeman and Co., New York.
3. Hames, B.D. and Hooper, N.M. (2000). Instant Notes in Biochemistry, II Edition, BIOS Scientific Publishers Ltd., U.K.

Core Paper XI

Molecular Biology

Unit 1: Nucleic Acids, DNA Replication & Repair

Salient features of DNA and RNA, Watson and Crick model of DNA.,Nucleic acids cot curves, denaturation and renaturation of DNA, DNA Replication in prokaryotes and eukaryotes, mechanism of DNA replication, Semi-conservative, bidirectional and semi-discontinuous replication, RNA priming, Replication of circular and linear ds-DNA, replication of telomeres, Pyrimidine dimerization and mismatch repair.

Unit 2: Transcription & Translation

RNA polymerase and transcription Unit, mechanism of transcription in prokaryotes and eukaryotes, synthesis of rRNA and mRNA, transcription factors and regulation of transcription.

Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNAsynthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation.

Unit 3: Post Transcriptional Modifications and Processing of Eukaryotic RNA

Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA.

Unit 4: Gene Regulation & Regulatory RNAs

Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencer elements; Gene silencing, RNA interference, miRNA, siRNA.

PRACTICAL

1. Study of Polytene chromosomes from *Chironomous / Drosophila* larvae
2. Preparation of liquid culture medium (LB) and raise culture of E. coli
3. Estimation of the growth kinetics of E. coli by turbidity method
4. Preparation of solid culture medium (LB) and growth of E. coli by spreading and streaking
5. Quantitative estimation of Salmon sperm/calf thymus DNA using colorimeter (Diphenylamine reagent) or spectrophotometer (A_{260}nm measurement)
6. Quantitative estimation of RNA using Orcinol reaction
7. Study and interpretation of electron micrographs/ photograph showing

(a) DNA replication, (b) Transcription and (c) Split genes.

TEXT BOOKS

1. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. Lewin B. (2013). Gene XI, Jones and Bartlett.
3. De Robertis E.D.P. (2017) Cell and Molecular Biology 8Ed.
4. Arnold Berk , Chris A. Kaiser, Harvey Lodish , Angelika Amon , Hidde Ploegh, Anthony Bretscher, Monty Krieger Kelsey C. Martin(2016) Molecular Cell Biology. 8th edition.

SUGGESTED READINGS

1. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter: Molecular Biology ofthe Cell, IV Edition.
3. Cooper G. M. and Robert E. Hausman R. E. The Cell: A Molecular Approach**,** V Edition, ASM Press and Sinauer Associates.
4. McLennan A., Bates A., Turner, P. and White M. (2015). Molecular Biology IV Edition. GS, Taylor and Francis Group, New York and London.

Core Paper XII

Principles of Genetics

Unit 1: Mendelian Genetics, Linkage, Crossing Over and Chromosomal Mapping

Principles of inheritance, Incomplete dominance and co-dominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Sex-linked, sex-influenced and sex-limited characters inheritance. Polygenic inheritance with suitable examples; simple numericals based on it.

Linkage and crossing over, Cytological basis of crossing over, Molecular mechanisms of crossing over including models of recombination, Recombination frequency as a measure of linkage intensity, Two factor and three factor crosses, Interference and coincidence, Somatic cell hybridization.

Unit 2: Mutations

Types of gene mutations (Classification), Types of chromosomal aberrations (Classification, figures and with one suitable example of each), Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB method, attached X method.

Unit 3: Sex Determination & Extra-chromosomal Inheritance

Chromosomal mechanisms of sex determination in *Drosophila* and Man; Criteria for extra-chromosomal inheritance, Antibiotic resistance in *Chlamydomonas*, Mitochondrial mutations in *Saccharomyces*, Infective heredity in *Paramecium* and Maternal effects.

Unit 4: Recombination in Bacteria and Viruses & Transposable Genetic Elements

Conjugation, Transformation, Transduction, Complementation test in Bacteriophage.

Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, Transposons in human.

PRACTICAL

1. Study of Mendelian laws and gene interactions.
2. Linkage maps based on data from conjugation, transformation and transduction.
3. Linkage maps based on data from *Drosophila* crosses.
4. Study of human karyotype (normal and abnormal).
5. Pedigree analysis of some human inherited traits.

TEXT BOOKS

1. Benjamin Pierce, (2015) Genetics- A Conceptual Approach, 5th edition, WH Freeman publication
2. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition.

SUGGESTED READINGS

1. Benjamin Cummings. Russell, P. J. (2009). Genetics- A Molecular Approach.III Edition.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B.Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
4. Fletcher H. and Hickey I. (2015). Genetics. IV Edition. GS, Taylor and Francis Group, New York and London.

Core Paper XIII

Developmental Biology

Unit 1: Introduction to Developmental Biology, Gametogenesis & Fertilization

Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation, Differentiation and growth, Differential gene expression, Cytoplasmic determinants and asymmetric cell division. Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to polyspermy.

Unit 2: Early Embryonic Development

Cleavage: Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers.

Unit 3: Late Embryonic Development

Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta).

Unit 4: Post Embryonic Development & Implications of Developmental Biology

Metamorphosis: Changes, hormonal regulations in amphibians and insects; Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each); Ageing: Concepts and Theories. Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis.

PRACTICAL

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages).
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
3. Study of the developmental stages and life cycle of *Drosophila* from stock culture.

4. Study of different sections of placenta (photomicropgraph/ slides).
5. Project report on *Drosophila* culture/chick embryo development.
6. Study of developmental stages by raising chick embryo in the laboratory

TEXT BOOKS

1. Lewis Wolpert (2010). Principles of Development. II Edition, Oxford University Press.
2. Gilbert, S. F. (2017). Developmental Biology, XI Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.

SUGGESTED READINGS

1. Carlson, R. F. Patten's Foundations of Embryology.
2. Kalthoff (2008). Analysis of Biological Development, II Edition, McGraw-Hill Publishers.
3. Verma PS and Agrawal VK, Chordata Embryology (2010) (S Chand Publication).

Core Paper XIV

Evolutionary Biology

Unit 1: Theories, Evidences of Evolution and Extinction

Life's Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes. Historical review of evolutionary concept: Lamarckism, Darwinism, Neo-Darwinism.Evidences of Evolution: Fossil record (types of fossils, transitional forms, geological time scale, evolution of horse, Sources of variations: Heritable variations and their role in evolution. Extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction.

Unit 2: Process of Evolutionary changes

Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application of law to human Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, selection coefficient, derivation of one unit of selection for a dominant allele, genetic load, mechanism of working, types of selection, density-dependent selection, heterozygous superiority, kin selection, adaptive resemblances, sexual selection). Genetic Drift (mechanism, founder's effect, bottleneck phenomenon); Role of Migration and Mutation in changing allele frequencies.

Unit 3: Species concept and Speciation

Product of evolution: Micro evolutionary changes (inter-population variations, clines, races, Species concept, Isolating mechanisms, modes of speciation—allopatric, sympatric, Parapatric. Adaptive radiation / macroevolution (exemplified by Galapagos finches);

Unit 4: Concept of Origin and Evolution of man

Origin and evolution of man, Unique hominin characteristics contrasted with primate characteristics, primate phylogeny from *Dryopithecus* leading to *Homo sapiens*, molecular analysis of human origin. Phylogenetic trees, Multiple sequence alignment, construction and interpretation of phylogenetic trees.

PRACTICAL

1. Study of fossils from models/ pictures
2. Study of homology and analogy from suitable specimens
3. Study and verification of Hardy-Weinberg Law by chi square analysis
4. Demonstration of role of natural selection and genetic drift in changing allele frequencies using simulation studies
5. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.
6. Construction of phylogenetic trees with the help of bioinformatics tools (Clustal X, Phylip, NJ) and its interpretation.

TEXT BOOKS

1. Campbell, N.A. and Reece J.B (2011). Biology. IX Edition. Pearson, Benjamin, Cummings.
2. Rastogi B.B., (2018). Organic Evolution, MedTech; 3rd edition

SUGGESTED READINGS

1. B.K. and Hallgrimson, B. (2008). Evolution IV Edition. Jones and Barlett Publishers.
2. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates. Snustad. S Principles of Genetics.
3. Ridley,M (2004) Evolution III Edition Blackwell publishing Hall.

Discipline Specific Elective Paper-1

Animal Behaviour and Chronobiology

Unit 1: Animal Behaviour

Origin and history of Ethology; Brief profiles of Karl von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen; Proximate and ultimate behavior; Objective of behaviour, Behaviour as a basis of evolution; Behaviour as a discipline of science; Innate behaviour, Instinct, Stimulus filtering, Sign stimuli and Code breakers.

Unit 2: Patterns of Behaviour

Stereotyped Behaviours (Orientation, Reflexes); Individual behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.

Unit 3: Social and Sexual Behaviour

Social Behaviour: Concept of Society; Communication and the senses; Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance.

Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

Unit 4: Chronobiology
Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period. Adaptive significance of biological clocks, Relevance of biological clocks, Types and characteristics of biological rhythms: Short- and Long-term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; Photoperiod and regulation seasonal reproduction of vertebrates; Role of melatonin.

PRACTICAL
1. To study nests and nesting habits of the birds and social insects.
2. To study the behavioural responses of wood lice in dry and humid condition.
3. To study geotaxis behaviour in earthworm.
4. To study the phototaxis behaviour in insect larvae.
5. Study and actogram construction of locomotor activity of suitable animal models.
6. Study of circadian functions in humans (daily eating, sleep and temperature patterns).
7. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioral activities of animals and prepare a short report.

TEXT BOOKS

1. John A (2009) Animal Behaviour.9th edition, Sinauer Associate Inc., USA.
2. Vinod Kumar (2002) Biological Rhythms: Narosa Publishing House, Delhi/ Springer-Verlag, Germany.

SUGGESTED READINGS

1. AK Pati. Chronobiology: The Dimension of Time in Biology and Medicine. PINSA (Bilogical Sciences). Part B 67 (6). 323-372, Dec., 2001.
2. David McF. Animal Behaviour. Pitman Publishing Limited, London, UK.
3. Manning A and Dawkins MS. An Introduction to Animal Behaviour. Cambridge University Press, USA.
4. Paul WS and John A (2013) Exploring Animal Behaviour. 6th Edition. Sinauer Associate Inc., Massachusetts, USA.
5. Jay. C. Dunlap, Jennifer. J. Loros, Patricia J. DeCoursey (ed). 2004, Chronobiology Biological Timekeeping: J, Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.

OR

Animal Biotechnology

Unit 1. Introduction to Animal Biotechnology
Concept and scope of biotechnology, Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC and Expression vectors (characteristics).
Restriction enzymes: Nomenclature, detailed study of Type II, Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Transformation techniques: Calcium chloride method and electroporation

Unit 2. Molecular Techniques
Southern, Northern and Western blotting, DNA sequencing: Sanger method Polymerase Chain Reaction, DNA Finger Printing and DNA microarray

Unit 3. Genetically Modified Organisms
Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection, Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock-out mice.

Unit 4. Culture Techniques and Applications
Animal cell culture, Expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Thalassemia, Haemophilia and Sickle cell anemia),Recombinant DNA in medicines: Recombinant insulin and human growth hormone, Gene therapy.

PRACTICAL
1. Genomic DNA isolation from *E. coli* / Animal tissue
2. Plasmid DNA isolation (pUC 18/19) from *E. coli*
3. Restriction digestion of plasmid DNA / Lambda Phage DNA
4. Construction of circular and linear restriction map from the data provided.
5. Calculation of transformation efficiency from the data provided.
6. To study following techniques through photographs
    a. Southern Blotting
    b. Northern Blotting
    c. Western Blotting
    d. DNA Sequencing (Sanger's Method)
    e. PCR
    f. DNA fingerprinting

TEXT BOOKS

1. BD Singh, (2014) Biotechnology: Expanding Horizons, Kalyani Publishers
2. U.Satyanarayan and U Chakrapani, (2014) Biotechnology, Books & Allied Ltd

SUGGESTED READINGS

1. Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). An Introduction to GeneticAnalysis. IX Edition. Freeman and Co., N.Y.,USA.
2. Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). Recombinant DNA- Genes and Genomes- AShort Course. III Edition, Freeman and Co., N.Y.,USA.
3. Brown, T.A. (2015). Gene Cloning and DNA Analysis. 7th Edition, Academic Press, California, USA.

OR

ENDOCRINOLOGY

Unit 1: **Introduction to Endocrinology**
History of endocrinology, Types of endocrine glands and hormones, Characteristic and Transport of Hormones, Neurosecretions and Neurohormones.

Unit 2: Epiphysis, Hypothalamo-hypophysial Axis
Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction. Structure of hypothalamus, Hypothalamic nuclei and their functions, Regulation of neuroendocrine glands, Feedback mechanisms Structure of pituitary gland, Hormones and their functions, Hypothalamohypophysial portal system, Disorders of pituitary gland.

Unit 3: Peripheral Endocrine Glands
Structure, Hormones, Functions and Regulation of Thyroid gland, Parathyroid, Adrenal, Pancreas. Structure, Hormones, Functions and Regulation of Ovary and Testis.
Hormones in homeostasis, Disorders of endocrine glands.

Unit 4: Regulation of Hormone Action
Hormone action at Cellular level: Hormone receptors, transduction and regulation Hormone action at Molecular level: Molecular mediators, Genetic control of hormone action.

PRACTICAL
1. Dissect and display of Endocrine glands in laboratory bred rat*
2. Study of the permanent slides of all the endocrine glands
3. Compensatory ovarian/ adrenal hypertrophy in vivo bioassay in laboratory bred rat*
4. Demonstration of Castration/ ovariectomy in laboratory bred rat*
5. Estimation of plasma level of any hormone using ELISA
6. Designing of primers of any hormone
7. Report on endocrine disorders in human

(*Subject to UGC guidelines)

TEXT BOOKS

1. C. Donnell Turner (2012) General Endocrinology Pub- Affiliated East-West press Pvt. Ltd.-New Delhi; 6th Edition
2. Hadley, M.E. and Levine J.E. (2007). Endocrinology, 6th Edition. Pearson Prentice-Hall, Pearson Education Inc., New Jersey

SUGGESTED READINGS

1. Stephen Nussey and Saffron Whitehead (2001). Endocrinology: An Integrated Approach; Oxford: BIOS Scientific Publishers

Discipline Specific Elective Paper-1I

Basics of Neuroscience

Unit 1: Introduction to Neuroscience & Nervous System
Origins of Neuroscience; Neuroanatomy, Neurophysiology, and Systems Neurobiology. Introduction to the structure and function of the nervous system: Cellular components: Neurons; Neuroglia; Neuron doctrine; The prototypical neuron – axons and dendrites as unique structural components of neurons.

UNIT 2: Cellular and Molecular Neurobiology
Molecular and cellular approaches used to study the CNS at the level of single molecules, The ionic bases of resting membrane potential; The action potential- its generation and properties; The action potential conduction. Synapse: Synaptic transmission, Types of synapses; synaptic function; Principles of chemical synaptic transmission; Principles of synaptic integration; EPSPs and IPSPs. Ion channels, Neural transmission.

Unit 3. Neurotransmitters
Different types of neurotransmitters– catecholamines, amino acidergic and peptidergic neurotransmitters; Transmitter gated channels; G-protein coupled receptors and effectors, neurotransmitter receptors; Ionotropic and metabotropic receptors.

UNIT 4: Neurobiology and Neuropharmacology of Behaviour

The principles of signal transduction and information processing in the vertebrate central nervous system, and the relationship of functional properties of neural systems with perception and behavior; sensory systems, molecular basis of behavior including learning and memory. Molecular pathogenesis of pain and neurodegenerative diseases such as Parkinson's, Alzheimer's, psychological disorders, Addiction.

PRACTICAL

1. Dissection and study of *Drosophila* nervous system using GFP reporter.
2. Observation and quantitation of *Drosophila* photoreceptor neurons in healthy and diseased condition.
3. Nerve Cell preparation from the spinal cord.
4. Study of neurons and/ or myelin by Nissl, Giemsa or Luxol Fast Blue staining.
5. Study of olfaction in Drosophila.
6. Study of novelty, anxiety and spatial learning in mice.

TEXT BOOKS

1. Kandel, Schwartz and Jessell (2000) Principles of Neural Science-4th Edn-Eds. - McGraw- Hill Companies
2. Mark F. Baer; Barry W. Connors,(2015) Neuroscience: Exploring the brain . Lippincott Williams and Wilkins

SUGGESTED READINGS

1. From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience by John H. Byrne. Ruth Heidelberg and M. Neal Waxham.
2. Neuroscience-Eds. Dale Purves (3rd Edn)-Sinauer Associates, Inc.-2004.
3. Nerve Cells and Animal Behaviour-2nd Edn-Peter J Simmons and David Young-CUP-2003.
4. Essential Psychopharamacology- Neuroscientific Basis and Practical Applications-2nd Edn.-Stephan M. Stahl-CUP-2000.
5. Phantoms in the Brain - Vilayanur S. Ramachandran and Sandra Blakeslee-1998 The Human Brain Book - Rita Carter-2009

OR

Reproductive Biology

Unit 1: Reproductive System and Endocrinology

Reproductive System: Development and differentiation of gonads, genital ducts, external genitalia,mechanism of sex differentiation.

Gonadal hormones and mechanism of hormone action, steroids, glycoprotein hormones, and prostaglandins, hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in male and female.

Unit 2: Functional anatomy of male reproduction

Outline and histology of male reproductive system in rat and human; Testis: Cellular functions, germ cell, system cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation; Accessory glands functions; Sperm transportation in male tract

Unit 3: Functional anatomy of female reproduction

Outline and histology of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization, prevention of polyspermy; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto- maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation

Unit 4: Reproductive Health

Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning.

PRACTICAL

Study of animal house: set up and maintenance of animal house, breeding techniques, care of normal and experimental animals.

1. Examination of vaginal smear rats from live animals.
2. Surgical techniques: principles of surgery in endocrinology. Ovarectomy, hysterectorny, castration and vasectomy in rats.
3. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix and vagina.
4. Human vaginal exfoliate cytology.
5. Sperm count and sperm motility in rat
6. Study of modern contraceptive devices.

TEXT BOOKS

1. Austin, C.R. and Short, R.V. (1982) Reproduction in Mammals. Cambridge University Press.
2. C. Donnell Turner (2012) General Endocrinology Pub- Affiliated East-West press Pvt. Ltd.-New Delhi; 6th Edition
3. Tandulwadkar Sunita R (2015) The Art & Science of Assisted Reproductive Technology,Jaypee Brothers Medical Publishers

SUGGESTED READINGS

1. Tony M. Plant and Anthony J. Zeleznik (2015) Knobil and Neill's Physiology of Reproduction, Academic Press

OR

Immunology

Unit 1: Innate and Adaptive Immunity

Historical perspective of Immunology, Early theories of Immunology, Cells and organs of the Immune system. Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural Immunity, Active: Artificial and natural Immunity, Immune dysfunctions (brief account of autoimmunity with reference to Rheumatoid Arthritis and tolerance, AIDS).

Unit 2: Antigens and Immunoglobulins

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes, Immunoglobulins: Structure and functions of different classes of immunoglobulins, Antigen antibody interactions, Immunoassays (ELISA-Direct, Indirect, Competitive, Sandwich and RIA)

Unit 3: Major Histocompatibility Complex, Cytokines and Complement system

Structure and functions of MHC molecules. Endogenous and exogenous pathways of antigen processing and presentation; Cytokines -Properties and functions of cytokines, Therapeutics Cytokines Complement System -Components and pathways of complement activation.

Unit 4: Hypersensitivity and Vaccines

Gell and Coombs' classification and brief description of various types of hypersensitivities Vaccines -various types of vaccines, Advances in vaccine production.

PRACTICAL

1. Study of lymphoid organs.
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of White blood cells.
4. ABO blood group determination.
5. Total WBC counting.
6. Demonstration of ELISA.
7. Demonstration of Bone marrow smears to study Immune cells.

TEXT BOOKS

2. Abbas K. Abul and Lechtman H. Andrew (2017) Cellular and Molecular Immunology. V Edition. Saunders Publication.
3. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2017). Immunology, VI Edition. W.H. Freeman and Company.

SUGGESTED READINGS

1. Peter J. Delves and Seamus J. Martin (2017) Roitt′s Essential Immunology, Wiley-Blackwell; 13th edition

Discipline Specific Elective Paper-III

Fish and Fisheries

Unit 1: Systematics, Morphology and Physiology
Systematic classification of native/exotic fishes (upto classes), Types of fins and their modification; Locomotion in fishes; Hydrodynamics; Types of scales, Use of scales in classification and determination of age of fish; Gills and gas exchange; Swim bladder; Reproductive strategies (Special reference to Indian fishes); Electric organs; Bioluminescence; Mechanoreceptors; Schooling; Migration

Unit 2: Fisheries
Inland fisheries; Marine fisheries; Environmental factors influencing the seasonal variation in fish; Fishing crafts and Gears; Depletion of Fisheries resources; Fisheries laws and regulations.

Unit 3: Aquaculture
Sustainable aquaculture; Extensive, semi-intensive and intensive culture of fish; Polyculture; Composite fish culture; brood stock management; Induced breeding of fish; Management of fin fish hatcheries; Preparation and maintenance of fish aquarium. Factors affecting aquaculture.

Unit 4:Fish Pathology and Transgenesis
Fish diseases: bacterial, viral and parasites; Preservation, diagnosis and treatment, Processing of harvested fish, Fishery byproducts; Transgenic fish, zebrafish as a model organism in research.

PRACTICAL
1. Study of *Petromyzon, Myxine, Pristis, Chimaera, Exocoetus, Hippocampus, Gambusia, Labeo, Heteropneustes, Anabas*
2. Study of different types of scales (Through permanent slides and photographs)
3. Study of crafts and gears used in fisheries.
4. Water quality criteria for aquaculture: assessment of pH, conductivity, total solids and total dissolve solids.
5. Study of air breathing organs in *Channa, Heteropneustes, Anabas and Clarias*.
6. Demonstration of induced breeding in fishes (Virtual).
7. Demonstration of parental care in fishes (Virtual).
8. Project report on a visit to any fish farm/ pisciculture unit/ zebra fish rearing lab

TEXT BOOKS
1. Q Bone and R Moore (2008), Biology of fishes, Taylor and Francis group, CRC Press, UK
2. S.S. Khanna and H.R. Singh (2014) A textbook of fish biology and fisheries, Narendra Publishing House, 3rd edition.

SUGGESTED READINGS
1. D H Evans and J D Claiborne, The Physiology of fishes, Taylor and Francis group, CRC, UK
2. R J Mogdans and B G Kapoor, The senses of fish: Adaptations for the reception of natural stimuli, Springer, Natherland

3. C B L Srivastava, Fish biology, Narendra Publishing House
4. J R Norman, A History of fishes, Hill and Wang Publishers.

OR

Wildlife Conservation And Management

Unit 1: Wildlife
Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies, Conservation and protection Laws, wild animal of India and Odisha.

Habitat analysis, Physical parameters: Topography, Geology, Soil and water; Biological Parameters: food, cover, forage, browse and cover estimation; Standard evaluation procedures: remote sensing and GIS.

Unit 2: Management of habitats
Setting back succession; Grazing logging; Mechanical treatment; Advancing thesuccessional process; Cover construction; Preservation of general genetic diversity;Restoration of degraded habitats, In situ and Ex situ conservation, Wild life Protection act, wildlife trade and related laws.

Unit 3: Population estimation
Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Census methods; Bio- telemetry; Care of injured and diseased animal; Quarantine; Common diseases of wild animals.

Unit 4: Management planning of wildlife in protected areas
Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence, National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

PRACTICAL
1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna India and Odisha.
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System,Various types of Cameras and lenses).
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, animal sounds.
4. Demonstration of different field techniques for flora and fauna.
5. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)
6. Submission of field study report (national park/ reserve forest/ sanctuary)

TEXT BOOKS
1. Gopal Rajesh (2011) Fundamentals of Wildlife Management, Natraj Publishers.
2. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.

SUGGESTED READINGS

1. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Co-existence? Cambridge University.
2. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5 th edition. The Wildlife Society, Allen Press.
3. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences.
4. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory.Blackwell Publishing.

Discipline Specific Elective Paper-IV

Economic Zoology

Unit 1: Bee-keeping and Bee Economy (Apiculture)

Varieties of honey bees and Bee pasturage; Setting up an apiary: Langstroth's/Newton's hive, bee veil, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet; Honey extraction techniques; Physico-chemical analysis of honey; Other beneficial products from bee.

Unit 2: Silk and Silk Production (Sericulture)

Different types of silk and silk worms in India; Rearing of *Bombyx mori*, Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons; Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles and their management; Silk reeling techniques and Quality assessment of silk fibre.

Unit 3: Aquaculture

Induced breeding of fish; Management of hatchery of fish; Management of nursery, rearing and stocking ponds; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish; Fishery by-products. Prawn farming; Culture of crab; Pearl culture.

Unit 4: Dairy and Poultry Farming

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing; Commercial importance of dairy and poultry farming; Varietal improvement techniques; Diseases and their management; Dairy or poultry farm management and business plan; Visit to any dairy farm or Poultry farm.

PRACTICAL

1. Submission of report on anyone field visits related to Aquaculture/Apiculture/ Sericulture/Poultry/ Dairy farm.
2. Study of different types of bees (Queens, Drones and Worker bees).
3. Study of different types of silk moths.
4. Study of different types of pearls.
5. Study of different types of fish diseases.
6. Identification of different types of scales in fishes.
7. Study of different types of fins.

8. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.)
9. Identification of various types of natural silks.

TEXT BOOKS

1. Sarkar, Kundu and Chaki. (2014) Introduction to Economic Zoology. NCBA Publisher.
2. T.V.R. Pillay (Author), M.N. Kutty (2011) Aquaculture: Principles and Practices, Wiley India Pvt Ltd; Second edition

SUGGESTED READINGS

1. Dhyan Singh Bisht, Apiculture, ICAR Publication.
2. Dunham RA (2004) Aquaculture and Fisheries Biotechnology – Genetic Approaches. CABI publications, U.K.
3. Hafez ESE (1962) Reproduction in Farm Animals. Lea and Fabiger Publishers.
4. Knobil E and Neill JD (2006) The Physiology of Reproduction. Vol.2. Elsevier Publishers, USA.
5. Prost PJ (1962) Apiculture. Oxford and IBH, New Delhi.
6. Singh S. Beekeeping in India, Indian council of Agricultural Research, New Delhi.
7. Srivastava CBL (1999) Fishery Science and Indian Fisheries. Kitab Mahal publications, India.

OR

Project Work

Each student has to undertake a project work under the guidance of a teacher and submit the project report in the form of a thesis. There will be a presentation of the project work before an external examiner.

Generic Elective Paper I

Animal Diversity

Unit 1: Protista, Porifera, Radiata, Aceolomates and Pseudocoelomates

General characters of Protozoa; Life cycle of *Plasmodium*, General characters and canal system in Porifera, General characters of Cnidarians and polymorphism, General characters of Helminthes; Life cycle of *Taenia solium*, General characters of Nemethehelminthes; Parasitic adaptations

Unit 2: Coelomate Protostomes, Arthropoda, Mollusca and Coelomate Deuterostomes

General characters of Annelida, Metamerism, General characters, Social life in insects,General characters of mollusca, torsion in gastropod, pearl formation, General characters of Echinodermata, larval form in Echinodermata.

Unit 3: Protochordata , Pisces, Amphibia
Salient features, Osmoregulation, Migration of Fishes, General characters, Adaptations for terrestrial life, Parental care in Amphibia.

Unit 4: Reptiles, Aves and Mammals
Amniotes, Origin of reptiles, Terrestrial adaptations in reptiles, Origin of birds; Flight adaptations, early evolution of mammals; Primates; Dentition in mammals.

PRACTICAL

1. Study of following specimens:

Non Chordates*:* *Euglena, Noctiluca, Paramecium, Sycon, ,Physalia, Tubipora, Metridium, Taenia, Ascaris, Nereis, Aphrodite, Leech, Peripatus, T. gigas, Limulus, Hermitcrab, Daphnia, Millipede, Centipede*, Beetle, *Chiton, Dentalium, Octopus, Asterias* and *Antedon*.

Chordates: *Balanoglossus, Amphioxus, Petromyzon, Pristis, Hippocampus, Labeo, Icthyophis/Uraeotyphlus, Salamander, Rhacophorus Draco, Uromastix, Naja, Viper*, model of *Archaeopteryx*, any three common birds-(Crow, duck, Owl), Squirrel and Bat.

2. Study of following Permanent Slides:

Cross section of *Sycon*, Sea anemone and *Ascaris* (male and female). T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva

3. Temporary mounts of Septal & pharyngeal nephridia of earthworm.

Unstained mounts of Placoid, cycloid and ctenoid scales.

TEXT BOOKS

1.Kotpal RL. (2016) Modern Textbook of Zoology –Vertebrates; Rastogi Publications – Meerut.
2. Kotpal RL.(2016) Modern Textbook of Zoology –Invertebrates; Rastogi Publications – Meerut.

SUGGESTED READINGS

1. Barnes, R.D. (1992). Invertebrate Zoology. Saunders College Pub. USA.
2. Campbell & Reece (2005). Biology, Pearson Education, (Singapore) Pvt. Ltd.
3. Raven, P.H. and Johnson, G. B. (2004). Biology, 6th edition, Tata McGraw Hill Publications, New Delhi.
4. Kardong, K.V. (2002). Vertebrates Comparative Anatomy. Function and Evolution. Tata McGraw Hill Publishing Company. New Delhi.

OR

Insect Vectors and Diseases

Unit 1: Insects, Concept of Vectors, Insects as Vectors

General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts with reference to. feeding habits, Brief introduction of Carrier and Vectors (mechanical and biological vector),Reservoirs, Host-vector relationship, Vectorial capacity, Adaptations as vectors, Host Specificity, Classification of insects up to orders, detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera

Unit 2: Dipteran as Disease Vectors

Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies; Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis; Control of mosquitoes Study of sand fly-borne diseases – Visceral Leishmaniasis, Cutaneous Leishmaniasis, Phlebotomus fever; Control of Sand fly, Study of house fly as important mechanical vector, Myiasis, Control of house fly

Unit 3: Siphonaptera and Siphunculata as Disease Vectors

Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas, Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases –Typhus fever, Relapsing fever, Trench fever, Vagabond's disease, Phthiriasis; Control of human louse

Unit 4: Hempitera as Disease Vectors

Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

PRACTICAL

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs: *Aedes, Culex, Anopheles, Pediculushumanuscorporis, Phithirus pubis, Xenopsylla cheopis, Cimexlectularius, Phlebotomus argentipes, Musca domestica* through permanent slides/ photographs
3. Study of different diseases transmitted by above insect vectors.
4. Submission of a project report on any one of the insect vectors and disease transmitted.

TEXT BOOKS

1. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases. Wiley-Blackwel
2. Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK

SUGGESTED READINGS

1. Mike Service (2012) Medical Entomology for StudentsCambridge University Press; 5th edition.
2. Pedigo L.P. (2002). Entomology and Pest Management. Prentice Hall Publication

5

Generic Elective Paper II

Aquatic Biology

UNIT 1: Aquatic Biomes

Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands,
Streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs

UNIT 2: Freshwater Biology

Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry,
Physico–chemical Characteristics: Light, Temperature, Thermal stratification,
Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes-Nitrogen,
Sulphur and Phosphorous

Streams: Different stages of stream development, Physico-chemical, environment, Adaptation of hill-stream fishes.

UNIT 3: Marine Biology

Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

UNIT 4: Management of Aquatic Resources

Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment-BOD and COD.
015

PRACTICAL

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
3. Determine the amount of Turbidity/transparency, Dissolved Oxygen, Free, Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from nearby lake/ water body.
4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes.

TEXT BOOKS

1. Wetzel RG (2001)Limnology: Lake and River Ecosystems, Academic Press; 3rd edition

SUGGESTED READINGS

1. Anathakrishnan : Bioresources Ecology 3rd Edition
2. Odum and Barrett : Fundamentals of Ecology, 5th Edition
3. Pawlowski: Physicochemical Methods for Water and Wastewater Treatment, 1st Edition
4. Trivedi and Goyal : Chemical and biological methods for water pollution studies
5. Welch : Limnology Vols. I-II

OR

Food, Nutrition And Health

Unit 1: Basic concept of food and nutrition

Food Components and food-nutrients, Concept of a balanced diet, nutrient needs and dietary pattern for various groups, adults, pregnant and nursing mothers, infants, school children, adolescents and elderly

Unit 2: Nutritional Biochemistry:
Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role Vitamins- Fat-soluble and Water-soluble vitamins- their dietary source and importance Minerals- Iron, calcium, phosphorus, iodine, selenium and zinc: their biological functions

Unit 3: Health
Introduction to health- Definition and concept of health, Major nutritional Deficiency diseases- Protein Energy Malnutrition (kwashiorkor and marasmus), Vitamin A deficiency disorders, Iron deficiency disorders, Iodine deficiency disorders- their causes, symptoms, treatment, prevention and government programmes, if any. Life style related diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention through dietary and lifestyle modifications, Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS) - their causes, treatment and prevention, Common ailments- cold, cough, and fevers, their causes and treatment

Unit 4: Food hygiene:
Potable water- sources and methods of purification at domestic level Food and Water borne infections: **Bacterial infection**: Cholera, typhoid fever, dysentery; **Viral infection**: Hepatitis, Poliomyelitis, **Protozoan infection**: amoebiasis, giardiasis; **Parasitic infection**: taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention. Brief account of food spoilage: Causes of food spoilage and their preventive measures
01

PRACTICAL
1. To detect adulteration in a) Ghee b) Sugars c) Tea leaves and d) Turmeric
3. Estimation of Lactose in milk
4. Ascorbic acid estimation in food by titrimetry
5. Estimation of Calcium in foods by titrimetry
6. Study of the stored grain pests from slides/ photograph (*Sitophilus oryzae*, *Trogoderma granarium*, *Callosobruchus chinensisand Tribolium castaneum*): their identification, habitat and food sources, damage caused andcontrol. Preparation of temporary mounts of the above stored grain pests.
7. Project- Undertake computer aided diet analysis and nutrition counseling for different age groups. OR Identify nutrient rich sources of foods **(fruits and vegetables),** their seasonal availability and price OR Study of nutrition labeling on selected foods

TEXT BOOKS

1. Mudambi, SR and Rajagopal, MV (2018). Fundamentals of Foods, Nutrition and Diet Therapy; Sixth Ed; New Age International Publishers.
2. Bamji MS, Rao NP, and Reddy V.(2017) Text Book of Human Nutrition; Oxford & IBH Publishing Co. Pvt Ltd., 4th edition

SUGGESTED READINGS

1. Srilakshmi B. Nutrition Science; 2002; New Age International (P) Ltd.
2. Srilakshmi B. Food Science; Fourth Ed; 2007; New Age International (P) Ltd.
3. Swaminathan M. Handbook of Foods and Nutrition; Fifth Ed; 1986; BAPPCO

Generic Elective Paper III

Human Physiology

Unit 1: Digestion and Respiratory Physiology
Structure and function of digestive glands; Digestion and absorption of carbohydrates, fats and proteins; Nervous and hormonal control of digestion (in brief), Ventilation, External and internal Respiration, Transport of oxygen and carbon dioxide in blood, Factors affecting transport of gases.

Unit 2: Functioning of Excitable Tissue (Nerve and Muscle)
Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fiber); Structure of skeletal muscle, Mechanism of muscle contraction (Sliding filament theory), Neuromuscular junction

Unit 3: Renal Physiology and Cardiovascular Physiology
Functional anatomy of kidney, Mechanism and regulation of urine formation, Structure of heart, Coordination of heartbeat, Cardiac cycle, ECG

Unit 4: Endocrine and Reproductive Physiology
Structure and function of endocrine glands (pituitary, thyroid, parathyroid, pancreas, adrenal, ovaries, and testes), Brief account of spermatogenesis and oogenesis, Menstrual cycle.

PRACTICAL
1. Preparation of temporary mounts: Neurons and Blood film.
2. Preparation of haemin and haemochromogen crystals.
3. Estimation of haemoglobin using Sahli's haemoglobinometer.
4. Examination of permanent histological sections of mammalian oesophagus, stomach, duodenum, rectum, lung, kidney, thyroid, pancreas, adrenal, testis, ovary.

TEXT BOOKS
1.Marieb EN and Hoehn K, (2015) Human Physiology, 10th global edition, Pearson Education, USA.
2. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company.

SUGGESTED READINGS
1. Widmaier, E.P., Raff, H. and Strang, K.T. (2008). Vander's HumanPhysiology, XI Edition, McGraw Hill.
2. Kesar, S. and Vashisht, N. (2007). Experimental Physiology, Heritage Publishers.
3. Prakash, G. (2012). Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Company Ltd.
4. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley and Sons, Inc.

OR

Environment and Public Health

UNIT 1: Environmental hazards
Sources of Environmental hazards, hazard identification and accounting, fate of toxic and persistent substances in the environment, dose Response Evaluation, exposure Assessment.

UNIT 2: Pollution
Air, water, noise pollution sources and effects, Pollution control; Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health

Unit 3: Waste Management Technologies
Sources of waste, types and characteristics, Sewage disposal and its management,
Solid waste disposal, biomedical waste handling and disposal, nuclear waste handling and disposal, Waste from thermal power plants, Case histories on Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath

Unit 4 Diseases
Causes, symptoms and control of: Tuberculosis, Asthma, Cholera, Typhoid, Malaria and AIDS

PRACTICAL (Credits 2)
1. To determine pH, Cl, SO_4, NO_3 in soil and water samples from different locations.

TEXT BOOKS

1. Cutter, S.L. (1999) Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Park K (2017) Parks Text Book Of Preventive & Social Medicine, Banarsidas Bhanot Publishers

SUGGESTED BOOKS

1. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff 1996. "Risk Assessment and Management Handbook", McGraw Hill Inc., New York.
2. Kofi Asante Duah 1998 "Risk Assessment in Environmental management", John Wiley and sons, Singapore.
3. Kasperson, J.X. and Kasperson, R.E. and Kasperson,R.E., 2003. Global Environmental Risks, V.N.University Press, New York,
4. Joseph F Louvar and B Diane Louver 1997 Health and Environmental Risk Analysis fundamentals with applications, Prentice Hall, New Jersey.
5. Wardlaw GM, Hampl JS. Perspectives in Nutrition; Seventh Ed; 2007; McGraw Hill.
6. Lakra P, Singh MD. Textbook of Nutrition and Health; First Ed; 2008; Academic Excellence.
7. Manay MS, Shadaksharaswamy. Food-Facts and Principles; 1998; New Age International (P) Ltd.

Generic Elective Paper IV

Animal Biotechnology

UNIT 1: Introduction and Techniques in Gene manipulation

Concept and Scope of Biotechnology, Outline process of genetic engineering and recombinant DNA technology, Isolation of genes, Concept of restriction and modification: Restriction endonucleases, DNA modifying enzymes, Cloning Vectors: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC, HAC. Shuttle and Expression Vectors**,** Construction of Genomic libraries and cDNA libraries, Transformation techniques: microbial, plants and animals: Cloning in mammalian cells, Integration of DNA into mammalian genome- Electroporation and Calcium, Phosphate Precipitation method.

UNIT2: Animal cell Culture

Basic techniques in animal cell culture and organ culture, Primary Culture and Cell lines, Culture media- Natural and Synthetic, Stem cells, Cryopreservation of cultures.

Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, DNA sequencing: Sanger method, Polymerase chain reaction, DNA Fingerprinting and DNA microarrays

UNIT 3: Fermentation

Different types of Fermentation: Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized, Downstream Processing: Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization

UNIT 4: Transgenic Animal Technology and Application in Health

Production of transgenic animals: nuclear transplantation, retroviral method,

DNA microinjection method, Dolly and Polly, Development of recombinant Vaccines, Hybridoma technology, Gene Therapy, Production of recombinant Proteins: Insulin and growth hormones.

PRACTICAL

1. Packing and sterilization of glass and plastic wares for cell culture.
2. Preparation of culture media.
3. Preparation of genomic DNA from *E. coli*/animals/ human.
4. Plasmid DNA isolation (pUC 18/19) and DNA quantitation using agarose gel electrophoresis (by using lambda DNA as standard).
5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
6. Preparation of competent cells and Transformation of E. coli with plasmid DNA using CaCl2, Selection of transformants on X-gal and IPTG (Optional).
7. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting, PCR, DNA Microarrays.

TEXTBOOKS

1. BD Singh, (2014) Biotechnology: Expanding Horizons, Kalyani Publishers
2. U.Satyanarayan and U Chakrapani, (2014) Biotechnology, Books & Allied Ltd

SUGGESTED READINGS

1. T.A. Brown (2008): Gene cloning and DNA analysis: An Introduction, Blackwell Science.
2. Animal Cell Culture Methods Academic Press
3. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2017).

4. B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001).
5. Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). An introduction to genetic analysis, IX Edition, Freeman & Co., N.Y., USA
6. Verma S A, Das S and Singh (2014) A. Laboratory Manual for Biotechnology. S Chand Publication.

OR

Cell and Molecular Biology

Unit 1: Cells and Plasma Membrane
Prokaryotic and Eukaryotic cells, Various models of plasma membrane; Transport across membranes, The Endoplasmic Reticulum; Golgi apparatus; Lysosomes; Structure and function of mitochondria

Unit 2: Nucleus, cell division
Ultra structure of nucleus; Mitosis, Meiosis, Cell cycle and its regulation

Unit 3: Nucleic Acids and DNA Replication
Salient features of DNA double helix; Watson and Crick model of DNA, Structure of RNA, tRNA, DNA Replication in prokaryotes and eukaryotes; Mechanism of DNA replication

Unit 4: Transcription and Translation
Mechanism of transcription in prokaryotes and Eukaryotes, Process of protein synthesis in prokaryotes and translation

PRACTICAL
1. Study of prokaryotic and eukaryotic cell types through permanent slides.
2. Study of mitosis and meiosis through squashing in Grasshopper.
3. Demonstration of transport through cell membrane.
4. Preparation of DNA and RNA models.
5. Demonstration of protein synthesis through models.

TEXT BOOKS
1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.

SUGGESTED READINGS
1. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008) Molecular Biology of the Cell. 5th Edition. Garland publishing Inc., New York.
2. Becker WM, Kleinsmith LJ, Hardin J and Bertoni G P (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
3. Cooper GM and Hausman RE (2009) The Cell: A Molecular Approach. 5th Edition. ASM Press, Washington D.C.
4. S Harisha (2007) Biotechnology procedures and experiments handbook., Infinity Science Press, Hingham

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ZOOLOGY Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers
Marks per paper - Midterm: 15 marks, End term: 60 marks, Practical: 25 marks,
Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 40 hours (theory) + 20 hours (practical)

Semester	Course Opted	Course Name	Credit	Marks
Semester-I	DSC-1(Theory)	Non-Chordata, Chordata, Comparative Anatomy, Evolution and Animal Behaviour	4	75
	DSC-1 (Practical)	Non-Chordata, Chordata, Comparative Anatomy, Evolution and Animal Behaviour	2	25
Semester-II	DSC-2(Theory)	Cell Biology, Genetics, Conservation Biology, Biostatistics and Aquatic Biology	4	75
	DSC-2 (Practical)	Cell Biology, Genetics, Conservation Biology, Biostatistics and Aquatic Biology	2	25
Semester-III	DSC-3(Theory)	Developmental Biology, Immunology, Endocrinology and Microbiology	4	75
	DSC-3 (Practical)	Developmental Biology, Immunology, Endocrinology and Microbiology	2	25
Semester-IV	DSC-4(Theory)	Physiology,Biochmistry and Molecular Biology	4	75
	DSC-4 (Practical)	Physiology,Biochmistry and Molecular Biology	2	25
Semester-V	DSE-1(Theory)	Economic Zoology	4	75
	DSE-1 (Practical)	Economic Zoology	2	25
Semester-VI	DSE-2(Theory),	Wildlife Conservation And Management	4	75
	DSE-2 (Practical)	Wildlife Conservation And Management	2	25
		Total:	**36**	**600**

Discipline Specific Core Paper I

Non-Chordata, Chordata, Comparative Anatomy, Evolution and Animal Behaviour

Unit 1: Non-Chordata
General characteristics and classification up to classes, Locomotion and reproduction in Protozoa, Canal system in sponges, Corals and coral reefs, Life cycle of *Fasciola hepatica*, Metamerism in Annelida, Metamorphosis in insects, Foot in Mollusca. Larval forms in Echinodermata.

Unit 2: Chordata & Comparative anatomy
General characters of Protochordata and Chordata with examples, Parental care in fishes and Amphibia, Poison apparatus and biting mechanism of snakes, Flight adaptation in birds, Dentition in mammals. Structure, functions and derivatives of integument, Alimentary canal and associated glands

Unit 3: Evolution
Lamarckism, Darwinism, Neo-Darwinism, Phylogeny of human, Natural selection, Modes of speciation (Allopatric, Sympatric and Parapatric).

Unit 4: Animal Behaviour
Primary and secondary orientation, Taxes of animals, Social structure in honey bee, Pheromones, Biological clocks.

PRACTICAL
1. Morphology of Paramecium, Binary fission and conjugation in Paramecium.
2. Life stages of *Plasmodium vivax*.
3. Study of *Sycon* (including T.S. and L.S.), Hyalonema, and Euplectella.Temporary mounts of spicules, gemmules, Study of *Obelia, Physalia, Millepora, Aurelia, Ephyra* larva.
4. Study of adult *Fasciola hepatica* Study of adult *Ascaris lumbricoides*
5.*Balanoglossus, Herdmania* and *Branchiostoma*
6. *Torpedo, Notopterus, Mystus, Heteropneustes*, *Hippocampus, Exocoetus, Echeneis, Anguilla, Tetrodon, Diodon, Anabas* and Flat fish. *Ichthyophis/Ureotyphlus, Necturus, Duttaphrynus, Polypedates, Hyla, Alytes* and *Salamandra.Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Draco, Ophiosaurus, Bungarus, Vipera, Naja* and *Hydrophis.*

TEXT BOOKS

1. Kotpal RL; Modern Textbook of Zoology – Invertebrates; Rastogi Publications - Meerut; 2016 edition
2. Kotpal RL; Modern Textbook of Zoology –Vertebrates; Rastogi Publications - Meerut; 2016 edition
3. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford University Press.
4. R. K. Saxena and Sumitra Saxena (2016). Comparative Anatomy of Vertebrates, Viva Books 2nd edition.
5. Rastogi B.B., (2018). Organic Evolution, MedTech; 3rd edition
6. Mathor Reena (2014) Animal behavior, Rastogi Publication

Discipline Specific Core Paper II

Cell Biology, Genetics, Conservation Biology, Biostatistics and Aquatic Biology

Unit 1: Cell Biology
Prokaryotic and Eukaryotic cells, Plasma membrane, Lysosomes, Mitochondria, Ultra structure of nucleus.

Unit 2: Genetics
Ultrastructure of chromosomes, Sex-linked inheritance, Chromosomal mechanisms of sex determination, Chromosomal and Gene mutation.

Unit 3: Conservation Biology & Aquatic Biology
Importance of conservation, Ex situ and In situ conservation methods, Evaluation and management of wildlife, Wildlife (Protection) Act, 1972,Protected areas (Sanctuaries, National Parks, Biosphere reserves). Physico-chemical condition of water of fish pond, Composite pisciculture, Ornamental pisciculture,

Unit 4: Biostatistics
Measures of central tendency (mean, median and mode), Measures of dispersion (Standard deviation), Hypothesis and testing of hypothesis (chi square test, t test and Z test),Correlation and regression analysis.

PRACTICAL

1.Study various stages of mitosis from permanent slides.
2.Study various stages of meiosis from permanent slides.
3.Preparation of temporary squashing of onion root tip.
4.Study of oral squamous cells.
5.Study of different types of aquatic insects and aquatic weeds.
6.Study of different types of major carps, minor carps and catfishes.
7.Mounting of cycloid and ctenoid scales of fish.

TEXT BOOKS

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition.
3. GopalRajesh (2011) Fundamentals of Wildlife Management, Natraj Publishers.
4. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
5. Myra Samuels, J. Witmer,A. Schaffner, Statistics for the life sciences, Prentice Halls, Boston, 4th edition, 2012
6. Sarkar, Kundu, Chaki (2016) Introduction to Economic Zoology, New Central Book Agency; New edition edition

Discipline Specific Core Paper III

Developmental Biology, Immunology, Endocrinology and Microbiology

Unit 1: Developmental Biology
Gametogenesis (Spermatogenesis, Oogenesis), Types of eggs, early development of frog and chick up to gastrulation, Placenta.

Unit 2: Immunology
Cells and organs of the immune system, Antigens, Structure and functions of different classes of immunoglobulin, Vaccines.

Unit 3: Endocrinology
Types of endocrine glands of human body, Classification of hormones and mechanism of hormone action, Structure and function of Pituitary, Thyroid and Gonads.

Unit 4: Microbiology
Structure of a typical bacterium, Structure of bacteriophage, Bacterial and viral diseases of human, Microbes of food, agriculture and industry.

PRACTICAL

1. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
2. Temporary preparation of chick embryo.
3. ABO blood group determination.
4. Cleaning of glass wares, Principle and methods of sterilization-moist heat, dry heat and filtration methods.
5. Media preparation: Liquid media, Solid media.
6. Slides of different mammalian endocrine glands.

TEXT BOOKS

1. Tortora GJ, Funke BR, Case CL (2016) Microbiology – an introduction, Pearson Education India; Eleventh edition
2. Abbas KA and Lechtman HA (2003) Cellular and Molecular Immunology. 5th Edition. Saunders Publication, Philadelphia.
3. Gilbert SF (2010) Developmental Biology. 9th Edition. Sinauer Associates, Inc., USA.
4. Hadley, M.E. and Levine J.E. (2007). Endocrinology, 6th Edition. Pearson Prentice-Hall,

Discipline Specific Core Paper IV

Physiology, Biochemistry and Molecular Biology

Unit 1: Physiology I
Digestion, Structural organization, histology and functions of gastrointestinal tract and its associated glands, Mechanical and chemical digestion of food, Respiration: Transport of respiratory gases, Structure of heart and cardiac cycle, Composition and clotting of blood, Blood group.

Unit 2: Physiology II
Excretion in human, Structure of neuron and transmission of nerve impulse, Structure of skeletal muscle and muscle contraction.

Unit 3: Biochemistry I
Structures and properties of important mono-, di- and polysaccharides, Fatty acids, triglycerides and steroids, Amino acids and Proteins. Glycolysis, Citric acid cycle, β-oxidation of saturated fatty acids, Urea cycle.

Unit 4: Molecular Biology
Structure and types of DNA and RNA, DNA replication, Genetic code, Transcription and Translation.

PRACTICAL
1. Enumeration of red blood cells using haemocytometer.
2. Estimation of haemoglobin using Sahli'shaemoglobinometer.
3. Identification of unknown carbohydrates in given solutions (Starch, Sucrose, Lactose, Galactose, Glucose, Fructose).
4. Colour tests of functional groups in protein solutions.
5. Action of salivary amylase under optimum conditions.

TEXT BOOKS

1. Marieb E.N. and Hoehn K.N. (2009) Human Physiology. Pearson Education Publication , 9th edition
2. Satyanarayan and Chakrapani , (2017) Biochemistry, Elsevier; Fifth edition.
3. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc

Discipline Specific Elective Paper I

Economic Zoology

Unit 1: Bee-keeping and Bee Economy (Apiculture)
Varieties of honey bees, Setting up an apiary: Lang troth's/Newton's hive, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet, Diseases of honey bee, honey extraction techniques, -chemical analysis of honey, Other beneficial products from bee; Visit to an apiculture institute and honey processing Units.

Unit 2: Silk and Silk Production (Sericulture)
Different types of silk and silkworms in India, Rearing of *Bombyx mori*, Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons, Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles, and their management; Silk reeling techniques and Quality assessment of silkfibre.

Unit 3: Aquaculture I
Brood stock management; Induced breeding of fish, Management of hatchery of fish, Management of nursery, rearing and stocking ponds, Preparation and maintenance of fish aquarium, Preparation of compound diets for fish, Role of water quality in aquaculture, Fish diseases: Bacterial, viral and parasitic, Preservation and processing of harvested fish, Fish by-products. Prawn farming, Culture of crab, Pearl culture and Culture of air breathing fishes.

Unit 4: Dairy and Poultry Farming
Introduction, Indigenous and exotic breeds, Rearing, housing, feed and rationing, Commercial importance of dairy and poultry farming, Varietal improvement techniques, Diseases and their management, Dairy or poultry farm management and business plan, Visit to any dairy farm or Poultry farm.

* Submission of report on anyone field visits mentioned above.

PRACTICAL

1. Study of different types of bees (Queens, Drones and Worker bees).
2. Study of different types of silk moths.
3. Study of different types of pearls.
4. Study of different types of fish diseases.
5. Identification of different types of scales in fishes.
6. Study of different types of fins.
7. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.)
8. Identification of various types of natural silks.

TEXT BOOKS

1. Sarkar, Kundu and Chaki. (2014)Introduction to Economic Zoology. NCBA Publisher.
2. T.V.R. Pillay (Author), M.N. Kutty (2011) Aquaculture: Principles and Practices, Wiley India Pvt Ltd; Second edition

Discipline Specific Elective Paper II

Wildlife Conservation And Management

Unit 1: Wildlife: Values of wildlife, positive and negative; Our conservation ethics, Importance of conservation, Causes of depletion and World conservation strategies. Habitat analysis; Management of habitats; Biological parameters: food, cover, forage, browse and cover estimation, Standard evaluation procedures: remote sensing and GIS

Unit 2: Population estimation: Population density, Natality, Birth rate, Mortality, fertility Schedules and sex ratio computation, Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Pug marks and census method

Unit 3: National Organizations involved in wildlife conservation, Wild life Legislation: Wildlife (Protection) Act, 1972, its amendments and implementation, Management planning of wildlife in protected areas, Estimation of carrying capacity, Eco tourism/wildlife tourism in forests, Concept of climax persistence.

Unit 4: Management of excess population & translocation, Bio- telemetry, Care of injured and diseased animal, Quarantine and common diseases of wild animal, Protected areas National parks & sanctuaries, Community reserve, Important features of protected areas in India, Tiger conservation: Tiger reserves in India and Management challenges in Tiger reserve.

PRACTICALS

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna.
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses).
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
4. Demonstration of different field techniques for flora and fauna.
5. PCQ, Ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences).

TEXT BOOKS

1. Gopal Rajesh (2011) Fundamentals of Wildlife Management, Natraj Publishers.
2. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.

OPTIONAL FOR SECC II PAPER

SKILL ENHANCEMENT COURSE (SECC II Option I)

Apiculture

Unit 1: History – Biology and classification of honey bee species of honey bees, Social Organization of honey bee colony.

Unit 2: Bee hive, Flora for apiculture, Selection of bees for apiculture, Method of bee Keeping and Indigenous method of extraction of honey.

Unit 3: Modern methods of apiculture, Appliances for modern method, Products of bee keeping: Honey, Bee wax, Chemical composition and economic importance of honey bee wax.

Unit 4: Diseases of honey bee and control measures, Bee enemies, Bee keeping industry, Modern method in employing honey bees for cross pollination in horticultural gardens.

TEXT BOOKS:

1. Abrol, D.P. (2013) Beekeeping : A Compressive Guide To Bees And Beekeeping, Scientific Publishers, India
2. Singh S. (1982) Beekeeping in India, Indian Council of Agricultural Research, New
3. Delhi.

SKILL ENHANCEMENT COURSE (SECCII Option II)

Aquarium Fish Keeping

Unit 1: The potential scope of aquarium Fish Industry as a cottage Industry, Exotic and endemic species of aquarium Fishes, Food and feeding of aquarium fishes, Use of live fish feed organisms, Preparation and composition of formulated fish feeds.

Unit 2: Common characters and sexual dimorphism of fresh water and marine aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.

Unit 3: Live fish transport, Fish handling, packing and forwarding techniques, General aquarium maintenance, budget for setting up an aquarium fish farm as a cottage industry.

Unit 4: Health education in India, WHO programmes, Government and voluntary Organizations and their health services, Precautions, First Aid and awareness on sporadic diseases.

TEXT BOOKS

1. Srivastava CBL (2006) Fishery Science and Indian Fisheries. KitabMahal publications, India.
2. Gina Sandford (2003) Aquarium Owner's Manual, Dorling Kindersley; 2Rev Ed edition

SKILL ENHANCEMENT COURSE (SECC Option III)

Medical Diagnostics

Unit 1: Introduction to Medical Diagnostics and its Importance
Diagnostic methods used for analysis of Blood, Blood composition, Preparation of blood smear and Differential Leucocyte Count(D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte, Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.).

Unit 2: Diagnostic Methods Used for Urine Analysis
Urine, Composition of urine, Urine Analysis: Physical characteristics; Abnormal constituents of urine.

Unit 3:Non-infectious Diseases and Infectious Diseases
Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using
Glucometer/Kit, Commercial diagnostic kits for identification of infectious diseases. Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis.

Unit 4: Tumours
Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

TEXT BOOKS

1. Vinay Kumar, Abul K. Abbas , Jon C. Aster (2014) Robbins and Cortan, Pathologic Basis of Disease, Elsevier India; 1 edition
2. Godkar P.B. and Godkar D.P. (2005) Textbook of Medical Laboratory Technology, Vol. I & II, Bhalani Publishing House.

SUGGESTED READINGS

1. Guyton A.C. and Hall J.E. Guyton & Hall Physiology Review, Saunders; 3 edition (13 July 2015)
2. Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
3. Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis forTraining Courses
4. Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S.
5. Chand and Co. Ltd.

SKILL ENHANCEMENT COURSE (SECC Option IV)

Research Methodology

Unit 1: Foundations of Research
Meaning, Objectives, Motivation: Research Methods vs Methodology, Types of Research: Analytical vs Descriptive, Quantitative vs Qualitative, Basic vs applied.

Unit 2: Research Design
Need for research design: Features of good design, important concepts related to good design- Observation and Facts, Prediction and Explanation, Development of Models. Developing a research plan: Problem identification, Experimentation, Determining experimental and sample designs.

Unit 3: Data Collection, Analysis and Report Writing
Observation and Collection of Data-Methods of data collection- Sampling, Methods, Data Processing and Analysis Strategies, Technical Reports and Thesis, writing, Preparation of Tables and Bibliography. Data Presentation using digital technology.

Unit 4: Ethical Issues
Intellectual property Rights, Commercialization, Copy Right, Royalty, Patent law, Plagiarism, Citation, Acknowledgement.

TEXT BOOKS
1. Nicholas Walliman, (2017) Research Methods: The Basics:Routledge
2. C.R.Kothari and Gaurav Garg (2019) Research Methodology, New Age International.

SUGGESTED READINGS
1. Anthony, M, Graziano, A.M. and Raulin, M.L. (2009) Research Methods: A Process of Inquiry, Allyn and Bacon.
2. Wadhera, B.L.: Law Relating to Patents, Trade Marks, Copyright Designs and Geographical Indications, , Universal Law publishing
3. Coley, S.M. and Scheinberg, C.A. (1990) "Proposal writing". Stage Publications.

SKILL ENHANCEMENT COURSE (SECC Option V)

Sericulture

Unit 1: Biology of Silkworm
Life cycle of *Bombyx mori*, Structure of silk gland and secretion of silk, Sericulture: Definition, history and present status; Silk route, Types of silkworms, Distribution and Races, Exotic and indigenous races, Mulberry and non-mulberry Sericulture.

Unit 2: Rearing of Silkworms
Selection of mulberry variety and establishment of mulberry garden, Rearing house and rearing appliances, Disinfectants: Formalin, bleaching powder, RKO, Silkworm rearing technology: Early age and Late age rearing, Types of mountages, Spinning, harvesting and storage of cocoons.

Unit 3: Pests and Diseases
Pests of silkworm: Uzi fly, dermestid beetles and vertebrates, Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial, Control and prevention of pests and diseases.

Unit 4: Entrepreneurship in Sericulture
Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture. Visit to various, sericulture centers.

TEXT BOOKS
1. P. Venkatanarasaiah (2013) Sericulture, APH Publishing
2. S.R. Ullal and M.N. Narasimhanna (1987), Handbook of Practical Sericulture: CSB, Bangalore

SUGGESTED READINGS

1. M. S. Jolly, Appropriate Sericultural Techniques; (Ed., Director,) CSR & TI, Mysore.
2. M. N. Narasimhanna (1988), Manual of Silkworm Egg Production;, CSB, Bangalore.
3. K. Sengupta (1989) A Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore.
4. S. Krishnaswamy (1986) Improved Method of Rearing Young age silkworm;reprinted CSB,Bangalore.

Part of syllabus (ZOOLOGY B.Sc.) to be covered in Refresher Course

Theory

1. Linear and Y-shaped food chains
2. Energy flow through the ecosystem
3. Ecology in Wildlife Conservation and Management.
4. Laws of limiting factors
5. Gause's Principle with laboratory and field examples
6. Hypothesis and hypothesis testing (Chi-square test, t- test)
7. Global warming and Climate change
8. Impacts of environmental disturbances
9. Biodiversity patterns and global biodiversity hot spots; India as a mega-biodiversity nation
10. Solid waste management: Control measures of urban and industrial wastes
11. Convention on Biological Diversity (CBD)
12. Mitochondrial Respiratory Chain
13. Chemi-osmotic hypothesis
14. Cell signaling
15. Origin of chordates and Tetrapoda (Evolution of terrestrial ectotherms)
16. Adaptive radiation in mammals
17. Plate tectonic and Continental drift theory
18. Distribution of vertebrates in different realms
19. Ossification, bone growth and resorption
20. Neural receptors and transmission
21. Hypothalamus-Pituitary & Gonadal axis
22. Mechanism of hormone action
23. Structural organization of Proteins
24. Hypo-Hyperchromaticity of DNA
25. Enzyme kinetics
26. Respiratory pigments
27. Regulation of water and acid-base balance
28. Haemoglobin and haemopoiesis
29. Cardiac cycle
30. Biological oxidation reduction reactions
31. Oxidative Phosphorylation
32. Electron Transport System
33. DNA Damage & Repair
34. Regulation of transcription and translation
35. RNA editing
36. Operon concept
37. Gene silencing
38. RNA interference
39. Polygenic inheritance
40. Chromosome mapping

41. Molecular mechanisms of recombination
42. Detection of mutations
43. Molecular mechanism of sex determination in *Drosophila* and Man
44. Transposons
45. Cell-Cell interaction
46. Pattern formation
47. Differential gene expression
48. Metamorphosis and Regeneration
49. Teratogenesis
50. *In vitro* fertilization
51. Stem cell
52. Natural selection
53. Genetic drift
54. Species concept and Speciation
55. Phylogenetic trees
56. Insect vectors borne diseases and their control
57. RNA world & origin of life
58. Extinctions
59. Hardy-Weinberg Law
60. Coral reefs diversity and their role in ecosystem
61. Origin and morphometry of lakes
62. Adaptation of hill-stream fishes.
63. Eutrophication and management of aquatic resources and conservation (legislations), Sewage
64. Nutritional Biochemistry
65. Life style related diseases
66. Social health problems
67. Food spoilage and their preventive measures
68. Environmental hazards
69. Effect of climate change on public health
70. Biomedical waste handling and disposal
71. Nuclear waste handling and disposal
72. Waste from thermal power plants
73. Cloning Vectors
74. Genomic libraries and cDNA libraries
75. Cloning in mammalian cells, Integration
76. Animal cell culture and organ culture
77. DNA sequencing
78. DNA Fingerprinting and DNA microarrays
79. Ttransgenic animals
80. Development of recombinant Vaccines
81. Gene Therapy
82. Artificial beehives and cross pollination
83. Aquarium Fish Industry

84. Hypertension
85. Commercial diagnostic kits
86. Research Design
87. Technical Reports and Thesis writing
88. Intellectual property Rights and Patent law
89. Plagiarism
90. Entrepreneurship in Sericulture
91. Behaviour as a basis of evolution
92. Social Behaviour in Honey bee
93. Biological clocks, and Circadian rhythms
94. Restriction enzymes
95. DNA Finger Printing
96. Transgenic animals
97. Molecular diagnosis of genetic diseases
98. Cells of the Nervous system
99. Neurotransmitters
100. Neurodegenerative diseases
101. Psychological disorders
102. MHC molecules
103. Therapeutics Cytokines
104. Complement System
105. Hypersensitivity
106. Advances in vaccine production
107. Sustainable aquaculture
108. Census methods in wildlife
109. Common diseases of wild animals
110. Eco tourism
111. Bee Economy
112. Dairy or poultry farm management and business plan
113. Developing Projects for students

Practical

1. Examination of pond water collected from different places for diversity in protista.
2. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
3. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
4. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.
5. Preparation of permanent slide to demonstrate: DNA by Feulgen reaction; DNA and RNA by MGP; Mucopolysaccharides by PAS reaction; Proteins by Mercuric bromophenol blue/Fast Green
6. Microtomy: Preparation of permanent slides/photographs/computer models of any five types of mammalian (Goat/rat,etc) tissues
7. Paper chromatography of amino acids.

8. Effect of pH, temperature and inhibitors on the action of salivary amylase./Urease /acid or alkaline phosphatases
9. Demonstration of proteins separation by SDS-PAGE.
10. Determination of ABO Blood group
11. Estimation of total protein in given solutions
12. Detection of SGOT and SGPT or GST and GSH in serum/ tissue
13. To study the enzymatic activity of Trypsin / Lipase.
14. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.
15. Study of Polytene chromosomes from *Chironomous* / *Drosophila* larvae
16. Preparation of liquid culture medium (LB) and raise culture of *E. coli*
17. Study of Mendelian laws and gene interactions.
18. Linkage maps based on data from conjugation, transformation and transduction.
19. Linkage maps based on data from *Drosophila* crosses.
20. Study of human karyotype (normal and abnormal).
21. Pedigree analysis of some human inherited traits.
22. Study of homology and analogy from suitable specimens
23. Study and verification of Hardy-Weinberg Law by chi square analysis
24. Demonstration of role of natural selection and genetic drift in changing allele frequencies using simulation studies
25. Determine the area of a lake using graphimetric and gravimetric method.
26. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
27. Estimation of Lactose in milk
28. Ascorbic acid estimation in food by titrimetry
29. Estimation of Calcium in foods by titrimetry
30. Preparation of temporary mounts: Neurons and Blood film.
31. Preparation of genomic DNA from *E. coli*/animals/ human.
32. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting, PCR, DNA Microarrays.
33. Study of mitosis and meiosis through squashing in Grasshopper.
34. Plasmid DNA isolation (pUC 18/19) from *E. coli*
35. Restriction digestion of plasmid DNA / Lambda Phage DNA
36. Construction of circular and linear restriction map from the data provided.
37. Estimation of plasma level of any hormone using ELISA
38. Observation and quantitation of *Drosophila* photoreceptor neurons in healthy and diseased condition.
39. Nerve Cell preparation from the spinal cord.
40. Study of neurons and/ or myelin by Nissl, Giemsa or Luxol Fast Blue staining.
41. Human vaginal exfoliate cytology.
42. Sperm count and sperm motility in rat
43. Demonstration of ELISA.
44. Demonstration of Bone marrow smears to study Immune cells.
45. Demonstration of different field techniques for flora and fauna.
46. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

List of instruments/equipments

SL No	Name of the equipment
1	Students' Compound Microscope
2	Stereo Microscope
3	Haemocytometer
4	pH Meter
5	UV-Visible Spectrometer
6	Bench Top Centrifuge
8	Paper Chromatography Unit
9	Digital Weighing balance
10	Laminar Airflow
11	BOD Incubator
12	Refrigerator
13	Hot Air Oven
14	Autoclave
15	Magnetic Stirrer with Hot Plate
16	Microtome
17	Gel electrophoresis unit with accessories
18	Trans illuminator
19	Water bath

STATE MODEL SYLLABUS
FOR
UNDER-GRADUATE
COURSE IN HOME SCIENCE
(Bachelor of Arts Examination)

UNDER

UGC

CHOICE BASED CREDIT SYSTEM

2019

B.A. Home Science

Semester	Course Opted	Course Name	Credits
I	Ability Enhancement Course-I	English Communications/ Environmental Science	2
	CC -I Theory	Human Development I: The Childhood Years	4
	CC -I Practical	Human Development I: The Childhood Years Practical	2
	CC -2 Theory	Food and Nutrition	4
	CC -2 Practical	Food and Nutrition Practical	2
	GE -I Theory	Human Nutrition	6
II	Ability Enhancement Course-II	English Communications/ Environmental Science	2
	CC-3 Theory	Extension Education	4
	CC-3 Practical	Extension Education	2
	CC-4 Theory	Family Resource Management	4
	CC-4 Practical	Family Resource Management Practical	2
	GE -2 Theory	Human Development and Family Studies	6
III	CC-5 Theory	Textiles	4
	CC-5 Practical	Textiles Practical	2
	CC-6 Theory	Dynamics of Communication	4
	CC-6 Practical	Dynamics of Communication Practical	2
	CC-.7 Theory	Personal Finance & Consumer Studies	4
	CC-7 Practical	Personal Finance & Consumer Studies Practical	2
	SEC-I	Home based catering / Maternal and Child nutrition	2
	GE -3 Theory	Family Resource Management	6
IV	CC-8 Theory	Human Development II: Development in Adolescence and Adulthood	4
	CC-8 Practical	Human Development II: Development in Adolescence and Adulthood Practical	2
	CC-9 Theory	Nutrition: A Life Cycle Approach	4
	CC-9 Practical	Nutrition: A Life Cycle Approach Practical	2
	CC-10 Theory	Fashion Design	4
	CC-10 Practical	Fashion Design Practical	2
	SEC-2		2
	GE -4 Theory	Family Resource Management	6
V	CC-11 Theory	Therapeutic Nutrition	4
	CC-11 Practical	Therapeutic Nutrition Practical	2
	CC-12 Theory	Physiology and Promotive Health	4
	CC-12 Practical	Physiology and Promotive Health Practical	2
	DSE -I Theory	Indian Textiles Heritage	4
	DSE -1 Practical	Indian Textiles Heritage Practical	2
	DSE -2 Theory	Communication Systems and Mass Media	4
	DSE -2 Practical	Communication Systems and Mass Media practical	2

Contd ...

VI	CC-I 3 Theory	Research Methodology in Home Science	4
	CC-13 Practical	Research Methodology in Home Science Practical	2
	CC-14 Theory	Socio Economic Environment	4
	CC-14 Practical	Socio Economic Environment Practical	2
	DSE -3 Theory	Marriage and family relationship	4
	DSE -3 Practical	Practical Marriage and family relationship	2
	DSE -4 Theory	Public Nutrition	4
	DSE -4 Practical	Public Nutrition Practical	2
		Total	**140**

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers

Generic Elective for Non Home Science students – 4 papers.

Total – 100 marks

Credit per paper – 6

Teaching hours per paper – 50 hours + 10 hours tutorial

Marks per paper with practical – Midterm : 15 marks, End term: 60 marks, Practical: 25 marks

Generic Elective

Marks per paper – Mid term : 20 marks, End term : 80 marks

HOME SCINECE PASS

Core course – 4 papers

Discipline Specific Elective – 2 papers

Generic Elective -1 paper

SEC- 3 papers

BA HOME SCIENCE (HONS)

CORE COURSES

Core Course 1: HUMAN DEVELOPMENT 1: THE CHILDHOOD YEARS

(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES:60**

Objective

1. To understand importance of Human development & principles involved in it.
2. To study the developmental pattern of children starting from prenatal period up to middle childhood years in the areas of physical ,motor, social , emotional & language development.

Unit 1: Introduction to Human Development

- Definition of growth and development, scope of child development
- Scientific methods of Studies of Child Development
- Principles of Growth and Development
- Stages of human Development

Unit II: Prenatal Development, Birth and the Neonate

- Conception, Pregnancy
- Stages of Prenatal Development and factors affecting prenatal Development
- Capacities of the new born

Unit III: Infancy and Preschool years (0-5 years)

- Physical and motor development
- Social and Emotional development
- Language development

Unit IV: Late Childhood years (6-10 years)

- Physical and motor development
- Social and emotional development
- Language development

PRACTICAL

1. Prepare poster showing different emotions (pleasant and unpleasant).
2. Plan and develop activities to facilitate cognitive development through preparation of materials such as Posters, toys etc.

3. Study the role of familial (parents) and non familial (pears/teachers/neighbors) people in a child's life

RECOMMENDED READINGS

Text book:

- Hurlock, E.B. (2008). Developmental Psychology. Tata McGraw-Hill. New Delhi
- Singh, A. (Ed). (2015). Foundations of Human Development: A life span approach. New Delhi: Orient Black Swan.

Reference book:

- Bee. H.(1995). The developing child. Harper Collins.
- Berk, L.E. (2007). Development through the lifespan Delhi: Pearson Education.
- Rice. F.P. (1998). Human development: A lifespan approach. New Jersey: prentice Hall.
- Santrok, J.W. (2007). A topical approach to life-span development. New Delhi: Tata McGraw- Hill.

Core course 2: FOOD AND NUTRITION

(CREDITS: THEORY-4 PRACTICAL-2)

THEORY

LECTURES: 60

Objectives:

- To understand basic concepts of food, nutrition and their related terms
- To study the functions, requirement& deficiency of macro & micronutrients in the human body.
- To examine the difference between weights & measures of raw & cooked foods.
- To gain knowledge on nutritional contribution of various foods and principles involved in its cooking.

Unit I: Basic concepts in food and nutrition

- Basic terms used in study of food and nutrition.
- Understanding relationship between food, nutrition and health.
- Classification of food
- Functions of food- physiological, psychological and social.

Unit II: Nutrients

- Classification,Functions, dietary sources, daily requirement and clinical manifestations in deficiency/ excess of the following nutrients:
- Carbohydrates, Proteins and Lipids
- Fat soluble vitamins- A, D, E and K
- Water soluble vitamins- Thiamin, Riboflavin, Niacin, Folate, Vitamin B12 and Vitamin C,
- Minerals- Calcium, Iron, Zinc and Iodine.

Unit III: Food groups

Nutritional contribution and changes during cooking of the following food groups:

- Cereal
- Pulses
- Fruits and vegetables
- Milk & milk products
- Meat, poultry and fish

Unit IV: Methods of cooking and enhancing the nutritional quality of foods-

- Methods of cooking- Dry, moist, frying and microwave cooking---their advantages and disadvantages.
- Enhancing the nutritional quality of foods ---Supplementation, germination, fermentation, fortification and GM foods.

PRACTICAL

1.Weights and measures- Raw and Cooked food (Rice, dal, chapatti, egg, seasonal vegetables)

2. Understanding the principles of cooking involved and nutritional quality of following foods

- Cereals: Boiled rice, pulao, chapatti, paratha, puri, pastas
- Pulses: whole, dehusked
- Vegetables: curries, dry preparations
- Milk and milk products: Kheer, custard

3. Understanding the principles of cooking involved and nutritional quality of the following foods.

- Baked products: Biscuits, cookies, cakes, tarts and pies
- Snacks: pakoras, cutlets, samosas, upma, poha, and sandwiches
- Salads: salads and salad dressings.
- Fermented products : Idli, dosa, appam, kulcha, dhokla etc.

RECOMMENDED READINGS

Text Book:

- Sri lakshmi (2007) .Food science .4th edition. New age international Ltd.
- Swaminathan,M. -Essentials of Food and Nutrition. Ganesh and Company

Reference book:

- Bamji MS, KrishnaswamyK.Brahman GNV (2009). Textbook of Human Nutrition 3rd edition. Oxford and IBH publish Co Pvt Ltd.
- Wardlaw and insel MG Insel PM (2004). Perspectives in Nutrition's sixth edition Mosby.
- Chadha R and Mathur P (eds) Nutrition: a lifecycle approach. Orient Blackswan, New Delhi. 2015
- Khanna K, Gupta S, Seth R, Mahhna R, Rekhi T (2004). The art and science of cooking; a practical manual revised edition elite publishing house pvt Ltd.
- Raina U. Kashyap S, Narula V, Thomas S, Suvira, Vir S, Chopra S (2010). Basic food preparation -A complete manual, fourth edition. Orient black swan Ltd.

Core course:3- EXTENSION EDUCATION

THEORY **LECTURES 60**

Objectives:

- To enable the student to understand the meaning, principles, philosophy of Home Science Extension Education.
- To enable the student to know about different methods used in Extension Education.
- To enrich the Knowledge of the students about teaching learning process in Extension education.

UNIT -I

Extension Education-

- Definition needs and objectives.
- Principles of extension education.
- Behavioral changes brought about by extension education.

UNIT II

Role of Extension Education in Development –

- Role of Home Science & its inter relationship with Community Development.
- Role & qualities of Home Science extension workers.

UNIT III

Methods of teaching in Extension Education-

- Individual, group & mass methods. Individual Methods: Farm and Home Visits, Office Calls, Telephone Calls, Personal letters.
- Group Methods: Method Demonstration, Result Demonstration. Group Discussion, Field Trips, Lecture, Seminars and Workshop
- Mass Methods: Leaflets, Circular Letter, Radio, T.V. Bulletins, News Articles, Their advantages & disadvantages.

UNIT IV

Teaching-Learning process-

- Meaning, principles & steps in teaching learning process.
- Criteria for effective extension teaching. Elements of teaching and learning situation.
- Criteria for effective learning. Principles of learning. Factors affecting learning.

Core paper III: Practical

Practical: 25 Marks

- Prepare posters: women empowerment, violence against women, child &

maternal health issues, environmental pollution.

- Prepare a project report within one thousand words on any one of the above issues.

Text Book:

- 1.Education and communication for development – O.P. Dahama and O.P. Bhatnagar.
- 2.Extension Education and Communication–V.K. Dubey and Indira Bishnoi

Reference Books:

- Extension communication and management – G.L. Ray.
- Extension Techniques for Rural Management - C. Satapathy & Sabita Mishra.
- Extension Education – A. Reddy

Core course 4 FAMILY RESOURCE MANAGEMENT

(CREDITS: THEORY -4 PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To achieve goals in life through judicious resource management
- To utilize the available resources effectively.

Unit I: Introduction to Family Resource Management and its application

- Concept and scope of family resource management
- Processes in resource Management
- Decision Making

Unit II: Resources

- Meaning, classification and characteristics of family resources, factors affecting utilization of resources.
- Motivating factors in home management: values, standards and goals and their inter-relationship.

Unit III: Availability and management of specific resources by an individual/ family

- Money-Types of income, Supplementing family income
- Time-Concept, Factors and steps in time management

Unit IV: Availability and management of specific resources by an individual/ family

- Energy- Efforts, Fatigue, Work simplification
- Steps in successful event planning—Planning, Budgeting and Evaluating.

PRACTICAL

1. SWOC analysis
2. Building decision making abilities through management games (Any two)
3. Preparation of time plans for one day for self and family.
   Event planning for family occasion.(Any one).

RECOMMENDED READINGS

Text Book

- Rao V.S and Narayana P.S., Principles and practices of management, 2007, konark publishers Pvt Ltd.
- Nickell, P and Dorsey, J.M., Management in family living,2015,CBS Publishers and Distributors

Reference Book

- Management for Modern Families – I.H.Gross and E.W. Crandall.
- Home Management - Vergese, Ogale, Srinivasan
- Home Management for Indian Families. – M.K.Mann
- Home Management – Education Planning Group, Arya publishing house,Delhi.
- Text book of Home Science- Premlata Mallick.
- An Introduction to family Resource management-Premavathy Seetharaman, Sonia Batra & Preeti mehera
- Koontz H and O'Donnel C, 2005Management- A System and Contingency analysis of Managerial Functions. New York: Mc Graw – Hill Book Company
- Kretiner, 2009 , Management Theory and Applications , Cengage Larning : India

Core course 5: TEXTILES

(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To know the manufacturing process of different types of textile fibers, their structures and uses
- To know the manufacturing process of different types of fabrics.
- To impart knowledge on different textile finishes

Unit I: Introduction to Textile Fibres

- Meaning and classification of fibres
- Production, properties and usage of fibres

  Natural fibre: cotton, flax, silk and wool

  Man-made fibers: Rayon(Viscose)

Unit II: Yarn construction and their properties

- Yarn formation
- Mechanical spinning (cotton system, wool system, worsted system) chemical spinning (wet, dry, melt)
- Types of yarns: Staple and filament, simple yarn, complex yarns

Unit III: Techniques of fabric construction, finishing, dyeing and printing

- Parts of a loom
- Operations of a loom
- Classification of weaves (Plain, Basket, Ribbed, Twill, Satin, Sateen)- Structure, Properties, usages

Unit IV: Finishing

- Finishing-Mechanical finishes-Beetling, Calendaring, Embossing, Glazing, Napping.
- Chemical Finishes- Mercerization, Ammoniating.
- Dyeing - Types of dyes

PRACTICAL

1. Fiber identification tests- visuals, burning, microscopic
   Yarn identification- single, ply, cord, textured, elastic, monofilament, multifilament and spun yarn.
2. Thread count and balance, Dimensional stability,
3. Weaves- Identification and their design interpretation on graph (any three)

RECOMMENDED READINGS:

Text Book:

Corbman P.B. (1985) Textiles- Fiber to fabric (6th Edition) , Gregg Division /Mc Graw Hill Book Co, US.

Reference Book:

- Joseph, M.L. (1988) Essentials of Textiles (6th Edition), Holt , Rinehart and Winston Inc, Florida.
- Vilensky G. (1983) Textile science, CBS Publishers and Distributors, Delhi.
- Tortora, G. Phyllis, Understanding Textiles, Mc Millanm Co. USA.
- Sekhri S. (2013) Textbook of Fabric Science: Fundamentals to finishing, PHI Learning, Delhi.

Core course 6: DYNAMICS OF COMMUNICATION

(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To understand the different spheres of communication
- To understand the concept, process, models and process of communication

Unit I: Communication:

- Historical background, concept and nature
- Functions of communication

- Types of communication- formal and informal communication; verbal and non-verbal communication
- Scope of communication- education, corporate communication, management of organizations advertising and public relations.

Unit II: Principles, elements and models Communication

- Signs, symbols and codes in communication
- Postulates / principles of communication
- Elements of communication and their characteristics
- Models of communication- -Aristotle, Losswell, Shannon &Weaver, Osgood and Schramm,
- Riley models
- Barriers to communication

Unit III: Effective communication

- Concept, nature and relevance to communication process: Empathy, Persuasion, Perception, Listening

Unit IV: Diffusion, adoption & innovation-

Concept & elements of diffusion

Adoption – Characteristics, stages& factors associated with adoption. Sources of information, characteristics of adopters.

PRACTICAL

1. Developing skills of communication by forming small groups among the students.
2. Review of selected issues published in newspapers.
3. Writing short stories, related to health and nutrition for conveying messages to the society.

RECOMMENDED READINGS

Text book:

- Devito. J. (1998) Human communication New York: Harper & Row.
- Extension communication and management – G.L.Ray.

Reference Book:

- Barker, L. (1990) “Communication” New Jersey prentice Hall Inc 171.
- Patri and Patri (2002); Essentials of communication Greenspan publication

Core course 7: PERSONAL FINANCE AND CONSUMER STUDIES

(CREDITS: THEORY-4 PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To gain knowledge about the need of consumer education
- To create awareness among consumers through education

.

Unit I: Income and expenditure

- Budgets, maintaining household accounts
- Factors influencing expenditure
- Family savings and investments-objectives and types of savings.

Unit II: Consumer in India: Consumer problems and education

- Definition of a consumer
- Role of consumers - National income, per capita income.
- Changing nature of the business world, e- commerce, e-business.
- Consumer problems- products and service related problems and solution.

Unit III: Consumer Protection

- Consumer education and empowerment.
- Consumer protection

Unit IV: Legislative Measures for Consumer Protection, Standardization and quality control measures:

- Consumer organizations – Role and function
- Basic legislative framework for consumer protection in India- consumer protection Act 1986, alternative redressed mechanisms, mediation centers.
- ISI, FPO, AGMARK, ISO FSSAI, Eco mark, , handloom mark,.

PRACTICAL

1. Evaluation of advertisements in the print media
2. Evaluation of labels on different types of food products (at least three).
3. Learning to fill up different forms of banks and post office. (at least three).

RECOMMENDED READING

Text Book :

- Khanna S.R. Hanspal S. Kapoor S. & Awashti H.K. 2007, Consumer affairs, Universities press India Pvt Ltd.

Reference Book :

- Sawhney H.K & Mital, M, 2007, Family finance & consumer studies, Elite publishing House Pvt Ltd.
- Seetharaman P. and Sethi, M. 2001, Consumerism, Strength and Tactics, New Delhi CBS Publisher

Core Course 8: HUMAN DEVELOPMENT II

DEVELOPMENT IN ADOLESCENCE AND ADULTHOOD

(CREDITS: THEORY-4 PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To know the different developmental tasks during adolescence.
- To know the socio-emotional and cognitive developments of adulthood.

Unit I : Puberty

Characteristic and age at puberty

Puberty growth spurt

Body changes at puberty

Effect of puberty

Unit II : Adolescence

- Characteristics of adolescent years
- Developmental tasks during Adolescence
- Physical changes
- Emotional changes

Unit III : Early Adulthood

- Developmental tasks of early adulthood
- Characteristics of early adulthood
- Changes in interest
- Social mobility

Unit IV : Early Adulthood and family adjustment

- Marital adjustment
- Adjustment to parenthood

Adjustment to singlehood

PRACTICAL

1. To study creativity during adolescence
2. Use of the questionnaire method to study the responsibility of an adult in roles as :

Father/ husband

Mother/wife

3. Use of the questionnaire method to study the responsibility of an adult in roles as :

- Single parent
- Employed woman

RECOMMENDED READINGS

Text book:

- Singh A. (Ed.) 2015 : Foundation of Human Development, A life span approach , New Delhi, Orient Black Swan.

Reference Book:

- Berk. L.E. (2007) Development through the lifespan, Delhi: Person Education.

- Rice F.P(1998) Human Development: A lifespan approach, New Jersey: Prentice Hall
- Rutter, M. and Rutter , M (1992) A topical approach to life-span, development, New Delhi Tata Mc Graw-Hill.
- Sntrock J.W. (2007) A tropical approach to life- spam development, New Delhi: Tata McGraw- Hill
- Tennant, M and Pogson, p. (1995) Learning and Change in the Adult year San Francisco, Jossey- Bass

Core Course 9: NUTRITION: A LIFE CYCLE APPROACH

(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To know the importance of nutrition in different stages of life cycle.
- To study the nutritional need in special conditions.

Unit I : Principle of meal planning

- Food groups and food exchange list
- Factors affecting meal planning.
- Dietary guidelines for Indians-2017

Unit II

Nutrition during childhood

RDA, nutritional guidelines,

and healthy food choices-

• Infants

• Preschool children

• School children

• Adolescents

Unit III: Nutrition during adulthood

RDA, nutritional guidelines, healthy food choices.

- Adult

- Pregnant woman
- Lactating mother
- Elderly

Unit IV: Nutrition for special conditions

- Nutrition for physical fitness and sports
- Feeding problems in fussy eaters. (children)
- Food Consideration during natural disasters e.g. floods,

PRACTICAL

1. Prepare a table on rich sources of different nutrients
2. Prepare a of food exchange list

3. Planning and preparation of diets for –

- Preschooler
- Pregnant and Lactating woman
- Elderly

RECOMMENDED READINGS

Text Book:

- Human Nutrition-B. Srilaxmi , New age publication.
- Principles of Nutrition and Dietetics-Swaminathan M.

Reference Book:

- Gopalan C, Rama Sastri BV, Balasubramanian SC (1989)
- Nutritive Value of Indian Foods. National Institute of Nutrition, ICMR, Hyderabad.
- Seth V and Singh K (2006). Diet Planning through the Life Cycle: Part 1
- Bamji MS, Krishnaswamy , K. Brahman GNV(2009), Textbook of Human Nutition 3rd Edition, Oxford and IBH Publishing Co. Pvt. Ltd
- Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Puri S (2013). Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd.
- Wardlaw GM, Hampi JS, DiSilvestro RA (2004). Perspectives in Nutrition, 6th edition.
  McGraw Hill.
- Chadha R and Mathur P eds. Nutrition: A Lifecycle Approach. Orient Blackswan, New Delhi. 2015.

Core Course 10: FASHION DESIGN

(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES:60**

Objectives:

- To support and collaborate with fashion, textiles and design industry to achieve a sustainable progress.
- To give advance knowledge and pushing the boundaries in fashion, textile and designing.

Unit I: Fashion

Definition and background of fashion in India**,** fashion cycle

Factors favoring and retarding fashion

- Role of a designer
- Leading Fashion designing centers in India NIFT, NID, SID, NIIFT

Unit II: Importance of clothing

- Origin of clothing.
- Functions of Clothing
- Factors influencing selection of clothing
- Clothing related to various activities

Unit III: Selection of Clothing

- Selection of clothes according to body built
- Use of colours in clothing.
- Selection and evaluation of ready-made garments

Unit IV: Aesthetics in Dress.

- Elements and principles of design
- Structural and applied design
- Sleeves, necklines, collars, pockets

PRACTICAL

1. Flat sketching of Sleeves, necklines,
2. Flat sketching of collars, pockets

3. Collections of dress designs of famous designers.

RECOMMENDED READINGS

Text Book: Tata S.L., Edwards M.S., 1982, The Complete Book of Fashion Design, Harper and Row Publications, NewYork.

- The complete Book & Fashion Design, Harper and Row Publication, New York by Tate, S.L., Edwards, M.S 1982

Reference Book:

- Brown, Patty, Rice J., 1998, Ready to Wear Apparel Analysis. Prentice Hall.
- Marshall S G, Jackson H O, Stanley MS, Kefgen M &Specht T, 2009, Individuality in Clothing & Personal
- Appearance, 6th Edition, Pearson Education, USA.

Core Course 11: THERAPEUTIC NUTRITION

(CREDITS: THEORY-4, PRATICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To study about principles of therapeutic nutrition
- To know the nutritional need during different disease conditions.

Unit 1: Principles of nutrition care-

- Nutrition Care Process
- Therapeutic adaptations of normal diet
- Progressive diets- Clear fluid, full fluid, soft and regular

Unit II: Etiology, clinical features and nutritional management:

- Weight Imbalances- Over weight and obesity, Under weight

- Eating disorder- anorexia nervosa and bulimia
- Type 1 and Type 2 -Diabetes Mellitus
- Hypertension and Coronary Heart Disease

Unit III: Etiology, Clinical features and nutritional management of the following

- Diarrhea
- Lactose intolerance
- Liver: Infective Hepatitis

Unit IV: Etiology clinical features and nutritional management of the following

- Typhoid
- Tuberculosis
- HIV

PRATICAL

Planning of Diets for the following_

1. Therapeutic Diet- Normal, soft, clear and full fluid
2. Obesity, Type 2 Diabetes
3. Hypertension and CHD

RECOMMEDED READING

Text Book:

- Antia,F.P Clinical Dietetics and Nutrition
- Srilakshmi.B (2014) Dietetics. New Age International Publishers

Reference Book:

- Khanna, K . Gupta S, Seth R, Passi, S.J. Mahan, R. PuriS(2013), Text book of Nutrition and Dietetics Phoenix Publishing House Pvt Ltd.
- Mahan L K and Escott Stump S (2013) Krause's food & Nutrition Theraphy, 13thed Saunders – Elsevier
- Stacy Nix (2009) Willam's Basic Nutrition and Diet Therapy 13th Edition , Elsevier Mosby

- Seth V and Sing K (2007) Diet Planning through the life Cycle Part 11 Diet Therapy A Practical Manual 4, edition, Elite Publishing House Pvt. Ltd.
- ICMR (2010) Nutritive value of Indian Foods. National Institute of Nutrition , Indian Council of Medical Research Hyderabad

Core Course 12: PHYSIOLOGY AND PROMOTIVE HEALTH

(CREDITS: THEORYT-4, PRACTICAL-2)

THEORY **LECTURES; 60**

Objectives:

- To understand the structure and functions of various organs of the body
- To focus on different mechanism of human body

Unit 1: Respiratory and Circulatory Physiology

- Structure of Lungs and its function
- Structure of Heart and its function
- Different type of blood circulation and cardiac cycle

Unit II: Endocrine Physiology

- Actions and disorders of pituitary, thyroid, parathyroid, adrenal and pancreatic hormones.

Unit III: Renal and Reproductive physiology

- Structure of Kidney and its function
- Male reproductive organs and its function, Female reproductive organs and their functions,
- Physiology of Menstruation and Menopause

Unit IV: Promotive Health

- Concept of Health, Disease and its prevention
- General risk factors and prevention of Anemia, Jaundice and Cancer
- Drug abuse and Alcoholism
- Family planning and contraception

PRATICAL

1. Case study of Iron deficiency Anemia, Investigation and diagnosis, Blood indices Measurement of blood pressure by using sphygmomanometer.
2. Demonstration of procedures of clinical examination to see for pallor, jaundice, edema and dehydration and
3. Basic First Aid procedures CPR, Burns.

RECOMMENDED READINGS

Text Book:

- J.E. Park and K. Park (2009). Park's textbook of preventive and Social Medicine, 20th edition. M/s Banarsi Das, Jabalpur.
- Ross and Wilson (1973). Foundation of Anatomy and physiology, medical division of Longman Group Ltd

Reference Book:

- Ganong WF (2003). Review of Medical Physiology, 21sted Mc Graw Hill.
- Yash Pal Bedi (1980). A Handbook of social and preventive medicine, Atma Ram and Sons.

Core Couse 13: RESEARCH METHODOLOGY

(CREDITS: THEORY-4 PRATICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To understand the meaning and process of research in social sciences.
- To know about the technique of collection, analysis and interpretation of data.
- To understand the meaning & process of research in social sciences.
- To have fundamental knowledge about analysis of data & the diagrammatic representation of data.
- To learn the techniques of interpretation of data & report writing.

Unit1: Research- Meaning, purpose and types

- Theoretical, empirical
- Descriptive, analytical
- Applied, fundamental
- Qualitative, quantitative

Unit II: Research Design

- Exploratory
- Explanatory
- and Experimental

Unit III: Sampling, Tools and techniques

- Types of sampling
- Collection of data- primary and secondary data
- Tools and techniques of data collection - observation , interview schedule , questionnaire, case study, FGDs
- Measures of central tendency- Mean , Median and Mode

Unit IV: The Research Process

- Identifying the problems
- Review of literature
- Formulation of objectives and hypothesis
- Preparing the research design
- Data collection
- Data analysis
- Interpretation and report writing
- Bibliography/reference

PRATICAL

1. Prepare a schedule/questionnaire on a topic
2. Make a pilot study by applying the above schedule.
3. Solve a given problem by using mean

RECOMMENDED READINGS

Text Book:

- Kothari C.R. (2008) Research Methodology: Methods and Techniques 2nd Ed. New Age International Pvt Ltd. New Delhi.

Reference Book:

- Kumar R. (2006) Research Methodology: A step by step Guide for Beginners, Sage Publication, New Delhi.

- Kelinger F.N. and Lee, H.B (2000) Foundations of Behavioral Research 4th Ed. Harcourt College Publishers.
- Black J.A & Champion D.J. (1976); Methods and issues in Social Research New York: John Wilely and Sons.

Core Course 14: SOCIO ECONOMIC ENVIRONMENT

(CREDITS: THEORY:-4, PRACTICAL -2)

THEORY **LECTURES: 60**

Objectives:

- To know the relationship between society, economy and environment.
- Create awareness among people regarding constraints in economic environment and its consequences.

Unit -1: Sociological Concerns and Orientation

Sociological Orientation

- Society, Culture and institutions
- Family, Kinship and Relationships
- Social mobility and social change
- Cultural diversity in contemporary society.

Unit-II: Economics Theory and Environment

- Definition, Scope of Economics
- Wants- Classification and Characteristics
- Utility- Law of Diminishing Marginal Utility, Law of Equi- Marginal Utility , Demand- Law of Demand, Elasticity of Demand.
- Engel's Law of Consumption

Unit III. Money, Banking and Public Revenue

- Types and function of money, inflation
- Types and functions of banks
- Public Revenue.

Unit IV. Indian Economic Environment

- Constraints on growth: Issue of population, income distribution, poverty, unemployment and migration, food security.
- Recent development programmes of the Government of India : Jana Dhana Yojana, Sarva Sikha Yojana , Objective and Achievement
- Issues related to gender discrimination: IMR, MMR, Sex Ratio, Literacy

PRACTICAL

Do a project on any of the following topic

- Changing families & Relations in Society
- Changing status and roles at home and work place
- Gender discrimination.
- current economic issues (Development and Environmental)

RECOMMENDED READINGS

Text Book:

- Ahuja H.L., 2010, Modern Micro Economics. Sultan Chand & sons
- Dhingra IC and Garg VK, 2010, Introductory Economic Theory. Sultan Chand & Sons
- Mishra &Puri, Recent edition 2014, Indian Economy, Himalaya Publishing House.

Reference Book:

- Abhraham, M. F. (2006). Contemporary Sociology: An introduction to concepts and theories: New York: Oxford University Press.
- Beattie, J. (1964). Other cultures. Cohen and West.
- Das, V. (Ed.) (2003) The Oxford companion to sociology and social anthropology: volume 1 and 2.New Delhi: Oxford University Press.
- Johnson, M.H. (2001). Sociology: A systematic introduction. New Delhi: Allied Publishers Limited.
- Rawat, H.K. (2007). Sociology: Basic concepts. New Delhi: Rawat Publications.
- Srinivas, M.N. (Ed.) (1996). Caste: Its twentieth century avatar. New Delhi: Viking Penguin
- Mithani D.M., 2010 New Edition, Macro-Economics. Himalaya Publishing House
- Sundaram K.P.M., 2010, Introduction to Economics. RatanPrakashan

DISPLIINE SPECIFIC ELECTIVE (DSE)

DSE 1: INDIAN TEXTILES HERITAGE
(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives

- To study about different traditional textile and crafts of India
- To know the care and storage techniques of different traditional textile.
- To study the socio- economic significance of traditional textile and its popularity in modern India.

Unit I: Study of Textile Crafts of India: with reference to history, production centers, techniques, designs, colours and products

Woven Textiles -Benaras Brocades, Jamdanis and Baluchars of Bengal, Kani Shawls of Kashmir.

Unit II: Study of Textile Crafts of India: with reference to history, production centers, techniques, designs, colours and products

Embroidered Textiles-Kanthas of Bengal, Kasuti of Karnataka, Phulkari of Punjab, Chikankari of Uttar Pradesh, Kashida of Kashmir, Gujarat embroideries.

Unit III: Study of Textile Crafts of India: with reference to history, production centers, techniques, designs, colours and products

- Painted and Printed textiles –Kalamkaris of Andhra Pradesh, Dabu printing of Rajasthan ,Ajarakh prints of Gujarat
- Dyed textiles –Bandhnis of Rajasthan and Gujarat, Ikats- Patola of Gujarat.
- Bandhas of Orissa

Unit IV. Conservation of Traditional Textile

- Evolution and Socio- economic significance of Khadi, Handloom and Handicraft sector
- Sustenance of Traditional textile crafts

PRACTICAL

1. Traditional Embroideries
2. Tie and dye
   Batik
   Block Printing
   Stenciling
3. Visit to craft Centers.

Recommended Readings.

Text Book:

- Chattopadhaya K.D. 1995, Handicrafts of India, Wiley Eastern Limited Delhi

Reference Book:

- Agrawal O.P. 1977 Care and Presentation of Museum Projects –II NRL

Das Shukla, Fabric Art- Heritage of India, Abhinav Publications N.Delhi

DSE II: COMMUNICATION SYSTEMS AND MASS MEDIA

(CREDITS: THEORY-4 PRACTICAL-2)

THEORY **LECTURES:60**

Objectives:

- To achieve the target of the organization by motivating and influencing the audience.
- To inform the public locally or globally.

Unit I: Self and communication

- Awareness of self in communication
- Intrapersonal communication
- Self-concept and self esteem

Unit II: Interpersonal communication

- Concept, types and functions of interpersonal communication
- Dyadic, small and large group communication
- Stages in human relationship development
- Small group communication: types and functions

Unit III: Organization and public communication

- Organizational communication: concept types, functions and networks
- Public communication- concept and techniques

Unit IV: Mass Communication and Mass media

- Mass communication – concept, significance, functions and elements
- Print media: types, nature, characteristics, reach, access.
- Radio: types, nature, characteristics, reach, access.
- Television and cinema: types, nature, characteristics, reach, access.
- ICTs: types, characteristics, reach and access.

PRACTICAL

1. Know yourself exercises.(Johari's window)
2. Studying group dynamics in organizations- formal and informal
3. Audience analysis- Leadership, listenership and viewership studies ,Content analysis of mass media

RECOMMENDED READINGS

Text Book:

Roy, G.L. Extension, Communication and Management.

Devito, J. (1998) Human communication. New York: Harper & Row.

Baran Stanley J (2009). Introduction to mass communication, Mc Graw hill medical publishing.

Reference Book:

- Barker, Larry Lee (1990) communication. Eaglewood cliffs, New Jersey: Prentice Hall.
- Mc Quail, D. (2000) Mass communication theories London: sage Publications

- Vivian, J (2012). The Media of mass communication, Pearson.
- Dominick, Joseph R. (2012). Dynamics of mass communication: media in transition , Mc Graw hill education
- Baran, Stanley J (2014). Mass communication theory, Wadsworth publishing

DSE 3: MARRIAGE & FAMILY RELATIONSHIP

(CREDITS: THEORY 4 AND PRACTICAL:2)

THEORY **LECTURE:60**

Objectives:

- To understand the concept of marriage & its importance in family life.
- To acquire knowledge about the different pattern of marriage rituals & ceremonies existing in Indian society.
- To understand the problems of Family & Marital life prevalent in the society.

UNIT I: Marriage as an Institution

- Meaning, definitions, functions& importance of marriage.
- Types of marriages- Monogamy, polygamy, Exogamy, Endogamy, polyandry, Polygyny.
- Marriage in contemporary society.

UNIT II: Marriage Rituals & Ceremonies in different Indian Communities

- Significance of marriage.
- Process of marriage among Hindu, Muslim & Christian Community.
- Adjustments in marriage- Sex, financial, in laws and among working couples.

UNIT III: Family, kinship and relationship

- Meaning, definition, importance, characteristics & functions of family.
- Contemporary Family types prevalent in India.
- Family life Cycle: meaning, importance, & stages of family life cycle.
- Family- in- transition- Merits & demerits.

UNIT IV: Problems of Family

- Prolonged sickness/illness, accidents widowhood, unemployment, economic distress /poverty, broken family, family with a disables and suicide in the family.
- Marital problems-Marital disharmony& conflict, separation & divorce, single parenthood, loss of spouse.

Practical

1. Do a Project work on a topic related to marriage and family.

RECOMMEDNED READINGS

Text Book:

- Marriage and Family in India – Kapadia

Reference Books:

- The Family – Goode, W.J.
- India Social Problems – Madan G.R.
- Sociology – Vidya Bhusan
- Indian Society and Social Institutions – Nukhi H. R. Surjeet.
- An Introduction to Sociology – Vidya Bhusan and Sachadeva.
- Indian Social Problems. Vol. I and II – G.R. Madan.

DSE-4: PUBLIC NUTRITION

THEORY **LECTURES: 60**

Objectives:

- To understand the importance of public health nutrition and its role
- To gain knowledge on different ongoing nutrition programmes.
- To study the different methods for assessment of nutritional status.

Unit 1 Concept and scope of public nutrition

- Definition, Concept and Scope of public health nutrition
- Objectives , principles and scope of nutrition and health education and its promotion
- Role of Public nutritionist

Unit II: Nutritional problems and their implications

Etiology, prevalence, clinical features and preventive strategies of

Under nutrition -

- Protein energy malnutrition, nutritional anemia, vitamin A deficiency, iodine deficiency disorders.
- Over nutrition- obesity, coronary heart disease, diabetes.
- Fluorosis

Unit III: Assessment of nutritional Status

- Objectives and importance
- Methods of Assessment

A. Direct- Clinical signs, nutritional anthropometry, biophysical tests.

B. Indirect- Diet Surveys, Statistics.

Unit IV -International and National Nutrition Policy and Programmes:

- **I**nternational Agencies and their functions – World Health Organization (WHO), Food and Agriculture Organization (FAO), United Nations International Children's Emergency Fund (UNICEF), Cooperatives for Assistance & Relief Everywhere (CARE).
- National Agencies and their functions , Indian Council of Agriculture (ICAR), Indian Council of Medical Research (ICMR), National Institute of Nutrition (NIN). National Institute of Public cooperation & child development(NIPCCD)

PRACTICAL

1. Assessment of nutritional status:

- Anthropometry- weight and height measurements
- Interpretation of data on the basis of BMI of ten numbers of adolescents

RECOMMENDED READINGS

Text Book:

- B Srilakshmi, Nutition Science, New Age Publication
- Park K (2011) Park's Text book or Preventive and Social Medicine, 21st Edition, M/S Banarasidas Bhanot Publisher, Jabalpur, India

Reference Book:

- Wadhwa A and Sharma S (2003) Nutrition in community – A Text book, Elite Publishing House Pvt. Ltd New Delhi

- Park K (2011) Park's Text book or Preventive and Social Medicine, 21st Edition, M/S Banarasidas Bhanot Publisher, Jabalpur, India
- Bamji MS Krishnaswamy K and Brahman GNC (Eds) (2009), Text Book of Human Nutrition 3rd Edition, Oxford and IBH Publishing Co Pvt Ltd New Delhi,
- ICMR (2011) Dietary Guideline for Indian- A Manual National Institute of Nutrition, Indian Council of Medical Research Hyderabad.
- Bamji MS Krishnaswamy K and Brahman GNC (Eds) (2009), Text Book of Human Nutrition 3rd Edition, Oxford and IBH Publishing Co Pvt Ltd New Delhi,
- Jeliffe DB, Jeliffe ERP, Zarfar A and NeumananCG(1989) Community Nutritional Assessment with special reference to less technically developed countries, Oxford University Press Oxford.
- World Health Organization (2006) WHO Child growth Standards. Methods and development , length/height for age, weight of age, weight-for length , weight for height and body mass index for age (http:// who.int/child growth/standards/en/)

SKILL ENHANCEMENT COURSES (SEC)

SEC-A: HOME BASED CATERING

(CREDITS: THEORY 6)

THEORY **LECTURES: 60**

Objectives:

- To know different type food service unit.
- To study the different-step towards planning and execution of food service unit.

Unit I: Introduction of food service

Types of food service establishments

- State and local regulations related to catering.

Unit II: Food production

- Menu planning in food production units - Importance of menu
- Factors affecting menu planning in different kinds of food service units
- Quantity food production: Standardization of recipes, quantity food preparation techniques , recipe adjustments and portion control

Unit III: Resource management in food service unit

- Money
- Manpower
- Time
- Facilities and equipment

- Utilities

Unit IV: Planning of food service unit

- Preliminary planning - Survey of types of units, identifying clientele, menu, operations and delivery

Unit V: Purchase and storage in food service unit

- Food purchase and storage

Unit VI: Maintenance of hygiene and sanitation in food service unit

- Hygiene and sanitation
- Packaging

Recommended readings:

Text Book:

Taneja S and Gupta SL (2001) Enterpreneurship development, Galgotia publishing.

Reference Book:

- West B Besie & Wood Levelle (1988) Food service in institutions 6th Edition revised By Hargar FV, Shuggart & Palgne Palacio June, Macmillian publishing company.
- SethiMohini (2005) institution food management New age international publishers.
- Knight J.B & Kotschevar LH (2000) quantity food production planning & management 3rd edition John Wiley & Sons.
- Philip E Thangam (2008) Modern Cookery for teaching and Trade Part I & II orient Longman.

SEC-B: MATERNAL AND CHILD NUTRITION

(CREDIT: THEORY 6)

THEORY **LECTURERS: 60**

Objectives:

- To study the community based health and nutrition programmes for mothers and children.
- To improve the health status of mother and child.

Unit-I:

- Nutritional needs during pregnancy,
- Relationship between maternal diet and birth outcome.

Unit II: Maternal nutritional status:

- Nutritional needs of nursing mothers and infants,
- Determinants of birth weight and consequences of low birth weight,

Unit III Child feeding and care-

- Current feeding practices and nutritional concerns, guidelines for feeding, weaning and complementary feeding.
- Ongoing program me on maternal and child health

Unit IV

- Child health and morbidity, neonatal, infant and child mortality, IMR and U5MR, link between mortality and malnutrition
- Overview of maternal and child nutrition policies and programmes.

Unit V

- Common disorder during pregnancy:
- Anemia, pregnancy induced hypertension

Unit VI

- Causes and prevention of Maternal Mortality
- Issues relating to maternal health: Hemorrhage, infection, unsafe abortion

RECOMMENDED READINGS

Text Book:

- Wadhwa A and Sharma S (2003). Nutrition in the community- A Textbook. Elite publishing house Pvt Ltd New Delhi.

Reference Book

- Park K (2011). Park's textbook of preventive and social medicine, 21st edition M/s Banarasidas Bhanot publishers, Jabalpur, India.

- Bamji MS, Krishnaswamy K and Brahman GNV (Eds) (2009). Textbook of human nutrition 3rd edition. Oxford and IBH publishing Co. Pvt Ltd, New Delhi.
- National guidelines on infant and young child feeding (2006). Ministry of women and child development, Government of India.

Generic Elective Courses (GE)

Generic Elective Paper I

HUMAN NUTRITION

Objectives:

1. To gain knowledge about different nutrients, their classification, function, sources, requirement and deficiency diseases.

UNIT-1 :

Basic Concepts of Nutrition:

- Meaning and definition of Nutrients& Nutrition.
- Guidelines for good health.
- Food: Definition, Classification.
- Functions of Food- Physiological, psychological and socio-cultural. Understanding relationship between food, nutrition and health.
- Basic Food Groups: Basic four, Basic five, Basic seven and their importance.

UNIT-II:

Study of Macro Nutrients

- Classification, functions, sources, requirement and
- Deficiency diseases of Carbohydrates, proteins & fats.

UNIT-III: Study of Micro-Nutrients:

- Vitamins- Classification, functions, sources, daily requirement & deficiency diseases of Fat-soluble & Water -Soluble Vitamins – B Complex Vitamins and Vitamin C.
- Minerals: Functions, sources, daily requirement & deficiency of Iron, calcium, phosphorous, sodium & Iodine.
- Water & roughage- Functions, sources & deficiency.

UNIT IV: Nutrition during different stages of lifecycle:

- Infants,
- Preschool children,
- School going children,
- Adolescent boys and girls,
- Adult man and woman,
- Pregnant Woman and Lactating Mother.

Text Book:

1. Food & Nutrition- Educational Planning Group, Arya Publication,New Delhi.

Reference Books:

- Fundamental of food and Nutrition- by S.R.Mudambi.
- Srilakshmi B (2012) Nutrtion Science 4th Revised Edition, New Age International Publishers.
- Khann K. Gupta , S. Seth R. Passi, SJ, Mahna , R. Puri S(2013) Textbook of Nutrition and Dietetics, Phonenix Publishing House Pvt Ltd.
- ICMR (2010) Recommended Dietary Allowances for Indias, Published by National Institute of Nutrition, Hyderabad
- Chadha R and Mathur P. cds (2015) Nutrition: A lifecycle Approach, Orient Blackwan, New Delhi.
- Seet V and Singh K (2006) Diet Planning through the life Cycle : Part 1 Normal

Nutrition A Practical Manual, Elite Publishing House Pvt. Ltd. New Delhi.

- Gopalan C. Rama Sastri BV. Balasubramanian SC (1989) Nutritive Value of Indian

  Foods, National Institute of Nutrition, ICMR , Hyderabad.

- Wardlaw and Insle, MG, Insel PM (2004) , Perspectives in Nutrition, Six Edition,

  Mr. Graw Hill

Generic Elective Paper II

Human Development & Family Studies

Objectives:

- To know the importance of child study and about pre-natal Development.
- To understand the importance of Breast feeding and artificial feeding.
- To know the causes and consequences of infant and maternal mortality in India.

UNIT-I:

- Study of Human Development – Meaning and importance of studying human development,
- Stages of Human Development – Infancy, early childhood, late childhood, adolescence, adulthood & old age.

UNIT-II:

- Pre-natal development-
- Conception,
- Symptoms
- Complication of pregnancy.
- Different stages of pre- natal development-period of ovum, embryo & foetus.

- Factors affecting pre-natal Development –Age of the Mother, Nutrition, Drugs and Smoking, X-ray, Infection and chronic diseases of mother, Rh-incompatibility, Maternal emotional state.

UNIT-III:

- Neonatal Care – Immediate baby cleaning ,diet, temperature regulation , Daily Care of the new born baby, care of umbilicus ,care of the tongue and mouth ,massaging and exercise .

- Weaning, and care of the feeding equipment.
- Common childhood aliments -Vomiting, fever, thrush, Diarrhea, constipation Flatulence (wind), nappy rash.
- Maternal and Infant mortality - Causes and prevention

UNIT – IV:

- Family: Meaning, definition, characteristics and functions of family.
- Types of family: Nuclear and joint family, their merits and demerits, causes of disintegration of joint family.

Text Book:

1. Marriage and Family in India-K.M.Kapadia

Reference Books:

- Child Development –E.B. Hurlock
- Child Development – by K.C. Panda
- Family-Goode
- Principles of sociology – R.N. Sahrma

Generic Elective Paper III

TEXTILES

(CREDITS: THEORY-6)

THEORY **LECTURES: 60**

Objectives:

- To know the manufacturing process of different types of textile fibers, their structures and uses
- To know the manufacturing process of different types of fabrics.
- To impart knowledge on different textile finishes

Unit I: Introduction to Textile Fibres

- Meaning and classification of fibres
- Source,composition,manufactureing processes and properties :

  Natural fibers: cotton, flax, silk and wool

Unit II: Yarn making

- Twist in yarn-S, Z twist
- Types of yarns: Simple an novelty yarns

- **Unit III: Techniques of fabric construction**
- Parts of a loom
- Operations of a loom
- Classification of weaves (Plain, Basket, Ribbed, Twill, Satin, Sateen)- Structure, Properties, usages

Unit IV: Finishing

- Finishing-Mechanical finishes-Beetling, Calendaring, Embossing, Glazing, Napping.
- Chemical Finishes- Mercerization, waterproof and water repellent.
- Dyeing - Types of dyes

RECOMMENDED READINGS:

Text Book:

Corbman P.B. (1985) Textiles- Fiber to fabric (6th Edition) , Gregg Division /Mc Graw Hill Book Co, US.

Reference Book:

1. Joseph, M.L. (1988) Essentials of Textiles (6th Edition), Holt , Rinehart and Winston Inc, Florida.
2. Vilensky G. (1983) Textile science, CBS Publishers and Distributors, Delhi.
3. Tortora, G. Phyllis, Understanding Textiles, Mc Millanm Co. USA.
4. Sekhri S. (2013) Textbook of Fabric Science: Fundamentals to finishing, PHI Learning, Delhi.

Generic Elective Paper -IV

FAMILY RESOURCE MANAGEMENT

(CREDITS: THEORY -6)

THEORY **LECTURES: 60**

Objectives:

- To achieve goals in life through judicious resource management
- To utilize the available resources effectively. .

Unit I: Introduction to Family Resource Management and its application

- Concept and scope of family resource management
- Processes in resource Management
- Decision Making

Unit II: Resources

- Meaning, classification and characteristics of family resources, factors affecting utilization of resources.
- Motivating factors in home management: values, standards and goals and their inter-relationship.

Unit III: Availability and management of specific resources by an individual/ family

- Money-Types of income, Supplementing family income
- Time-Concept, Factors and steps in time management

Unit IV: Availability and management of specific resources by an individual/ family

- Energy- Efforts, Fatigue, Work simplification
- Steps in successful event planning—Planning, Budgeting and Evaluating.

RECOMMENDED READINGS

Text Book

- Rao V.S and Narayana P.S., Principles and practices of management, 2007, konark publishers Pvt Ltd.
- Nickell, P and Dorsey, J.M., Management in family living, 2015, CBS Publishers and Distributors

Reference Book

- Management for Modern Families – I.H.Gross and E.W. Crandall.
- Home Management - Vergese, Ogale, Srinivasan
- Home Management – Education Planning Group, Arya publishing house,Delhi.
- An Introduction to family Resource management-Premavathy Seetharaman, Sonia Batra & Preeti Mehera
- Koontz H and O'Donnel C, 2005Management- A System and Contingency analysis of Managerial Functions. New York: Mc Graw – Hill Book Company
- Kretiner, 2009 , Management Theory and Applications , Cengage Larning : India

HOME SCIENCE (PASS) CBCS SYLLABUS

FIRST SEMESTER

CORE-1 FOOD AND NUTRITION

(CREDITS: THEORY-4 PRACTICAL-2)

THEORY **LECTURE 60**

Objectives:

- To understand basic concepts of food , nutrition and their related terms
- To study the functions, requirement& deficiency of macro & micro nutrients in the human body.
- To examine the difference between weights & measures of raw & cooked foods.
- To gain knowledge on nutritional contribution of various foods and principles involved in its cooking.

Unit I: Basic concepts in food and nutrition

- Basic terms used in study of food and nutrition.
- Understanding relationship between food, nutrition and health.
- Classification of food

- Functions of food- physiological, psychological and social.

Unit II: Nutrients

- Classification, Functions, dietary sources, daily requirement and clinical manifestations in deficiency/ excess of the following nutrients:
- Carbohydrates, Proteins and Lipids
- Fat soluble vitamins- A, D, E and K
- Water soluble vitamins- Thiamin, Riboflavin, Niacin ,Folate, Vitamin B12 and Vitamin C,
- Minerals- Calcium, Iron, Zinc and Iodine.

Unit III: Food groups

Nutritional contribution and changes during cooking of the following food groups:

- Cereal
- Pulses
- Fruits and vegetables
- Milk & milk products
- Eggs
- Meat, poultry and fish
- Fat and oils
- Spices and herbs

Unit IV: Cooking of food and enhancing the nutritional quality of foods-

- Methods of cooking- Dry, moist, frying and microwave cooking---their advantages and disadvantages.
- Enhancing the nutritional quality of foods ---Supplementation, germination, fermentation, fortification and GM foods.

PRACTICAL

1. **Weights and measures**- Raw and Cooked food (Rice .dal, chapatti, egg, seasonal vegetables)
2. **Understanding the principles involved and nutritional quality of following foods**

- Cereals: Boiled rice, pulao, chapatti, paratha, puri, pastas

- Pulses: whole ,dehusked
- Vegetables: curries, dry preparations
- Milk and milk products: Kheer, custard

3. Understanding the principles involved and nutritional quality of the following foods.

- Baked products: Biscuits, cookies, cakes, tarts and pies
- Snacks: pakoras, cutlets, samosas ,upma, poha,and sandwiches
- Salads: salads and salad dressings.
- Fermented products : Idli, dosa, appam, kulcha, dhokla etc.

RECOMMENDED READINGS

Text Book:

- Sri lakshmi (2007) .Food science .4th edition. New age international Ltd.
- Swaminathan,M. -Essentials of Food and Nutrition. Ganesh and Company

Reference books:

- Bamji MS, KrishnaswamyK.Brahman GNV (2009). Textbook of Human Nutrition 3rd edition. Oxford and IBH publish Co Pvt Ltd.
- Wardlaw and insel MG Insel PM (2004). Perspectives in Nutrition's sixth edition Mosby.
- Chadha R and Mathur P (eds) Nutrition: a lifecycle approach. Orient Blackswan, New Delhi. 2015
- Khanna K, Gupta S, Seth R, Mahhna R, Rekhi T (2004). The art and science of cooking; a practical manual revised edition elite publishing house pvt Ltd.
- Raina U. Kashyap S, Narula V, Thomas S, Suvira, Vir S, Chopra S (2010). Basic food preparation -A complete manual, fourth edition. Orient black swan Ltd.

SECOND SEMESTER

CORE 2: RESOURCE MANAGEMENT
(CREDITS: THEORY -4 PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To achieve efficiency and effectiveness in life through resource management
- To utilize the available resources effectively.

Unit I: Introduction to Resource Management and its application

- Concept, universality and scope of resource management
- Steps in resource Management
- Decision Making
- Event planning and execution

Unit II: Resources

- Understanding meaning, classification and characteristics of family resources, factors affecting utilization of resources.
- Motivating factors in home management: values, standards and goals and their inter-relationship.

Unit III: Availability and management of specific resources by an individual/ family

- Money
- Time

Unit IV: Availability and management of specific resources by an individual/ family

- Energy
- Space

PRACTICAL

1. SWOC analyses
   Building decision making abilities through management games
2. Preparation of time plan of a day for self and family.
3. Event planning management of a birthday party.

RECOMMENDED READINGS

Text Book

- Rao V.S and Narayana P.S., Principles and practices of management, 2007, Konark publishers Pvt Ltd.
- Nickell, P and Dorsey, J.M., Management in family living

Reference Book

- Koontz H and O'Donnel C, 2005Management- A System and Contingency analysis of Managerial Functions. New York: Mc Graw – Hill Book Company
- Kretiner, 2009, Management Theory and Applications, Cengage Larning : India

THIRD SEMESTER

CORE 03: TEXTILES

CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives:

- To know the manufacturing process of different types of textile fibers, their structures and uses
- To know the manufacturing process of different types of fabrics.
- To impart knowledge on different textile finishes

Unit I: Introduction to Textile Fibres

- Meaning and classification of fibres
- Production, properties and usage of fibres

  Natural fibre: cotton, flax, silk and wool

Man-made fibers: Rayon(Viscose)

Unit II: Yarn construction and their properties

- Yarn formation
- Mechanical spinning (cotton system, wool system, worsted system) chemical spinning (wet, dry, melt)
- Types of yarns: Staple and filament, simple yarn, complex yarns

Unit III: Techniques of fabric construction, finishing, dyeing and printing

- Parts of a loom
- Operations of a loom
- Classification of weaves (Plain, Basket, Ribbed, Twill, Satin, Sateen)- Structure, Properties, usages

Unit IV: Finishing

- Finishing-Mechanical finishes -Beetling, Calendaring, Embossing, Glazing, Napping.
- Chemical Finishes- Mercerization, Ammoniating.
- Dyeing - Types of dyes

PRACTICAL

3. Fiber identification tests- visuals, burning, microscopic
   Yarn identification- single, ply, cord, textured, elastic, monofilament, multifilament and spun yarn.
4. Thread count and balance, Dimensional stability,

3. Weaves- Identification and their design interpretation on graph (any three)

RECOMMENDED READINGS:

Text Book:

Corbman P.B. (1985) Textiles- Fiber to fabric (6th Edition) , Gregg Division /Mc Graw Hill Book Co, US.

Reference Book:

- Joseph, M.L. (1988) Essentials of Textiles (6th Edition), Holt, Rinehart and Winston Inc, Florida.
- Vilensky G. (1983) Textile science, CBS Publishers and Distributors, Delhi.
- Tortora, G. Phyllis, Understanding Textiles, Mc Millanm Co. USA.
- Sekhri S. (2013) Textbook of Fabric Science: Fundamentals to finishing, PHI Learning, Delhi.

FOURTH SEMESTER

CORE 04: EXTENSION EDUCATION

THOERY **LECTURES 60**

Objectives:

- To enable the student to understand the meaning, principles, philosophy of Home Science Extension Education.
- To enable the student to know about different methods used in Extension Education.
- To enrich the Knowledge of the students about teaching learning process in Extension education.

UNIT -I

Extension Education-

- Definition needs and objectives.
- Principles of extension education.
- Behavioral changes brought about by extension education.

UNIT II

Role of Extension Education in Development –

- Role of Home Science & its inter relationship with Community Development.
- Role & qualities of Home Science extension workers.

UNIT III

Methods of teaching in Extension Education-

- Individual, group & mass methods. Individual Methods: Farm and Home Visits, Office Calls, Telephone Calls, Personal letters.
- Group Methods: Method Demonstration, Result Demonstration. Group Discussion, Field Trips, Lecture, Seminars and Workshop

- Mass Methods: Leaflets, Circular Letter, Radio, T.V. Bulletins, News Articles, Their advantages & disadvantages.

UNIT IV

Teaching-Learning process-

- Meaning, principles & steps in teaching learning process.
- Criteria for effective extension teaching. Elements of teaching and learning situation.
- Criteria for effective learning. Principles of learning. Factors affecting learning.

Core paper III: Practical

Practical: 25 Marks

- Prepare posters: women empowerment, violence against women, child & maternal health issues, environmental pollution.
- Prepare a project report within one thousand words on any one of the above issues.

Text Book:

- 1.Education and communication for development – O.P. Dahama and O.P. Bhatnagar.
- 2.Extension Education and Communication–V.K. Dubey and Indira Bishnoi

Reference Books:

- Extension communication and management – G.L. Ray.
- Extension Techniques for Rural Management - C. Satapathy & Sabita Mishra.
- Extension Education – A. Reddy

FIFTH SEMESTER

DISPLIINE SPECIFIC ELECTIVE (DSE)

DSE1`: INDIAN TEXTILES HERITAGE

(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES: 60**

Objectives

- To study about different traditional textile and crafts of India

- To know the care and storage techniques of different traditional textile.
- To study the socio- economic significance of traditional textile and its popularity in modern India.

Unit I: Study of Textile Crafts of India: with reference to history, production centers, techniques, designs, colours and products

Woven Textiles -Benaras Brocades, Jamdanis and Baluchars of Bengal, Kani Shawls of Kashmir.

Unit II: Study of Textile Crafts of India: with reference to history, production centers, techniques, designs, colours and products

Embroidered Textiles-Kanthas of Bengal, Kasuti of Karnataka, Phulkari of Punjab, Chikankari of Uttar Pradesh, Kashida of Kashmir, Gujarat embroideries.

Unit III: Study of Textile Crafts of India: with reference to history, production centers, techniques, designs, colours and products

- Painted and Printed textiles –Kalamkaris of Andhra Pradesh, Dabu printing of Rajasthan, Ajarakh prints of Gujarat
- Dyed textiles –Bandhnis of Rajasthan and Gujarat, Ikats- Patola of Gujarat.
- Bandhas of Orissa

Unit IV. Conservation of Traditional Textile

- Evolution and Socio- economic significance of Khadi, Handloom and Handicraft sector
- Sustenance of Traditional textile crafts

PRACTICAL

4. Traditional Embroideries
5. Tie and dye
   Batik
   Block Printing
   Stenciling
6. Visit to craft Centers.

Recommended Readings.

Text Book:

- Chattopadhaya K.D. 1995, Handicrafts of India, Wiley Eastern Limited Delhi

Reference Book:

- Agrawal O.P. 1977 Care and Presentation of Museum Projects –II NRL

Das Shukla, Fabric Art- Heritage of India, AbhinavPublicatons N.Delhi

SIXTH SEMESTER

DSE-02 : PUBLIC NUTRITION

(CREDITS: THEORY-4, PRACTICAL-2)

THEORY **LECTURES:60**

- **Objectives:** To understand the importance of public health nutrition and its role
- To gain knowledge on different ongoing nutrition programmes.
- To study the different methods for assessment of nutritional status.

Unit 1 Concept and scope of public nutrition

- Definition, Concept and Scope of public health nutrition
- Objectives principles and scope of nutrition and health education and its promotion
- Role of Public nutritionist

Unit II: Nutritional problems and their implications

- Etiology, prevalence, clinical features and preventive strategies of Under nutrition -
- Protein energy malnutrition, nutritional anaemias, vitamin A deficiency, iodine deficiency disorders.
- Over nutrition- obesity, coronary heart disease, diabetes.
- Fluorosis

Unit III: Assessment of nutritional Status

- Objectives and importance
- Methods of Assessment

C. Direct- Clinical signs, nutritional anthropometry, biophysical tests.

D. Indirect- Diet Surveys, Statistics.

Unit IV -International and National Nutrition Policy and Programmes:

- **I**nternational Agencies and their functions – World Health Organization (WHO),

Food and Agriculture Organization (FAO), United Nations International Children's Emergency Fund (UNICEF), Cooperatives for Assistance &Relief Everywhere (CARE).

- National Agencies and their functions , Indian Council of Agriculture (ICAR), Indian Council of Medical Research (ICMR), National Institute of Nutrition (NIN). National Institute of Public cooperation &child development(NIPCCD)

PRACTICAL

2. Assessment of nutritional status:
- Anthropometry- weight and height measurements
- Plotting and interpretation of growth charts for children below 5years

2. Identification of clinical signs of common nutritional disorders.
3. Dietary assessment- FFQ and 24hour diet recall

RECOMMENDED READINGS

Text Book:

- Park K (2011) Park's Text book or Preventive and Social Medicine, 21st Edition, M/S BanarasidasBhanot Publisher, Jabalpur, India
- Bamji MS Krishnaswamy K and Brahman GNC (Eds) (2009), Text Book of Human Nutrition 3rd Edition, Oxford and IBH Publishing Co Pvt Ltd New Delhi,

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Reference Book:

Wadhwa, A and Sharma, S (2003) Nutrition in community – A Text book, Elite Publishing House Pvt. Ltd New Delhi

Park,S K (2011) Park's Text book or Preventive and Social Medicine, 21st Edition, M/S Banarasidas Bhanot Publisher, Jabalpur, India

Bamji MS Krishnaswamy K and Brahman GNC (Eds) (2009), Text Book of Human Nutrition 3rd Edition, Oxford and IBH Publishing Co Pvt Ltd New Delhi,

Jeliffe, D.B, Jeliffe, ERP, Zarfar A and Neumanan, CG(1989) Community Nutritional Assessment with special reference to less technically developed countries, Oxford University Press Oxford.

World Heath Organization (2006) WHO Child growth Standards. Methods and development, length/height for age, weight of age, weight-for length , weight for height and body mass index for age (http:// who.int/child growth/standars/en/)

GENERIC ELECTIVES (GE)

GE 1: HUMAN NUTRITION
(CREDITS: THEORY 6)

THEORY **LECTURES:60**

Objectives

- To understand the relationship between food, nutrition and health.
- To understand the importance of food and nutrition in different life stages.

Unit-1 : Basic Concepts in Nutrition

- Basics terms used in nutrition
- Understanding relationship between food, nutrition and health
- Functions of Food- Physiological, psychological and social
- Basic food groups and concept and balanced diet.

Unit II: Nutrients

- Functions, Recommended Dietary, Allowances, dietary sources, effect of deficiency and or excess consumption on health of the following nutrients.
- Carbohydrates and dietary fiber
- Lipids
- Proteins
- Fat soluble vitamins- A,D,E, and K
- Water soluble vitamins- Thiamin, Riboflavin, Niacin, Pyridoxine, Folate, Vitamin B 12 and Vitamin C
- Minerals- Calcium, Iron, Zinc and lodine

Unit III: Nutrition during lifecycle

Physiological considerations and nutritional concerns for following life stages.

- Adult Man/ Woman
- Preschool children
- Adolescent Children
- Pregnant Woman

Nursing Woman and infant

RECOMMEDNED READINGS

Text Book:

- Srilakshmi B (2012) Nutrtion Science 4th Revised Edition, New Age International Publishers.

Reference Book:

- Wardlaw and Insle, MG, Insel PM (2004), Perspectives in Nutrition, Six Edition, McGraw Hill
- Khann K. Gupta, S. Seth R. Passi, SJ, Mahna, R. Puri S (2013) Textbook of Nutrition and Dietetics, Phonenix Publishing House Pvt Ltd.
- ICMR (2010) Recommnded Dietary Allowances for Indias, Published by National Institute of Nutrition, Hyderabad

- Chadha R and Mathur P. cds (2015) Nutrition : A lifecycle Approach, Orient Blackwan, New Delhi.

SKILL ENHANCEMENT COURSES (SEC)

THIRD SEMESTER

SEC-A : HOME BASED CATERING

(CREDITS: THEORY 2)

THEORY **LECTURES:60**

Objectives:

- To know different type food service unit.
- To study the different-step towards planning and execution of food service un

Unit I: Introduction to food service

- factors contributing to the growth of food service industry

- kinds of food service establishments

Unit II: Food production

- Menu planning importance of menu, factors affecting menu planning, menu planning for different kinds of food service units
- Food purchase and storage
- Quantity food production: Standardization of recipes, quantity food preparation techniques, recipe adjustments and portion control
- Hygiene and sanitation

Unit III: Resources

- Money
- Manpower
- Time
- Facilities and equipment
- Utilities

Unit IV: Planning of A food service Unit

- Preliminary planning - Survey of types of units, identifying clientele, menu, operations and delivery

RECOMMENDED READINGS:

Text Book:

- SethiMohini (2005) institution food management New age international publishers.

Reference Book:

- West B Besie& Wood Levelle (1988) Food service in institutions 6th Edition revised By Hargar FV, Shuggart & Palgne Palacio June, Macmillian publishing company.
- Knight J.B & Kotschevar LH (2000) quantity food production planning & management 3rd edition John Wiley & Sons.
- Philip E Thangam (2008) Modern Cookery for teaching and Trade Part I & II orient Longman.
- Taneja S and Gupta SL (2001) Enterpreneurship development, Galgotia publishing.

FOURTH SEMESTER

SEC-B: MATERNAL AND CHILD NUTRITION

(CREDIT: THEORY 2)

THEORY **LECTURERS: 30**

Objectives:

- To improve utilization of community based health and nutrition for pregnant women and children.
- To improve the health status of mother and child.

Unit-I

- Nutritional needs during pregnancy, common disorder of pregnancy (Anaemia, HIV infection, pregnancy induced hypertension), relationship between maternal diet and birth outcome.
- Maternal health and nutritional status, maternal mortality and issue relating to maternal health.

Unit-II

- Nutritional needs of nursing mothers and infants determinants of birth weight and consequences of low birth weight, breastfeeding support and counseling.

Unit-III

- Infant and young child feeding and care- current feeding practices and nutritional concerns, guidelines for infant and young child feeding, Breast feeding, weaning and complementary feeding.
- Assessment and management of moderate and severe malnutrition among children, Micronutrient malnutrition among preschool children.
- Child health and morbidity, neonatal, infant and child mortality, IMR and U5MR, link between mortality and malnutrition.

Unit-IV

- Overview of maternal and child nutrition policies and programmes.

RECOMMENDED READINGS

Text Book:

- Park, (2011). Park's textbook of preventive and social medicine, 21st edition M/s Banarasidas Bhanot publishers, Jabalpur, India.

Reference Book:

- Wadhwa, A. and Sharma, S. (2003) . Nutrition in the community- A Textbook. Elite publishing house Pvt Ltd New Delhi.
- Bamji, M.S, Krishnaswamy, K and Brahman, GNV (Eds) (2009). Textbook of human nutrition 3rd edition. Oxford and IBH publishing Co. Pvt Ltd, New Delhi.
- National guidelines on infant and young child feeding (2006). Ministry of women and child development, Government of India.

FIFTH SEMESTER

SEC – C: SELF DEVELOPMENT AND WELL-BEING

(CREDITS: PRACTICAL -6)

PRACTICAL

1. Understanding the self – Theatre approach

2. Interview of two adolescents – 1 male, 1 female, about his/ her sense of self

3. An exercise In self-reflection from early childhood to adolescence

4. Case profile of an adolescent

5. Workshop on self – development

6. Analyzing images in media to understand the self

7. Organize small group discussions to arrive at indicators of self of well- being

8. Learning about assessment of well-being using a standardized test

RECOMMENDED READINGS

- Kakar, S. (1978). The inner world. Delhi: Oxford University Press
- Kakar, S. and Kakar, K (2007). The Indian: The portraiys of a people. London: Penguin/Viking.
- Rice, F.P. (2007). Adolescent: Development, Relationship and Culture.
- Santrock, J. (2010). Life Span Development: A Tropical Approach, New Delhi:Tata McGraw Hill.

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN ENGLISH

(Bachelor of Arts Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course structure of UG English Honours

Semester	Course	Course Name	Credits	Total marks
I	AEC-I	AEC-I	04	100
	C-I	British Poetry and Drama: 14th to 17th Centuries	06	100
	C-II	British Poetry and Drama: 17th and 18th Century	06	100
	GE-I	Academic Writing and Composition	06	100
			22	
II	AEC-II	AEC-II	04	100
	C-III	British Prose: 18th Century	06	100
	C-IV	Indian Writing in English	06	100
	GE-II	Gender and Human Rights	06	100
			22	
III	C-V	British Romantic Literature	06	100
	C-VI	British Literature 19th Century	06	100
	C-VII	British Literature: Early 20th Century	06	100
	GE-III	Nation, Culture, India	06	100

	SEC-I	SEC-I	04	100
			28	
IV	C-VIII	American Literature	06	100
	C-IX	European Classical Literature	06	100
	C-X	Women's Writing	06	100
	GE-IV	Language and Linguistics	06	100
	SEC-II	SEC-II	04	100
			28	

Semester	Course	Course Name	Credits	Total marks
V	C-XI	Modern European Drama	06	100
	C-XII	Indian Classical Literature	06	100
	DSE-I	Literary Theory	06	100
	DSE-II	World Literature	06	100
			24	
VI	C-XIII	Postcolonial Literatures	06	100
	C-XIV	Popular Literature	06	100

	DSE-III	Partition Literature	06	100
	DSE-IV	Writing for Mass Media	06	100
	OR			
	DSE-IV	Dissertation	06	100*
			24	

ENGLISH

HONOURS PAPERS:

Core Course -14 papers
Discipline Specific Elective - 4 papers (3 + 1 paper or Project)
Generic Elective for Non English students - 4 Papers. In case the University offers 2 subjects with two papers each in GE, then papers 1 and 2 will be the GE paper

Marks per paper – Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Project (Hard Copy-80, Presentation-20)

Core Paper I

BRITISH POETRY AND DRAMA: 14TH TO 17TH CENTURIES

Introduction:
The paper seeks to introduce the students to British poetry and drama from the 14th to the 17th century. It helps students sample and explore certain seminal texts from the early modern period, covering the genesis of modern English poetry and the Renaissance that set British poetry and drama on their glorious course to greatness.

UNIT 1: Historical overview

(i) The period is remarkable in many ways: 14th century poetry evokes an unmistakable sense of "modern" and the spirit of Renaissance is marked in the Elizabethan Drama. The Reformation brings about sweeping changes in religion and politics. A period of expansion of horizons: intellectual and geographical.

UNIT 2: Geoffrey Chaucer

(i) *The Pardoner's Tale*

UNIT 3: Spenser: "Sonnet 34 (Amoretti)"

(i) Shakespeare: 'That time of the year…" (Sonnet 73)
(ii) Ben Jonson: "Song to Celia"
(iii)John Donne: "Sunne Rising"

UNIT 4: Shakespeare

(i) *Macbeth*

Text Books

- Texts as prescribed in Units 2,3,4

Reference Books

- *The Pelican Guide to English Literature*. Ed. Boris Ford. Vol 1
- *The Age of Chaucer English Literature in Context*. Paul Poplawski. Cambridge UP, 2008
- *Routledge History of Literature in English.* Ronald Carter & John Mc Rae. London: Routledge, 1997
- *Shakespeare for Beginners* by Brandon Toropov
- *English Literature* by Jonathan Bate (Ch. 7 "Shakespeare and the Dramatic Literature")

Core Paper II

BRITISH POETRY AND DRAMA: 17TH AND 18TH CENTURY

Introduction:

The Introduction of this paper is to acquaint students with the Jacobean and the 18th century British poetry and drama, the first a period of the acid satire and the comedy of humours, and the second a period of supreme satiric poetry and the comedy of manners.

UNIT 1: Historical overview

(i) 17th C: Period of the English Revolution (1640–60); the Jacobean period; metaphysical poetry; cavalier poetry; comedy of humors; masques and beast fables

(ii) 18th C: Puritanism; Restoration; Neoclassicism; Heroic poetry; Restoration comedy; Comedy of manners

UNIT 2: Milton: "Lycidas"

(i)Andrew Marvell: 'To His Coy Mistress"
(ii) Alexander Pope: "Ode On Solitude"
(iii)Aphra Behn: "I Led my Silvia to a Grove"
(iv)Robert Herrick: "His Return to London"

UNIT 3: Ben Jonson

(i) *Volpone*

UNIT 4: Dryden

(i) *All For Love*

Text Books

- Texts prescribed in units 2, 3, 4 (All the texts are freely available on the sites such as www.poetryfoundation.org, www.bartleby.com, http://www.poemhunter.com etc. In addition, the following anthologies may be consulted.)

Reference Books

- *Routledge History of Literature in English.* Ronald Carter & John Mc Rae. London:

Routledge, 1997
- Black, Joseph (Ed). : *The Broadview Anthology of British Literature* Concise Edition, Vol. A. Broadview Press, London, 2007.
- Corns, T N(ed.) *The Cambridge Companion to English Poetry*. Cambridge: University Press, 1973
- Ford, Boris ed. *The Pelican Guide to English* Literature. Vol 3. From *Donne to Marvell* in. Harmondsworth: Penguin Books, 1976.
- Parry, G.: *The Seventeenth Century: The Intellectual and Cultural Context of English Literature*. Harlow: Longman, 1989.
- Sherwood, T. G: *Fulfilling the Circle: A Study of John Donne's Thought*, Toronto, Toronto Press, 1984.

Core Paper III

BRITISH PROSE: 18TH CENTURY

Introduction:
The Introduction of the paper is to acquaint the students with a remarkable, newly evolved form of literature: the essay. The period is also known for its shift of emphasis from reason to emotion

UNIT 1: Historical overview: Restoration, Glorious Revolution, Neo-classicism, And Enlightenment.

UNIT 2: Mary Wollstonecraft

(i) "The Rights and Involved Duties of Mankind Considered" (Chapter 1, *A Vindication of the Rights of Women*)

UNIT 3: Joseph Addison: Essays

(i) "Friendship," "Good Nature," "Six Papers on Wit"

(From *Joseph Addison: Essays and Tales*, <http://www.biblioteca.org.ar/libros/167707.pdf>)

UNIT 4: Samuel Johnson

(i) "Narratives of Travellers Considered," and "Obstructions of Learning"

from *Samuel Johnson's Essays* < http://www.johnsonessays.com/>

Text Books

- Texts prescribed in Units 2, 3, 4. Web sources are indicated against the texts in brackets.

Reference Books

- *Routledge History of Literature in English.* Ronald Carter & John Mc Rae. London: Routledge, 1997

- Norton Anthology of English Literature. Vol 2 (Head notes on the periods and authors featured in the paper)
- *English Literature* by Jonathan Bate (Ch. 4 "The Study of English")
- *Pelican Guide to English Literature*. Ed. Boris Ford. Vol 4. *From Dryden to Johnson*
  O.M. Myres, "Introduction" to *The Coverley Papers*

Core Paper IV

INDIAN WRITING IN ENGLISH

Introduction:
Indian writing in English has been the fastest growing branch of Indian literature in the last one hundred years. It has produced a rich and vibrant body of writing spanning all genres. As a 'twice born' form of writing, it partakes of both the indigenous and the foreign perspectives and has an inherent tendency to be postcolonial. This paper seeks to introduce the students to the field through a selection of representative poems, novel and play.

UNIT 1: Historical overview

(i) Indian writing in English, the key points of which are East India Company's arrival in India, Macaulay's 1835 Minutes of Education, India's first war of independence and the establishment of colleges to promote Western education and the evolution of Indian writing in English in 20th century.

UNIT 2:

(i) Sarojini Naidu "The Bangle Sellers",
(ii) A.K.Ramanujan "Obituary",
(iii)Jayanta Mahapatra "Grandfather",
(iv)Nissim Ezekiel "Night of the Scorpion"

UNIT 3: R.K Narayan

(i) *The Guide*

UNIT 4: Mahesh Dattani

(i) *Final Solutions*

Text Books

- Texts prescribed in Units 2, 3, 4.

Reference Books

- Mehrotra, Arvind Krishna. *Concise History of Indian Literature in English*, Permanent Black, 2010.
- K. Srinivas Ayenger. *A History of Indian Writing in English*
- M.K. Naik. *History of Indian Writing in English*
- Vinay Dharwadker. "The Historical Formation of Indian English Literatrue" in Sheldon Pollock (ed) *Literary Cultures in History*
- *Modern Indian Drama: Issues and Interventions* (ed) Lakshmi Subramanyam

Core Paper V

BRITISH ROMANTIC LITERATURE

Introduction:

The paper aims at acquainting the students with the Romantic period and some of its representative writers. The students will be able to sample some seminal works of the Romantic age which gave expression to the key ideas of the period such as return to nature, subjectivity, desire for personal freedom and the defiance of classicism-imposed restrictions on poetic form.

UNIT 1: Historical overview

(i) The period otherwise known as The Romantic Revival; The Age of Revolution as it owes its origin to the epoch making French Revolution of 1789. The emphasis on the organic relationship between man and Nature, individual liberty and unbridled desire free from the shackles of classicism made this period unique—Romanticism vs Classicism

UNIT 2:

(i) Thomas Gray: "Elegy Written in a Country Churchyard,"
(ii) William Blake: "A Poison Tree" and "Chimney Sweeper"

UNIT 3:

(i) William Wordsworth's "Tintern Abbey"
(ii) S. T. Coleridge: "Kubla Khan,"
(iii)John Keats: "Ode to a Nightingale,"
(iv)P. B. Shelley: "Ode to the West Wind,"

UNIT 4:

(i) William Wordsworth's *Preface* to the 2nd edition of *Lyrical Ballads*

Text Books

- Texts prescribed in Units 2, 3, 4

Reference Books

- Paul Poplawski, *English Literature in Context*, "The Romantic Period"
- *Routledge History of Literature in English.* Ronald Carter & John Mc Rae. London: Routledge, 1997
- Norton Anthology of English Literature. Vol 2 (Head notes on the periods and authors featured in the paper)
- *Pelican Guide to English Literature*. *Vol 5*. *From Blake to Byron*. Ed. Boris Ford
- Maurice Bowra, *The Romantic Imagination*
- *English Literature*. Jonathan Bate (Ch. 5 "Periods and Movements")

Core Paper VI

BRITISH LITERATURE 19TH CENTURY

Introduction:

This paper seeks to introduce the students to the exploits of the 19th century British Literature in prose, especially fiction and cultural criticism. It also includes samples of Victorian poetry.

UNIT 1: Historical overview

(i) The 19th century British literature though mainly famous for the Romantic Movement, was also a witness to major socio-political developments like industrialization, technological advancements and large scale mobilization of people from the rural to the urban centers.

UNIT 2: Poetry

(i) Tennyson; "Break, Break, Break", Robert Browning, "My Last Duchess"
(ii) Criticism: Matthew Arnold: "The Study of Poetry"

UNIT 3: Jane Austen

(i) *Pride and Prejudice*

UNIT 4: Charles Dickens

(i) *Hard Times*

Text Books:

- Texts prescribed in Units 2, 3, 4

Reference Books:

- *English Literature in Context*. Paul Poplawski. Cambridge UP, 2008
- *Routledge History of Literature in English.* Ronald Carter & John Mc Rae. London: Routledge, 1997
- Norton Anthology of English Literature. Vol 2 (Head notes on the periods and authors featured in the paper)
- *English Literature*. Jonathan Bate (Ch. 4 "The Study of English", Ch. 5 "Periods and Movements")
- Terry Eagleton, *The English Novel*

Core Paper VII

BRITISH LITERATURE: EARLY 20TH CENTURY

Introduction:
The paper aims at acquainting the students with the literature of Britain in the early 20th century, focusing on the modernist canon in poetry, novel, and literary criticism.

UNIT 1: **Historical overview**

(i) Developments in society and economy, leading to a crisis in western society known as the First World War and the resultant change in the ways of knowing and perceiving. Marx's concept of class struggle, Freud's theory of the unconscious are to be discussed.

UNIT 2: Poetry

(i) T.S. Eliot "Love Song of J. Alfred Prufrock",
(ii) Yeats: "Second Coming",
(iii) Wilfred Owen: "Strange Meeting",
(iv) Siegfried Sassoon, "Suicide in the Trenches"
(v) Criticism: T.S. Eliot: "Tradition and the Individual Talent"

UNIT 3:

(i) Virginia Woolf: *Mrs. Dalloway*

UNIT 4:

(i) J M Synge *Ryders to the Sea*

Text Books

- Texts prescribed in Units 2, 3, 4

Reference Books:

- *Pelican Guide to English Literature*: *Vol. 7. The Modern Age* (ed.) Boris Ford

- *Routledge History of Literature in English*. Ronald Carter & John Mc Rae. London: Routledge, 1997
- *English Literature*. Jonathan Bate (Ch. 5 "Periods and Movements")
- *Modernism*. Critical Idiom. By Peter Faulkner
- *Modernism*. New Critical Idiom. By Peter Childs
-

Core Paper VIII

AMERICAN LITERATURE

Introduction:
This is a survey paper providing an overview of canonical authors from American Literature in the established genres.

UNIT 1: **Historical overview**

(i) Genesis and evolution, and the defining myths of American Literature—city on a hill, the frontier spirit, the American Dream, manifest destiny, *epluribusunum*

UNIT 2:

(i) Walt Whitman: "Out of the Cradle Endlessly Rocking",
(ii) Robert Frost: "Stopping by the Woods in a Snowy Evening",
(iii) Emily Dickinson: "Because I could not stop for death"
(iv) Maya Angelou: "I Know Why the Caged Birds Sing"

UNIT 3:

(i) Arthur Miller: *The Death of a Salesman*

UNIT 4:

(i) Ernest Hemingway: *A Farewell to Arms*

Text Books

- Texts prescribed in Units 2, 3, 4 (All texts are available on the Internet.)

Reference Books:

- *Pelican Guide to English Literature*. Vol. 9. *American Literature*. Ed. Boris Ford
- *Highlights of American Literature*. Dr. Carl Bode (USIS)
- *A Short History of American Literature*, Krishna Sen and Ashok Sengupta. Orient BlackSwan, 2017
- *The Story of American Literature*. By Ludwig Lewisohn
- *Norton Anthology of American Literature*. (Head notes on authors and periods to be read)

Core Paper IX

EUROPEAN CLASSICAL LITERATURE

Introduction:
This paper seeks to introduce the students to European Classical literature, commonly considered to have begun in the 8th century BC in ancient Greece and continued until the decline of the Roman Empire in the 5th century AD. The paper seeks to acquaint the students with the founding texts of the European canon.

UNIT 1: Historical Review

(i) Classical Antiquity: ancient Greece, the rise and decline of the Roman Empire; Geographical space: cultural history of the Greco-Roman world centered on the Mediterranean Sea

UNIT 2: Epic poetry

(i) Homer: *Odyssey* (Book I)

UNIT 3: Tragedy:

(i) Sophocles: *Oedipus the King*

UNIT 4: Criticism:

(i) Aristotle: *Poetics* (Chapters: 6,7,8)

Text Books

- Texts prescribed in Units 2, 3, 4(All texts are available for free access on Project Gutenberg https://www.gutenberg.org/)

Reference Books:

- H.D.F. Kitto, *Form and Meaning in Greek Drama*
- H.D.F. Kitto, *The Greeks*
- Eric Auerbach, *Mimesis*: *The Representation of Reality in Western Literature*
- Gilbert Murray*, A History of Ancient Greek Literature*, Andesite Press, 2017.
- *Classicism*: *A Very Short Introduction* OUP

Core Paper X

WOMEN'S WRITING

Introduction:

The paper seeks to acquaint the students with the works of women writers from different

cultures and nations in various genres. Further, it seeks to make them critically aware of the issues relating to the workings of patriarchy, issues of gender, and relations of desire and power.

UNIT 1: Virginia Woolf

(i) "Chapter 1" from *A Room of One's Own*

UNIT 2: Charlotte Bronte

(i) *Jane Eyre*

UNIT 3:

(i) Kamala Das, 'An Introduction', 'The Sunshine Cat'
(ii) Sylvia Plath, 'Mirror', 'Barren Woman'
(iii)Eunice de Souza, 'Women in Dutch Painting', 'Remember Medusa'
(iv)Shanta Acharya, 'Homecoming', 'Shringara'

UNIT 4:

(i) Ashapurna Devi, *The Distant Window*

Text Books

- Texts prescribed in Units 1, 2, 3, 4

Reference Books:

- Toril Moi, *Sexual/Textual Politics*
- Elaine Showalter, *A Literature of Their Own*
- Sandra Gilbert and Susan Guber, *The Mad Woman in the Attic*
- *The Distant Window,* Prachi Prakashan, Tr. Anima Bose, 1997
- Helen Carr, 'A History of Women's Writing' in *A History of Feminist Literary Criticism* by Gill Plain and Susan Sellers
- Mary Eagleton, 'Literary Representations of Women' in *A History of Feminist Literary Criticism* by Gill Plain and Susan Sellers

Core Paper XI

MODERN EUROPEAN DRAMA

Introduction:
The aim of this paper is to introduce the students to the best of experimental and innovative dramatic literature of modern Europe.

UNIT 1: Historical Review

(i) Politics, social change and the stage; text and performance; European Drama: Realism and Beyond; Tragedy and Heroism in Modern European Drama; The Theatre of the Absurd

UNIT 2: Henrik Ibsen

(i) *Ghosts*

UNIT 3: Eugene Ionesco

(i) *Chairs*

UNIT 4: Bertolt Brecht

(i) *Life of Galileo*

Text Books

- Texts prescribed in Units 1, 2, 3, 4

Web Resources

- Ionesco: http://www.kkoworld.com/kitablar/ejen-ionesko-kergedan-eng.pdf
- Ibsen: http://www.gutenberg.org/files/8121/8121-h/8121-h.htm

Reference Books:

- Constantin Stanislavski, *An Actor Prepares*, Chap. 8,
- 'Faith and the Sense of Truth', tr. Elizabeth Reynolds Hapgood (Harmondsworth: Penguin, 1967) sections 1,2, 7,8,9, pp. 121-5, 137-46.
- Bertolt Brecht, 'The Street Scene', 'Theatre for Pleasure or Theatre for Instruction', and 'Dramatic Theatre vs Epic Theatre', in *Brecht on Theatre:The Development of an Aesthetic*, ed. And tr. John Willet (London: Methuen, 1992) pp.68-76, 121-8.
- George Steiner, 'On Modern Tragedy', in *The Death of Tragedy* (London: Faber, 1995) pp. 303-24.
- Raymond Williams, *Drama from Ibsen to Brecht*
- Jean Genet, Reflections on Theatre (London:Faber & Faber) Chapter 2: "The Strange World Urb…" pp. 63-74.
- *Theatre of Absurd*. Martin Esslin

Core Paper XII

INDIAN CLASSICAL LITERATURE
(Training of teachers essential for teaching this course)

Introduction:

This paper seeks to create awareness among the students of the rich and diverse literary and aesthetic culture of ancient India.

UNIT 1: Introduction to the history and genesis of Indian Classical Literature

UNIT 2: Sanskrit Drama –1

(i) Kalidasa, *Abhijnanasakuntalam*, Act IV, tr. M.R Kale, Motilal Banarasi Dass, New Delhi

UNIT 3: Sanskrit Drama-2

(i) *Mrcchakatika* by Sudraka, Act I, tr. M.M. Ramachandra Kale (New Delhi: Motilal Banarasidass, 1962)

UNIT 4: Aesthetics and Maxims

(i) Bharata's *Natyasastra*, Chapter VI on Rasa theory

Text Books

- Texts prescribed in units II,III, IV

Reference Books:

- Kalidasa. Critical Edition. Sahitya Akademi
- Bharata's Natyashastra. English Translation by M.M. Ghosh. Vol 1. 2nd edition. Asiatic Society, Kolkata, 1950. Ch. 6 "Sentiments". Pp. 158-95
- J.A.B. Van Buitenen, "Dharma and Moksa" in Roy W. Perrett. Ed. *Indian Philosophy*. Vol 5, *Theory of Value*: *A Collection of Readings*. New York: Garland, 2000. Pp. 33-40
- Vinay Dharwadkar, "Orientalism and the Study of Indian Literature", Orientalism and the Postcolonial Predicament: Perspectives on South Asia. Ed. Carol A. Breckenridge and Peter Van der Veer. New Delhi: OUP, 1994. Pp. 158-95
- Haldhar Panda, *Universals of Poetics*

Core Paper XIII

POSTCOLONIAL LITERATURES

Introduction:

This paper seeks to introduce the students to postcolonial literature —a body of literature that responds to European colonialism and empire in Asia, Africa, Middle East, the Pacific and elsewhere. The paper aims to provide the students with the opportunity to think through the layered response – compliance, resistance, mimicry, subversion – that is involved in the production of post-independence literature

UNIT 1:

(i) Postcolonialism: Elleke Boehmer (From *Literary Theory and Criticism* Ed. Patricia Waugh)
(a) The post in Postcolonial,
(b) Movements and theories against Empire
(c) Leading Postcolonial Thinkers (Frantz Fanon, Edward Said, Gayatri Spivak, Homi Bhabha)

UNIT 2: Raja Rao
(i) *Kanthapura*

UNIT 3: Jean Rhys
(i) *Wide Sargasso Sea*

UNIT 4: Athol Fugard
(i) *Blood Knot*

Text Books
- Texts prescribed in Units 1, 2, 3, 4

Reference Books:
- Chinua Achebe: "English and the African Writer" (Available online)
- Ngugi wa Thiong'o: "The Quest for Relevance" from *Decolonizing the Mind: The Politics of Language in African Literature*
- Leela Gandhi, *Postcolonial Theory: An Introduction*. OUP, 1998.
- Bill Ashcroft, Gareth Griffin, Helen Tiffin, *The Empire Writes Back*: *Theory and Practice of Post-Colonial Literature*.
- Edward Said. *Orientalism*.

Core Paper XIV

POPULAR LITERATURE

Introduction:
This paper seeks to introduce the students to genres such as children's literature, detective fiction and campus fiction, which have a "mass" appeal, and can help us gain a better understanding of the popular and folk roots of literature.

UNIT 1: Introduction to the concept
(i) What is popular literature?
(ii) Debate between popular and high cultures ('high brow' v/s 'low brow')
(iii) What is Genre fiction?
(iv) Debate between genre fiction and literary fiction

Essays for discussion:

- Lev Grossman: "Literary Revolution in the Supermarket Aisle: Genre Fiction is Disruptive Technology" http://entertainment.time.com/2012/05/23/genre-fiction-is-disruptive-technology/
- Arthur Krystal: "Easy Writers: Guilty pleasures without guilt" http://www.newyorker.com/magazine/2012/05/28/easy-writers
- Joshua Rothman: "A Better Way to Think About the Genre Debate" http://www.newyorker.com/books/joshua-rothman/better-way-think-genre-debate
- Stephen Marche: How Genre Fiction Became More Important than Literary Fiction" http://www.esquire.com/entertainment/books/a33599/genre-fiction-vs-literary-fiction/

UNIT 2: Children's Literature

(i) Lewis Caroll: *Alice in Wonderland*

UNIT 3: Detective Fiction

(i) Arthur Conan Doyle: *The Hound of the Baskervilles*

UNIT 4: Campus Fiction

(i) Chetan Bhagat: *Five Point Someone*

Text Books

- Essays given for discussion under unit I and Texts prescribed in Units 2, 3, 4

Reference Books

- Leslie Fiedler, "*Towards a Definition of Popular Literature"* in *Super Culture: American Popular Culture and Europe.* Ed. C.W.E. Bigsby. pp. 29-38
- Leo Lowenthal, *Literature, Popular Culture and Society*
- Felicity Hughes, "Children's Literature: Theory and Practice" in *English Literary History*. Vol. 45, 1978. pp. 542-61.
- Raymond Chandler, "The Simple Art of Murder", Atlantic Monthly. Dec. 1944 (available at <http://www.en.utexas.edu/amlitprivate/scans/chandlerart.html>
- *Popular Fiction: Essays in Literature and History* by Peter Humm, Paul Stigant, Peter Widdowson
- Sumathi Ramaswamy, "Introduction", in Beyond Appearances?: Visual Practices and Ideologies in Modern India. Pp.xiii-xxix

Discipline Specific Elective Paper-I

LITERARY THEORY

Introduction:
This paper seeks to expose the students to the basic premises and issues of major theoretical approaches to literary texts.

UNIT 1:
(i) New Criticism ("Language of Paradox" by Cleanth Brooks)

UNIT 2:
(i) Marxist Criticism (Terry Eagleton: "Literature and Ideology" from *Marxism and Literary Criticism*

UNIT 3:
(i) Feminist Criticism (*Second Sex*, Vol 1 Introduction "Facts and Myths")

UNIT 4:
(i) Structuralism ("The Nature of Linguistic Sign" by Saussure)

Text Books
- Texts prescribed in Units 1, 2, 3, 4

Reference Books
- Peter Barry, *Beginning Theory*
- Terry Eagleton, *Literary Theory*
- David Lodge, ed. *Twentieth Century Criticism*
- David Lodge, ed. *Modern Criticism and Theory*: *A Reader*
- Jonathan Culler, "In Pursuit of Signs"
- Tony Bennett, *Formalism and Marxism* (New Accents)

Discipline Specific Elective Paper- II

WORLD LITERATURE

Introduction:

This paper proposes to introduce the students to the study of world literature through a representative selection of texts from around the world. The idea is to read beyond the classic European canon by including defining literary texts from other major regions/countries—except the United States of America—written in languages other than English, but made available to the readers in English translation.

UNIT 1: European

(i) Albert Camus: *The Outsider*

UNIT 2: Caribbean

(i) V S Naipaul: *A Bend in the River*

UNIT 3: Canadian Short Fiction

(i) Alice Munroe: "The Bear Came Over the Mountain", "Face"

UNIT 4: Latin American Poetry

(i) Pablo Neruda :"Tonight I can Write" and "Every day you play"

(ii) Octavio Paz: "Between going and staying the day wavers" and "Motion"

Text Books

- Texts prescribed in Units 1, 2, 3, 4

Web Resources:

- Alice Munro's short Stories http://www.newyorker.com/magazine/2013/10/21/the-bear-came-over-the-mountain-2, http://www.newyorker.com/magazine/2008/09/08/face
- Poems of Octavio Paz http://www.poetrysoup.com/famous/poems/best/octavio_paz

Reference Books:

- *Weltliteratur*: John Wolfgang von Goethe in *Essays on Art and Literature* Goethe : The Collected Works Vol.3
- Rabindranath Tagore "World Literature": *Selected Writings On Literature and Language: Rabindranath Tagore* Ed. Sisir Kumar Das and Sukanta Chaudhuri
- Goethe's "World Literature Paradigm and Contemporary Cultural Globalization" by John Pizer
  "Something Will Happen to You Who Read": Adrienne Rich, Eavan Boland' by Victor Luftig .JSTOR iv. *Comparative Literature* University of Oregon.
- "WLT and the Essay" *World Literature Today* Vol. 74, No. 3, 2000. JSTOR Irish University Review, Vol.23 Spring 1, Spring-Summer.
- What is world Literature? (Introduction) David Damrosch http://press.princeton.edu/chapters/i7545.html
- Tagore's comparative world literature

https://www.academia.edu/4630860/Rabindranath_Tagores_Comparative_World_Literature

Discipline Specific Elective Paper- III

PARTITION LITERATURE

Introduction:
This paper seeks to expose the students to some significant writings on Indian partition, which brought untold miseries to those who lost lives and homes. The issues of loss, trauma, communalism etc. are explored by the texts.

UNIT 1: Defining partition literature

(i) Ritu Menon and Kamla Bhasin, 'Introduction' from *Borders and Boundaries* (New Delhi: Kali for Women, 1998)

UNIT 2:

(i) W.H. Auden "Partition", Agha Shahid Ali, "Learning Urdu", "The Dawn of Freedom" Faiz Ahmad Faiz

UNIT 3: Bapsi Sidhwa

(i) *Ice-candy-man*

UNIT 4:

(i) Sadat Hassan Manto, 'Toba Tek Singh" (from *Mottled Dawn*, Penguin India)
(ii) Rajinder Singh Bedi, "Lajwanti"(Trans. Khushwant Singh)
(iii)Lalithambika Antharajanam, "A Leaf in the Storm"

Text Books

- Texts prescribed in Units 1, 2, 3, 4
- (*Mottled Dawn* for Manto and Bedi in Unit 4, Penguin India)
- *Borders and Boundaries*. New Delhi: Kali for Women, 1998

Reference Books:

- Sukrita P. Kumar, "Narrating Partition" (Delhi: Indialog, 2004)
- Urvashi Butalia, "The Other Side of Silence: Voices from the Partition of India" (Delhi: Kali for Women, 2000)

- Sigmund Freud, "Mourning and Melancholia" in *The Complete Psychological Works of Sigmund Freud*, tr. James Strachey (London: Hogarth Press, 1953) pp. 3041-53.

Discipline Specific Elective Paper- IV

WRITING FOR MASS MEDIA

UNIT 1:

(i) History of English in India, Brief history of Journalism in English in India , Status of English in India, Indian writers of English and their treatment of the English language a non-native variety

UNIT 2:

(i) Writing for the Print Media: News Stories, Features, Editorials

(The teacher is required to cite examples and use material from mass media)

UNIT 3:

(i) Writing for the Electronic Media

(ii) Advertisement caption writing and tag lines (print and electronic)

UNIT 4:

(i) Email, Blogs, Social networking

(ii) Internet Journalism

Reference Books

- Rangaswamy Parthasarathy, *Journalism in India: From the earliest times to the present day*, Sterling.
- S V Parasher, *Indian English: Functions and Form*, Bahri Publications.
- Stepehen McLaren, *Easy Writer*
- A R Parhi*, Indian English through Newspapers,* Concept Publications.
- G L Labru, Indian Newspaper English, B R Publishing House.
- Vinod Dubey, Newspaper English in India, Bahri Publications.
- Kachru, Braj: *from* Indianization of English
- Dutta and Parhi, 'Prospect of Electronic Media as Curriculum in Non-Native Contexts', I-Manager's *Journal on English Language Teaching.* (2014)
- Aijaz Ahmed: 'Disciplinary English: Third-Worldism and Literature'.
- Narasimhaih; C.D. (ed.):*Awakened Consciousness: Studies in Commonwealth Literature,* New Delhi: Sterling.

- Omkar N. Koul: *English in India: Theoretical and Applied Issues.* New Delhi: Creative Publishers.

DSE Paper – IV: Dissertation/ Research Project (College can give this choice only for students with above 60% aggregate marks)

DISSERTATION/ RESEARCH PROJECT

Introduction and Outcome

A project is an individual or collaborative activity that is carefully planned to achieve a particular aim.

An undergraduate project is individual research by students to i. understand in-depth a particular topic or fact in their field of study, and ii. Strengthen their understanding of research processes and methods.

Undergraduate research is inquiry-based learning that involves practical work, and not just listening to classroom teaching and personal reading. Students learn to apply what they study in their courses to appreciate different aspects of their field better by working independently on the projects. At the same time, they contribute something original to the courses they study.

An undergraduate research project is expected to explore specific topics within the field of study of the students. The project should make an original contribution to the discipline in some manner. The results of quality undergraduate research can be presented in seminars and conferences, and published in research journals dedicated specifically to such work or in traditional academic journals with the student as a co-author.

There are many benefits of undergraduate research including, but not limited to, real world applications, research and professional experience, and better relationships between faculty and students. Relating coursework to out-of-class experiences, students train to work and think independently, take responsibility for their own learning, and take initiative to solve problems on their own rather than relying on experts for answers. They also learn to work in collaboration in interdisciplinary research. Most of all, projects help students learn a variety of skill sets to make them confident and competent in their future career.

The research process

Typically, all research answer three questions: *what, why* and *how*.

The *what* states the research question to be investigated in a project.

The *why* explains the purpose of the research and also every step undertaken to conduct the research.

The *how* describes the stages of the research procedure.

To understand the process of research and to practically conduct any requires a good background in research methodology. Students may study research methodology before undertaking their projects.

Pattern of examination

Mid-semester assessment

Presentation of the project synopsis

Synopsis to include:

i. Research statement/question and its rationale
ii. Review of literature stating the validity of the project
iii. Discussion of the research steps
iv. Possible conclusion/s
v. Contribution of the project to the existing body of research
vi. References

Semester final examination

A project of at least 3000 words to be submitted in the following structure:

- Research question - a short statement
- Rationale of the research
- Introductions of the research
- Review of literature relating the reviews to the research question and the research Introductions
- Data collection and interpretation
- Discussion of the findings; conclusions drawn
- Contribution of the project to the existing body of research
- Directions for future research
- Works cited section

Reference Books

- John Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications. 2009
- K Samantray, *Academic and Research Writing*. Orient Blackswan. 2015
- Sword, H. *Stylish Academic Writing*. Harvard University Press. 2012

- Norman Denzin, *Sage Handbook of Qualitative Research.* Sage Publications. 2005
- Kothari & Garg, *Research Methodology.* New Age Publishers
- Deepak Chawla & Neena Sondhi. *Research methodology: Concepts & Cases.* Vikas Publishing

Generic Elective Paper I

ACADEMIC WRITING AND COMPOSITION

Introduction:
This paper seeks to train the students in the basic writing skills required for writing competently in the academic context.

UNIT 1:

(i) Introduction to the Writing Process: with a focus on Academic Writing

UNIT 2:

(i) Writing in one's own words: Summarizing and Paraphrasing

UNIT 3:

(i) Critical Thinking: Synthesis, Analysis, And Evaluation

UNIT 4:

(i) Citing Resources: Editing, Book and Media Review

Reference Books:

- Liz Hamp-Lyons and Ben Heasley, Study Writing: *A Course in Writing Skills for Academic Purposes* (Cambridge UP, 2006)
- Ilona Leki, *Academic Writing: Exploring Processes and Strategies*. New York: CUP, 2nd edn, 1998
- Stanley Fish, *How to Write a Sentence and How to Read One*. Harpar Perennial. 2011.
- *Literature and the art of Communication*, Cambridge University Press
- Gerald Graff and Cathy Birkenstein, *They Say/I Say: The Moves That Matter in Academic Writing*. New York: Norton, 2009

Generic Elective Paper II

GENDER AND HUMAN RIGHTS

(Faculty training needed)

Introduction:

This paper seeks to familiarize the students with issues of inequality, and oppression of caste, race and gender.

UNIT 1:

(i) Unit I and II of *Gender Sensitivity* (UNESCO Module 5)

UNIT 2:

(i) " Castes in India": Dr Babasaheb Ambedkar

UNIT 3:

(i) *We Should All Be Feminists* by Chimamanda Ngozi Adichie,

UNIT 4:

(i) *Sultana's Dream* (a novella): Rokeya Sakhawat Hossain

Text Books

- Texts prescribed in Unit I,II,III, IV

Reference Books:

- Babasaheb Ambedkar, *Writings and Speeches,* Vol 1, Complied by Vasant Moon. Ambedkar Foundation, 2014.
- Chimamanda Ngozi Adichi- *We Should All Be Feminists*. London: Fourth Estate, 2014.
- Rokeya Sakhawat Hossain - *Sultana's Dream*. Penguin Modern Classics, 2005.
  UNESCO- Gender Sensitivity, Zambia, 2000.
  http://www.unesco.org/education/mebam/module_5.pdf

Generic Elective Paper III

NATION, CULTURE, INDIA

Introduction:

This paper seeks to introduce students across disciplines to basic ideas about Indian cultural ethos mediated through literature.

UNIT 1:

(i) *An Autobiography* (*My Experiments With Truth*) - M.K. Gandhi. Part V, 'The First Experience' (Chapters I) to 'Face to Face with Ahimsa'(Chap XIV)

UNIT 2:

(i) "Secularism and Its Discontents"- Amartya Sen (from *The Argumentative Indian*)

UNIT 3:

(i) "Nationalism in India"- Rabindranath Tagore (from *Nationalism*)

UNIT 4:

(i) " The Renaissance in India"- Sri Aurobindo (from The Renaissance in India and Other Essays)

Text Books

- Texts prescribed in Units 1, 2, 3, 4

Reference Books:

- A.L. Basham, *Wonder that was India*
- D.D. Kosambi, *Culture and Civilization of Ancient India in Historical Outline*
- Romila Thapar, *Time as a Metaphor in Human History*
- Pawan K. Verma, *The Great Indian Middleclass*

Generic Elective Paper IV

LANGUAGE AND LINGUISTICS

Introduction:

This paper aims to offer the students some fundamental knowledge in Linguistics and English Language Teaching ELT). It also seeks to acquaint the students with the variety of English that people come in contact with in contemporary times with a special emphasis on Asia and in particular, India.

UNIT 1:

(i) Language : What is Language, Linguistics, Branches and Scope, Applied Linguistics Global Englishes: Who Speaks English today? Standard Language and Language Standards, Language Variation, Postcolonial English, Pidgin and Creole, English in Asia and Europe

UNIT 2:

(i) Phonology and Morphology

UNIT 3:

(i) Syntax

UNIT 4:

(i) Semantics

Reference Books

- *Introductory book on Linguistics and Phonetics* by R L Varshney

- *Global Englishes: A Resource Book for Students*, Jennifer Jenkins, 3rd Edn, Special Indian Edition, Routledge, 2016
- *An Introduction to Language and Communication,*
- A R Parhi,'Localising the Alien: Newspaper English and the Indian Classroom', *English Studies in India*, Springer, 2018.
- Adrian Akmajian, R. A. Demers, Ann K Farmer and R, M. Harnish, Prentice Hall of India, 2012
- David Crystal, *Linguistics*
- Braj B Kachru, The Indianization of English (OUP)
- David Crystal, *English as a World Language*

GE Tutorial - 4 (20 marks: 1 credit)

Introduction: This paper seeks to reinforce learning of the theory paper by way of engaging the students in remedial teaching and doubt clearing classes.
Scheme of Examination- Internal Assessment will be done by tutors through 10 multiple choice questions (10 x 1 = 10) and very short answer-type questions (5 x 2 = 10)

Course structure of UG English Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Indian writing in English	06	100
II	DSC-II	Writing for mass media	06	100
III	DSC-III	Postcolonial literatures	06	100
IV	DSC-IV	Popular literature	06	100
V	DSE-I	Academic writing and composition	06	100
VI	DSE-II	Nation, culture, India	06	100

			30	**600**

ENGLISH Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

Discipline Specific Core Paper I

INDIAN WRITING IN ENGLISH

Introduction:

Indian writing in English has been the fastest growing branch of Indian literature in the last one hundred years. It has produced a rich and vibrant body of writing spanning all genres. As a 'twice born' form of writing, it partakes of both the indigenous and the foreign perspectives and has an inherent tendency to be postcolonial. This paper seeks to introduce the students to the field through a selection of representative poems and short stories and a novel and a play.

UNIT 1: (Poetry)

(i) Sarojini Naidu: "The Bangle Sellers",
(ii) A.K.Ramanujan, "Obituary",
(iii)Jayanta Mahapatra "Grandfather",
(iv)Nissim Ezekiel "Night of the Scorpion"

UNIT 2: (Short Stories)

(i) Anita Desai "The Accompanist" ,
(ii) Shiv K Kumar " A Nun with Love",
(iii)Manohar Malgaonkar " A Pinch of Snuff"

UNIT 3:

(i) R.K Narayan *The Guide*

UNIT 4:

(i) Mahesh Dattani *Final Solutions*

Text Books

- Texts prescribed in Units 1, 2, 3, 4

Reference Books:

- Mehrotra, Arvind Krishna. *Concise History of Indian Literature in English*, Permanent Black, 2010.
- K. Srinivas Ayenger. *A History of Indian Writing in English*
- M.K. Naik. *History of Indian Writing in English*
- Vinay Dharwadker. "The Historical Formation of Indian English Literatrue" in Sheldon Pollock (ed) *Literary Cultures in History*
- *Modern Indian Drama: Issues and Interventions* (ed) Lakshmi Subramanyam

Discipline Specific Core Paper II

WRITING FOR MASS MEDIA

UNIT 1:

(i) History of English in India, Brief history of Journalism in English in India, Status of English in India, Raja Rao, Preface to *Kanthapura* and 'The Caste of English' (Awakened Consciousness: Studies in Commonwealth Lit. ed. C.D. Narasimhaiah).

UNIT 2 :

(i) Writing for the Print Media: News Stories, Features, Editorials

(The teacher is required to cite examples and use material from mass media)

UNIT 3:

(i) Writing for the Electronic Media, Advertisement caption writing and tag lines (print and electronic)

UNIT 4:

(i) Email, Blogs, Social networking, Internet Journalism

Reference Books

- Rangaswamy Parthasarathy, *Journalism in India: From the earliest times to the present day*, Sterling.
- S V Parasher, *Indian English: Functions and Form*, Bahri Publications.

- Stepehen McLaren, *Easy Writer*
- A R Parhi*, Indian English through Newspapers,* Concept Publications.
- G L Labru, Indian Newspaper English, B R Publishing House.
- Vinod Dubey, Newspaper English in India, Bahri Publications.
- Kachru, Braj: *from* Indianization of English
- Dutta and Parhi,'Prospect of Electronic Media as Curriculum in Non-Native Contexts', I-Manager's *Journal on English Language Teaching,*2014
- Aijaz Ahmed: 'Disciplinary English: Third-Worldism and Literature'.
- Narasimhaih; C.D. (ed.): *Awakened Consciousness: Studies in Commonwealth Literature,* New Delhi: Sterling.
- Omkar N. Koul: *English in India: Theoretical and Applied Issues.* New Delhi: Creative Publishers.

Discipline Specific Core Paper III

POSTCOLONIAL LITERATURES

Introduction:

This paper seeks to introduce the students to postcolonial literature —a body of literature that responds to European colonialism and empire in Asia, Africa, Middle East, the Pacific and elsewhere. The paper aims to provide the students with the opportunity to think through the layered response – compliance, resistance, mimicry, and subversion – that is involved in the production of post-independence literature

UNIT 1: Post colonialism: Elleke Boehmer (From *Literary Theory and Criticism* Ed. Patricia Waugh)

(i) The post in Postcolonial,

(ii) Movements and theories against Empire,

(iii)Leading Postcolonial Thinkers(Frantz Fanon, Edward Said, Gayatri Spivak, Homi Bhabha)

UNIT 2:

(i) Raja Rao, *Kanthapura*

UNIT 3:

(i) Jean Rhys *Wide Sargasso Sea*

UNIT 4:

(i) Athol Fugard: *Blood Knot*

Text Books

- Texts prescribed in Units 1, 2, 3, 4

Reference Books:

- Chinua Achebe: "English and the African Writer" (Available online)
- Ngugi wa Thiong'o: "The Quest for Relevance" from *Decolonizing the Mind: The Politics of Language in African Literature*
- Leela Gandhi, *Postcolonial Theory: An Introduction*. OUP, 1998.
- Bill Ashcroft, Gareth Griffin, Helen Tiffin, *The Empire Writes Back*: *Theory and Practice of Post-Colonial Literature*.
- Edward Said. *Orientalism*.

Discipline Specific Core Paper IV

POPULAR LITERATURE

Introduction:

This paper seeks to introduce the students to genres such as children's literature, detective fiction and campus fiction, which have a "mass" appeal, and can help us gain a better understanding of the popular and folk roots of literature.

UNIT 1: Introduction to the concept

(i) What is popular literature?
(ii) Debate between popular and high cultures ('high brow' v/s 'low brow')
(iii) What is Genre fiction?
(iv) Debate between genre fiction and literary fiction

Essays for discussion:

- Lev Grossman: "Literary Revolution in the Supermarket Aisle: Genre Fiction is Disruptive Technology" http://en tertainment.time.com/2012/05/23/genre-fiction-is-disruptive-technology/
- Arthur Krystal: "Easy Writers: Guilty pleasures without guilt" http://www.newyorker.com/magazine/2012/05/28/easy-writers
- Joshua Rothman: "A Better Way to Think About the Genre Debate" http://www.newyorker.com/books/joshua-rothman/better-way-think-genre-debate
- Stephen Marche: How Genre Fiction Became More Important than Literary Fiction" http://www.esquire.com/entertainment/books/a33599/genre-fiction-vs-literary-fiction/

UNIT 2: Children's Literature

(i) Lewis Caroll: Alice in Wonderland

UNIT 3: Detective Fiction

(i) Arthur Conan Doyle: *The Hound of the Baskervilles*

UNIT 4: Campus Fiction

(i) Chetan Bhagat: *Five Point Someone*

Text Books

- Essays given for discussion under Unit I and Texts prescribed in Units II,III,IV

Reference Books

- Leslie Fiedler, "*Towards a Definition of Popular Literature"* in *Super Culture: American Popular Culture and Europe.* Ed. C.W.E. Bigsby. pp. 29-38
- Leo Lowenthal, *Literature, Popular Culture and Society*
- Felicity Hughes, "Children's Literature: Theory and Practice" in *English Literary History*. Vol. 45, 1978. pp. 542-61.
- Raymond Chandler, "The Simple Art of Murder", Atlantic Monthly. Dec. 1944 (available at <http://www.en.utexas.edu/amlitprivate/scans/chandlerart.html>
- *Popular Fiction: Essays in Literature and History* by Peter Humm, Paul Stigant, Peter Widdowson
- Sumathi Ramaswamy, "Introduction", in Beyond Appearances?: Visual Practices and Ideologies in Modern India. Pp.xiii-xxix

Discipline Specific Elective Paper I

ACADEMIC WRITING AND COMPOSITION

Introduction:

This paper seeks to train the students in the basic writing skills required for writing competently in the academic context.

UNIT 1:

(i) Introduction to the Writing Process: with a focus on Academic Writing

UNIT 2:

(i) Writing in one's own words: Summarizing and Paraphrasing

UNIT 3:

(i) Critical Thinking: Synthesis, Analysis, Evaluation

UNIT 4:

(i) Citing Resources: Editing, Book and Media Review

Reference Books:

- Liz Hamp-Lyons and Ben Heasley, Study Writing: *A Course in Writing Skills for Academic Purposes* (Cambridge UP, 2006)
- Ilona Leki, *Academic Writing: Exploring Processes and Strategies*. New York: CUP, 2nd edn, 1998
- Stanley Fish, *How to Write a Sentence and How to Read One*. Harpar Perennial. 2011.
- *Literature and the art of Communication*, Cambridge University Press.
- Gerald Graff and Cathy Birkenstein, *They Say/I Say: The Moves That Matter in*
- *Academic Writing*. New York: Norton, 2009

Discipline Specific Elective Paper II

NATION, CULTURE, INDIA

Introduction:
This paper seeks to introduce students across disciplines to basic ideas about Indian cultural ethos mediated through literature.

UNIT 1:

(i) *An Autobiography* (*My Experiments With Truth*) - M.K. Gandhi. Part V, 'The First Experience' (Chapters I) to 'Face to Face with Ahimsa'(Chap XIV)

UNIT 2:

(i) "Secularism and Its Discontents"- Amartya Sen (from *The Argumentative Indian*)

UNIT 3:

(i) "Nationalism in India"- Rabindranath Tagore (from *Nationalism*)

UNIT 4:

(i) " The Renaissance in India"- Sri Aurobindo (from The Renaissance in India and Other Essays)

Text Books

- Texts prescribed in Unit I,II,III,IV

Reference Books:

- A.L. Basham, *Wonder that was India*
- D.D. Kosambi, *Culture and Civilization of Ancient India in Historical Outline*
- Romila Thapar, *Time as a Metaphor in Human History*

- Pawan K. Verma, *The Great Indian Middleclass*

GE Tutorial - 4 (20 marks: 1 credit)

Introduction: This paper seeks to reinforce learning of the theory paper by way of engaging the students in remedial teaching and doubt clearing classes.
Scheme of Examination- Internal Assessment will be done by tutors through 10 multiple choice questions (10 x 1 = 10) and very short answer-type questions (5 x 2 = 10)

SKILL ENHANCEMENT COURSES (SEC)

Optional for SECC I paper

Total Marks- 100

Skill Enhancement Courses (SECC Option-I)

ENGLISH COMMUNICATION

Introduction: This paper intends to build up the four primary skills in students in the academic as well as in the wider domains of use like public offices. The books recommended only provide guidelines for what to teach, and the list is in no way exhaustive. Teachers must be free and resourceful enough to collect teaching materials on their own, and even use newspaper clippings as teaching materials.

This is an activity-based, goal-oriented, functional course in English Communication, which aims to make the students able and efficient communicators by helping them to be self-reflexive about English. This course has a pre-defined context of being supportive and complementary to the core courses in various disciplines. Therefore, unlike most other courses in English Communication on offer, it does not seek to build facile fluency that passes off as communicative competence. Rather, it intends to equip the students with the relevant skills of presentation and expression needed in the academic as well as in the professional domains of communicative use. While reading skills exercises are meant to promote the acquisition of analytical and comprehension skills, writing skills exercises are centered on sentence construction, paragraph development and précis writing. Teachers must be free and flexible enough in relation to teaching materials, using newspaper clippings, non-conventional and multi-media resources in the classroom. There is ample scope to build the speaking and listening skills of students in the way the course is planned with an emphasis on interactive learning and articulation.

UNIT 1: Introduction

(i) What is communication?
(ii) Types of communication (Horizontal, Vertical, Interpersonal, Grapevine),
(iii) Uses of Communication, Inter-cultural communication, Communication today:
(iv) Distinct features of Indianisation, alternative texts of language learning, global English and English in the print and electronic media in India.

UNIT 2: The Four Skills and Prospect of new material in language learning

(i) Listening-Passive and active, Speaking effective, intelligibility and clarity
(ii) Methods and techniques of reading such as skimming, scanning and searching for information; Reading to understand the literal, metaphorical and suggested meaning of a passage,
(iii) Identifying the tone (admiring, accusatory, ironical, sympathetic, evasive, indecisive, ambiguous, neutral etc.) of the writer and view-points.
(iv) Cohesive and Coherent writing

UNIT 3: Grammatical and Composition Skills

(i) Doing exercises like filling in the blanks, correcting errors, choosing correct forms out of alternative choices, joining clauses, rewriting sentences as directed, and replacing indicated sections with single words / opposites / synonyms, choosing to use correct punctuation marks, getting to understand and use formal and informal styles, learning to understand the usages of officialese, sexism, racism, jargon.
(ii) Learning to understand information structure of the sentence such as topic-focus relationship; strategies of thematization, postponement, emphasis, structural compression (deletion of redundant parts, nominalization, cleft and pseudo-cleft sentences, elliptical structures etc.), Logical Connectors between sentences, Methods of developing a paragraph, structure of an essay and methods of developing an essay

UNIT 4: Exercises in Written Communication

(i) Précis writing
(ii) Note-taking skills
(iii) Writing reports
(iv) Guidelines and essentials of official correspondence for making enquiries, complaints and replies
(v) Making representations; writing letters of application for jobs; writing CV, writing letters to the editor and social appeals in the form of letters/pamphlets.

Reference Books:

- *Ways of Reading: Advanced reading Skills for Students of English Literature*. Martin Montgomery et al. London: Routledge, 2007.
- *Applying Communication Theory for Professional Life: A Practical Introduction*. Dainton and Zelley, http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGhlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563
- *Literature and the art of Communication*, Cambridge University Press.
- *Vistas and Visions*. Orient Black Swan (writing and grammar exercises at the end of lessons are recommended) From *Remapping An Anthology for Degree Classes*, ('Writing

Skills'), Orient Black Swan.

- *Indian English through Newspapers (*Chapter 4,5 and 6), Concept, New Delhi,2008.
- *Contemporary Communicative English,* S Chand
- Technical Communication: A Reader Centred Approach. P.V. Anderson. Wadsworth, Cengage.

AECC-II Paper

MIL (ALTERNATIVE ENGLISH)

Introduction:

The paper is focused upon developing one fundamental skills of Language learning; reading which needs a thorough rethink and revision. In order to build a strong base for acquisition of the communication skills, suitable reading content is selected from diverse areas in prose form. This would boost the learner's competence in expressive and comprehension skills. The well researched language exercises in the form of usage, vocabulary and grammar is the other area that should attract the teacher and learner to work out for giving decent shape to the mastery of English language.

UNIT 1: Short Story

(i) Jim Corbett-The Fight between Leopards
(ii) Dash Benhur- The Bicycle
(iii)Dinanath Pathy- George V High School
(iv) Alexander Baron- The Man who knew too much
(v) Will f Jenkins- Uneasy Homecoming

UNIT 2: Prose

(i) Mahatma Gandhi- The way to Equal Distribution
(ii) S Radhakrishnan- A Call to Youth
(iii)C V Raman-Water- The Elixir of Life
(iv) Harold Nicolson- An Educated Person
(v) Claire Needell Hollander- No Learning without Feeling

UNIT 3:

(i) Comprehension of a passage and answering the questions

UNIT 4:

(i) Language exercises-test of vocabulary, usage and grammar

Text Books

All Stories and Prose pieces

Reference Books

- *The Widening Arc: A Selection of Prose and Stories*, Ed. A R Parhi, S Deepika, P Jani, Kitab Bhavan, Bhubaneswar.
- *A Communicative Grammar of English*, Geoffrey Leech.
- *A University Grammar of English,* Randolph Quirk and Sidney Greenbaum

- *Developing Reading Skills*. F. Grellet. Cambridge: Cambridge University Press, 1981.

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN EDUCATION (Bachelor of Arts Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course structure of UG Education Honours

Semester	Course	Course Name	Credits	Total marks
I	AEC-I	AEC-I	04	100
	C-I C-I Practical	Educational Philosophy	04 02	75 25
	C-II C-II Practical	Educational Psychology	04 02	75 25
	GE-I GE-I Practical	GE-I	04 02	75 25
			20	
II	AEC-II	AEC-II	04	100
	C-III C-III Practical	Educational Sociology	04 02	75 25
	C-IV C-IV Practical	Changing Pedagogical Perspective	04 02	75 25
	GE-II GE-II Practical	GE-II	04 02	75 25
			20	
III	C-V C-V Practical	Educational Assessment and Evaluation	04 02	75 25
	C-VI C-VI Practical	Educational Research	04 02	75 25
	C-VII C-VII Practical	Statistics in Education	04 02	75 25
	GE-III GE-III Practical	GE-III	04 02	75 25
	SEC-I	SEC-I	04	100

			26	
IV	C-VIII C-VIII Practical	History of Education in India	04 02	75 25
	C-IX C-IX Practical	Curriculum Development	04 02	75 25
	C-X C-X Practical	Guidance and Counseling	04 02	75 25
	GE-IV GE-IV Practical	GE-IV	04 02	75 25
	SEC-II	SEC-II	04	100
			26	

Semester	Course	Course Name	Credits	Total marks
V	C-XI C-XI Practical	Development of Education in Odisha	04 02	75 25
	C-XII C-XII Practical	Information And Communication Technology in Education	04 02	75 25
	DSE-I DSE-I Practical	A. Pedagogy of language (English) B. Pedagogy of language (Odia)	04 02	75 25
	DSE-II DSE-II Practical	A. Pedagogy of Social Sciences B. Pedagogy of Mathematics	04 02	75 25
			24	
VI	C-XIII C-XIII Practical	Contemporary Trends and Issues in Indian Education	04 02	75 25
	C-XIV C-XIV Practical	Educational Management and Leadership	04 02	75 25
	DSE-III	A. Policy and Practices in School Education in India	04	75

	DSE-III Practical	B. Policy and Practices in Higher Education in India	02	25
	DSE-IV DSE-IV Practical	Inclusive Education (Theory)	04 02	75 25
	OR			
	DSE-IV	Dissertation	06	100*
			24	

EDUCATION

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for Non Education students – 4 papers. -

Marks per paper - Midterm : 15 marks, End term : 60 marks, Practical : 25 marks
Total – 100 marks
Credit per paper – 6

Core Paper I

EDUCATIONAL PHILOSOPHY

Learning Objectives:

On completion of this course, the learners shall be able to:

- State and analyze the meaning of education and form own concept on education
- Explain philosophy as the foundation of education
- Analyze aims of education
- Describe the essence of different formal philosophies and draw educational implications
- Compare and contrast Indian and western philosophies of education

UNIT 1: Education in Philosophical Perspective

(i) Etymological meaning of education
(ii) Narrower and broader meaning of education, Lifelong Education
(iii) Aims of Education- Individual and Social Aims of Education
(iv) Meaning and nature of philosophy
(v) Branches of Philosophy- Metaphysics, Epistemology and Axiology, and its educational implications
(vi) Functions of Philosophy in relation to education

UNIT 2: Formal Schools of Philosophy and their Educational Implications

(i) Idealism, Naturalism, Pragmatism with reference to: Aims of Education, Curriculum, Methods of Teaching, Role of Teacher, Discipline

UNIT 3: Indian Schools of Philosophy and their Educational Implications

(i) Common Characteristics of Indian Philosophy

(ii) Sankhya, Vedanta, , Buddhism, Jainism with reference to:

Philosophical tenets, Aims of education, Curriculum, Methods of Teaching, Role of Teacher

UNIT 4: Educational Thought of Western and Indian Thinkers

(i) Plato

(ii)Dewey

(iii)Gopabandhu Das

(iv)Gandhi

(v) Tagore

(vi)Aurobindo

PRACTICAL

- Field visit to a seat of learning in the locality and prepare report.

NB: It will be evaluated by both the of internal core -1 internal and External examiners.

Text Books

- Safaya, R.N. & Shaida, B.D. (2010). *Modern Theory and Principles of Education*. New Delhi: Dhanpatrai Publishing Company Pvt. Ltd. Nayak, B.K. (2018).
- Ravi, Samuel.S. (2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Taneja, V.R. (2000). *Educational thought and practice*. New Delhi: Sterling Publishers Pvt. Limited.

Reference Books

- Aggrawal, J.C. (2013). *Theory and principle of education*. New Delhi: Vikash Publishing House Pvt Ltd.
- Anand, C.L. *et.al*. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT.
- Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dash, B.N. (2011) Foundation of education, New Delhi; Kalyani Publishers.
- Dewey, John (1916/1977). Democracy and education. New York: MacMillan.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/'92). National policy on education. New Delhi: MHRD.
- Krishnamurthy, J. (1953). Education and significance of life. New Delhi: B.I. Publications
- Kumar Krishna (1996). Learning from conflict. New Delhi: Orient Longman.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson. Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Peters, R.S. (1967). The Concept of education. London: Routledge Kegan & Paul.

Radhakrishnan, S. Indian philosophy Vol. I and Vol. II

- Ross, James S.(1981). Ground work of educational theory.Delhi: Oxford University Press Rusk, Robert R., Philosophical bases of education, London: Oxford University Press.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Wingo, G. Max (1975). Philosophies of education. New Delhi: Sterling Publisher Pvt. Limited.

Core Paper II

EDUCATIONAL PSYCHOLOGY

Learning Objectives:

On completion of this course, the learners shall be able to:

- Explain the concept of educational psychology and its relationship with psychology.
- Understand different methods of educational psychology.
- Describe the theoretical perspectives of educational psychology.
- Explain the concepts of growth and development of child and adolescence, and underlined general principles of growth and development.
- Describe briefly the periods and the typical characteristics ofgrowth and development during childhood and adolescence.
- Specify the contexts and factors influencing development.
- Explain the theory of cognitive development and its educational implications.
- State the different forms and characteristics of individual differences and the ways of meeting the classroom issues arising out of the differences.
- Identify the learning needs during the different stages of development and adopt appropriate strategies in and out of school to meet the learning needs.

UNIT 1: Educational Psychology in Developmental Perspective

(i) Meaning, nature, scope and relevance of educational psychology
(ii) Methods of educational psychology- observation, experimentation, and case study
(iii) Application of educational psychology in understanding learner
(iv) Growth and Development-Concept, difference between growth and development, and principles of growth and development
(v) Characteristics of development during adolescence in different areas: Physical, social, emotional and intellectual (with reference to Piaget)

UNIT 2: Intelligence, Creativity and Individual difference

(i) Individual difference-concept, nature, factors and role of education

(ii) Intelligence- meaning and nature of intelligence, concept of I.Q, theories of intelligence- Two factor theories, Guildford's structure of intelligence (SI) model, Gardner's multiple theory of intelligence.
(iii) Measurement of intelligence- individual and group test, verbal, non-verbal test
(iv) Creativity- meaning, nature and stages of creative thinking, strategies for fostering creativity

UNIT 3: Learning and Motivation

(i) Learning- meaning, nature and factors of learning
(ii) Theories of learning with experiment and educational implications-
(iii) Classical conditioning, operant conditioning, insightful learning and constructivist approach to learning
(iv) Motivation – concepts, types, and techniques of motivation

UNIT 4: Personality and Mental health

(i) Personality- meaning and nature of personality
(ii) Theories- type theory and trait theory
(iii) Assessment of personality- subjective, objective and projective techniques
(iv) Mental health-concept, factors affecting mental health and role of teacher, mental health of teacher.
(v) Adjustment mechanism: Concept and Types

PRACTICAL

- Administration and interpretation of any psychological test relating to intelligence or personality

N.B: It will be evaluated by both the Internal and External examiners.

Text Books

- Woolfolk, A. (2015). *Educational psychology (9th Ed.)*. New Delhi: Pearson Publication
- Chauhan, S.S. (2010). *Advanced educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Mangal, S.K. (2002). *Advanced educational psychology*. New Delhi: Prentice Hall of India.

Reference Books

- Arnett, J. (2007). Adolescence and emerging adulthood: A cultural approach. (3rd Edn.). Upper Saddle River, N.J.: Pearson.
- Berk, Laura E. (2011). Child development (9th Edn.). New Delhi: Prentice Hall of India.
- Flavell, J.H. (1963). The developmental psychology of Jean Piaget. New York: Van

Nostrand
- Hurlock, E. B. (1980). Developmental psychology: All span approach. New York: McGraw Hill Book.
- Hurlock, E.B. (1980). Child development (6th Edn.). Tokyo: McGraw-Hill, Kogakusha Ltd.
- Hurlock, E.B. (2007). Child growth and development. New York: McGraw Hill.
- Kail, Robert V (2011). Children and their development (6th Edition). Englewood Cliffs, N.J: Prentice Hall.
- Stephens, J. M.; Evans, E. D.(1973). Development and classroom learning: An introduction to educational psychology. New York: Holt, Rinehart and Winston

Core Paper III

EDUCATIONAL SOCIOLOGY

Learning Objectives:
On completion of this course, the students shall :

- State the relationship between education and society.
- Understand the meaning of Educational Sociology and function of education as a social system.
- State different agencies of education and their functions.
- Justify the importance of education for social change.
- Describe the role of education in modernization and globalization.
- Describe the function of education to ensure equality and equity.

UNIT 1: Education and Society

(i) Relationship between education and society, school as a miniature society
(ii) Educational Sociology- Concept, nature, scope and importance;
(iii) Relationship between education and sociology.
(iv) Education as a process of Socialization.
(v) Education and Politics, Education and Economic Development

UNIT 2: Agencies of Education

(i) Family- Importance, functions and role for education and socialization of the children
(ii) School - Importance, functions and role for education and socialization of the children
(iii) Society- Importance, functions and role for education and socialization of the children
(iv) Mass Media- Importance, functions and role for education and socialization of the children

UNIT 3: Education, Social change and Modernization

(i) Concept of social change and factors affecting Social Change
(ii) Education as an instrument of social change and social control
(iii) Concept and Attributes of modernization

(iv) Education for accelerating the process of modernization
(v) Impact of Globalization on Education

UNIT 4: Equalization of Educational opportunities for ensuring equity and Inclusion

(i) Concept of equality, equity and inclusion: its educational implication
(ii) Ensuring equality in the Education of SC and ST
(iii) Education for Women Empowerment
(iv) Inclusive Education with reference to children with special needs(CWSN)

PRACTICAL

Field Visit: Study of a social unit (Home/School/Village/slum) and reporting.

NB: It will be evaluated by both the internal and external examiners

Text Books

- Mathur, S. S. (2000). *A sociological approach to Indian education.* Agra : Vinod Pustak Mandir.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson.
- Bahttacharya, S. (2006). Sociological Foundation of Education. New Delhi: Atlantic

Reference Books

- Ravi, Samuel.S.(2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Safaya, R.N. & Shaida, B.D. (2010), *Modern theory and principles of education*. New Delhi: Dhanpati Publising Company Pvt. Ltd.
- Aggrawal, J.C.(2013). Theory and principle of education. New Delhi: Vikash Publishing House Pvt Ltd.
- Anand, C.L. et.al. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dewey, John (1916/1977). Democracy and education. New York: MacMillan.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/'92). National policy on education. New Delhi: MHRD.

  Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.

- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.

  Saraswati, T.S. (Ed.) (1999).Culture, socialization and human development. Theory, research and applications in India. New Delhi: Sage Publication.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling

  Publishers Pvt. Limited.

Core Paper IV

CHANGING PEDAGOGICAL PERSPECTIVE

Learning Objectives:

On completion of this course, the students shall:

- Explain the concept of pedagogy
- Differentiate pedagogy from other allied concepts
- Explain different teaching task with example
- Establish relationship between teaching and learning
- List out different approaches and methods of teaching
- Prepare a lesson plan following different designs

UNIT 1: Concept of Teaching and Learning

(i) Meaning and definition of teaching and learning
(ii) Relationship between teaching and learning
(iii) Variables involved in teaching task: independent, dependent and intervening
(iv) Phases of teaching: Pre- active, inter- active and post- active
(v) Levels of teaching: memory, understanding and reflective
(vi) Lesson plan design- The Herbartian steps, 5 E and ICON design model

UNIT 2: Theories of Teaching

(i) Meaning and nature of teaching theory
(ii) Types of teaching theories:
(iii) Formal theories of teaching- communication theory of teaching
(iv) Descriptive theories of teaching– Gagne's hierarchical theory of instruction and Bruner's cognitive theory of instruction
(v) Normative theories of teaching - Mitra's psychological theory of teaching and Clarke's general theory of teaching

UNIT 3: Principles and maxims of teaching

(i) General principles of teaching
(ii) Psychological principles of teaching
(iii) Maxims of teaching
(iv) Core teaching skills: Introducing the lesson, explaining, illustrating with examples, stimulus variation, and reinforcement, questioning, probing questions, closure.

UNIT 4: Approaches and methods of Teaching

(i) Concept of approach, method, strategy and techniques
(ii) Methods of teaching: inductive-deductive, analytic- synthetic, problem solving and project
(iii) Shift in focus from teaching to learning- constructivist approach to learning

PRACTICAL

- Preparation of rating scale/ checklist /observation schedule to evaluate classroom teaching and reporting.

NB: It will be evaluated by both the internal and external examiners

Text Books

- Kochar, S.K.(2011). *Methods and Techniques of teaching*. Sterling Publisher Pvt. Ltd., New Delhi
- Chauhan, S.S.(1995). *Innovations of teaching learning process*. Vikash Publishing House, New Delhi
- Sharma, R.A.(1986).*Technology of Teaching*. International Publishing House, Meerut.

Reference Books

- Aggarwal, J.C.(1995). *Essentials of Educational Technology*. Vikash Publishing House, New Delhi
- Walia, J.S. (2013). *Educational Technology*. Jalandhar, Punjab: Ahim Publications.
- Mangal, S.K. and Mangal, U.(2010) *Essentials of Educational Technology*, New Delhi, PHI Learning Pvt. Limited
- Mangal, S.K.(1988) *Foundations of Educational Technology,* Ludhiana, Tandan Publications
- Nageswar Rao, S., Sreedhar, P. & Rao, B.(2007). *Methods and techniques of teaching*, Sonali Publications, New Delhi
- Oliver,R.A. (1963) *Effective teaching*, JM Dent & Sons
- Pathak, R.P. & Chaudhary, J. (2012) *Educational Technology*, Pearson, New Delhi
- Ryburn, W.M.(1955) *Principles of Teaching*, Geoffrey Cembridge, OUP
- Sampath,K, Pannir Salvam,A.,& Santhanam, S.(1981) *Introduction to Educational Technology*, Sterling Publisher, New Delhi

Core Paper V

EDUCATIONAL ASSESSMENT AND EVALUATION

Learning Objectives:

On completion of this course, the students will.

- State the nature, purpose and types of educational assessment and evaluation.
- Develop and use different types of tools and techniques for continuous and comprehensive assessment of learning in the school situation.
- Explain the importance of assessment for learning and its processes for enhancing the quality of learning and teaching.
- Describe the characteristic of a good test.
- Analyze the trends and issues in learning and learner assessment.
- Analyze and interpret results of the assessment using standard score.
- Illustrate the principles of test construction in education.

UNIT 1: Assessment and Evaluation in Education

(i) Understanding the meaning and purpose of test, measurement, assessment and evaluation
(ii) Scales of measurement- nominal, ordinal, interval and ratio
(iii) Types of test- teacher made and standardized
(iv) Approaches to evaluation- placement, formative, diagnostic and summative
(v) Types of evaluation- norm referenced and criterion referenced
(vi) Concept and nature of continuous and compressive evaluation

UNIT 2: Instructional Learning Objectives

(i) Taxonomy of instructional Learning Objectives with special reference to cognitive domain
(ii) Criteria of selecting appropriate Learning Objectives, and stating of general and specific instructional Learning Objectives
(iii) Relationship of evaluation procedure with Learning Objectives
(iv) Difference between objective based objective type test and objective based essay type test

UNIT 3: Tools and Techniques of Assessment and construction of Test

(i) Steps of test construction: planning, preparing, trying out and evaluation
(ii) Principles of construction of objective type test items- matching, multiple choice, completion and true – false
(iii) Principles of construction of essay type test
(iv) Non- standardized tools: Observation schedule, interview schedule, rating scale, check list, portfolio and rubrics .

UNIT 4: Characteristics of a good Test

(i) Validity-concept, types and methods of validation
(ii) Reliability- concept and methods of estimating reliability

(iii) Objectivity- concept and methods of estimating objectivity
(iv) Usability- concept and factors ensuring usability

PRACTICAL

- Construction of Unit test on a school subject based on blueprint and reporting.

  NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C. (1997). *Essentials of examination system, evaluation, tests and measurement*. New Delhi: Vikas Publishing House Pvt Ltd.
- Goswami, M. (2011). *Measurement and evaluation in psychology and education*. Hyderabad: Neelkamal Publishers
  Gronlund, N.E. (2003). *Assessment of student Achievement*. Boston: Allyn & Bacon
- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Anastasi, A.(1976). Psychological testing. New York: Macmillan Publishing Co.
- Anderson, L.W. (2003). Classroom assessment: Enhancing the quality of teacher decision making.
- Banks, S.R. (2005). *Classroom assessment: issues and PRACTICES*. Boston: Allyn & Bacon.
- Blooms, B.S.(1956). *Taxonomy of educational Learning Objectives*. New York: Longman Green and Company
- Cohen, R.J., Swerdlik, M.E., & Phillips, S.M. (1996). *Psychological testing and assessment. an introduction to the tests and measurement*. California: Mayfield Publishing Co.
- Earl, L.M. (2006). *Assessment as learning: using classroom assessment to maximize student learning*. Thousand Oaks, California: Corwin Press
- Hopkins, KD. (1998). *Educational and psychological measurement and evaluation.* Boston: Allyn and Bacon.
- Linn, R.L. & Gronlund, N.E. (2000). *Measurement and assessment in teaching.* London: Merrill Prentice Hall.
  Macmillan, J.H. (1997). *Classroom assessment, principles and practice for effective instruction.* Boston: Allyn and Bacon
- Mohan, R. (2016). *Measurement evaluation and assessment in education*. Delhi: PHI Learning Pvt. Ltd.
- National Council of Educational Research and Training (2006). *Position paper: Examination Reforms.* New Delhi: NCERT
- Noll, N.H. S cannell, D.P. & Craig, RC. (1979). *Introduction to educational measurement.* Boston: Houghton Miffin.

Core Paper VI

EDUCATIONAL RESEARCH

Learning Objectives:

On completion of this course, the student will:

- Describe nature, scope and limitation of educational research.
- Understand different types and methods of educational research.
- Explain sources from where knowledge could be obtained.
- Describe the process of research in education.
- Analyze research design in education.
- Illustrate procedure of collecting and analyzing data.
- Prepare the research report.

UNIT 1: Concept and Types of Educational Research

(i) Concept and nature of research
(ii) Meaning, nature and scope of educational research
(iii) Types of research by purpose- Fundamental, Applied and Action
(iv) Types of research by approach- Quantitative and Qualitative

UNIT 2: Design of Research and preparation of research proposal

(i) Steps of Research
(ii) Review of Related Literature; and identification of problem
(iii) Hypothesis: Meaning, Types, Sources and Characteristics of hypothesis
(iv) Concept of population and sample
(v) Sampling procedures- Probability and Non-Probability
(vi) Tools and techniques for data collection(i.e. questionnaire, interview, observation and Procedure of data collection , Preparation of research proposal

UNIT 3: Methods of Research

Meaning nature and steps of:
(i) Survey method
(ii) Case-study method
(iii) Historical research
(iv) Experimental research

UNIT 4: Writing Research Report

(i) Data analysis and interpretation in research.
(ii) Steps for reporting research
(iii) Reporting style (APA Style)
(iv) Plagiarism checking
(v) Referencing Style (APA Style): Bibliography, Webliography

PRACTICAL

- Preparation of a Research Proposal on any Educational Topic (Issues/ Trends/ Problems/ Psychological Topics)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Best J.W. and Kahn, J. V. (2006). *Research in education (*9th Ed.) New Delhi: Pearson Education Inc.
- Kaul, L. (1984). *Methodology of educational research.* New Delhi: Vikas Publication
- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Nanda, G.C. & Khatoi, P.K. (2012). *Fundamentals of Educational Research and Statistics.* New Delhi: Ludhiana.
- Gay, L.R. (1990). *Educational research-competencies for analysis and application* (3rd Ed.), Macmillan Publishing Company, New York Ary, D., Jacobs, L. C., &Razavieh, A. (2002). *Introduction to research in education* (6th Ed.). Belmont, CA: Wadsworth/Thomson Learning.
- Bhandarkar, P.L. and Wilkinson,T.S. (2010). *Methodology and techniques of social research*. Himalaya Publishing House, New Delhi.
- Creswell, J.W. (2014). *Educational research-planning, conducting and evaluating quantitative and qualitative research (4th Ed.).* New Jersey, USA: Pearson Education Inc. (Indian Reprint available at PHI Learning Pvt.Ptd.)
- Kerlinger, F.N. (1973). *Foundation of behavioral research.* New York: Holt Rinehart & Winston.
- Rao, U. (2007). *Action research.* Himalaya Publishing House, New Delhi.
- Borg, W.R. & Gall, M.D. (1989). *Educational research: An introduction*. New York: Longman.
- Corey, S. M. (1953), *Action research to improve school practice*, New York: Teachers College Press
- Johnson, B. & Christensen, L. (2008). *Educational research: quantitative, qualitative, and mixed approaches*. London: Sage Publication
- McMillan, J.H. & Schumacher, S. (1989). *Research in Education- a Conceptual Introduction.* New York: Harper Collins.
- Mertler, C.A. (2006). *Action research: teachers as researchers in the classroom*. London: Sage Publication

Core Paper VII

STATISTICS IN EDUCATION

Learning Objectives:

On completion of this course, the students will:

- Describe the importance of statistics in education.
- Organise and represent educational data in tabular and graphical form.
- Compute and use various statistical measures of average, variation and bi-variate distribution to in analysis and interpretation of educational data.
- Describe the concept and importance of normal probability curve and interpret test scores in using normal probability curve.

- Understand the divergence of data from normality.

UNIT 1: Educational Statistics

(i) Educational Statistics-Meaning, Nature, Scope and Uses
(ii) Organization of Data: Frequency Distribution, Cumulative Frequency Distribution
(iii) Graphical Representation of Data (Histogram, Frequency polygon , Ogive and Pie-Diagram)

UNIT 2: Measures of Central Tendency and Variability

(i) Mean, Median and Mode- concept, computational process, uses and limitations
(ii) Range, Average Deviation, Quartile Deviation and Standard Deviation- Concept, computational process, uses and limitations

UNIT 3: Co-relational Statistics

(i) Meaning and types of Correlation
(ii) Computation of Coefficient of Correlation by Rank Difference Method; Product Moment Method

UNIT 4: Normal Probability Curve and Divergence from Normality

(i) Normal Probability Curve- concept, properties and applications
(ii) Skewness and Kurtosis
(iii) Interpretation of Derived scores: Z- score and T- score

PRACTICAL

- Analysis of Achievement Data of a particular class and Reporting

  NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggarwal,Y.P.(2009).*Statistical methods: concepts, application and computation*.New Delhi: Sterling Publishers Pvt. Ltd**.**
- Garrett, H.E. (1971). *Statistics in psychology and education.* New Delhi: Paragon International Publisher
- Mangal, S.K. (2008). *Statistics in education and psychology*. New Delhi: Prentice-Hall of India Private Limited

Reference Books

- Ferguson, G.A.(1971). *Statistical analysis in psychology and education.* Kogakusha, Tokyo: McGraw-Hill
- Guilford, J.P. &Fruchter, B. (1981). *Fundamental statistics in psychology and education.* New York: McGraw Hill
- McCall, R. (1993). *Fundamental statistics for the behavioral Science.* New York: Harcourt Brace
- Ravid, Ruth. (2000). *Practical statistics for education*. New York: University Press of America.

- Seigel. S. & Castel Ian N.J. (1988). *Non-parametric statistics for the Behavioral Science.* Singapore: Graw- Hill Book Co.

Core Paper VIII

HISTORY OF EDUCATION IN INDIA

Learning Objectives:

On completion of this course, the student will

- Understand the development of education in India during ancient period, medieval period and pre-independence period.
- Describe the development of education in India during post-independence period.
- Describe major recommendations of different policies and committee reports on education in India.

UNIT 1: Education during Ancient Period

(i) Features of Vedic period with special reference to aims, curriculum and methods of teaching
(ii) Features of Buddhist period with special reference to aims, curriculum and methods of teaching
(iii) Relevance of Gurukul system and Buddhist centers of learning
(iv) Ancient seats of Learning

UNIT 2: Education during Medieval Period

(i) Features of education during Medieval Period with special reference to aims, curriculum and methods of teaching
(ii) Educational institutions during Muslim period, important centers of education.
(iii) Relevance of Islamic period

UNIT 3: Education during pre-independence period

(i) Charter's Act(1813)
(ii) Maculay's Minute(1835)
(iii) Wood's Despatch (1854)
(iv) Indian Education Commission(1882)
(v) Calcutta University Commission(1917)
(vi) Hartog committee(1929)

UNIT 4: Education during post-independence period

Major recommendations of the following commissions and committees relating to the aims of education and curriculum:

(i) University Education Commission (1948)
(ii) Major recommendations of Secondary Education Commission (1954)
(iii) Major recommendations of Education Commission (1966)
(iv) National Policy on Education (1986), revised in 1992

PRACTICAL

- Study on implementation of NPE(1986) in respect of recommendations for elementary level

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C.(2010). *Landmarks in the history of modern Indian education*. New Delhi: Vikash Publishing Pvt Ltd.
- Dash, B.N. (1911). *Development of education in India*. New Delhi: Ajanta Prakashan
- Das, K.K. (1993). *Development of education in India*. New Delhi: Kalyani Publishers.

Reference Books

- Naik, J.P. & Narullah, S. (1996). *A student's history of education in India.*New Delhi: Mc Millan India Ltd
  Rawat, P.L. (1989). *History of Indian education* New Delhi: Ram Prasad & Sons.
- Govt. of India. (1992, 1998). National policy on education, 1986 (As modified in 1992). Retrieved from http://mhrd.gov.in/sites/upload_files/mhrd/files/NPE86-mod92.pdf
- Keay, F.E. & Mitra, Sukumar (1978). A history of education in India. New Delhi: Oxford University Press.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ministry of Human Resource Development (2004).Learning without Burden: Report of the National Advisory Committee. New Delhi: Min. of HRD.
- Mookharjee, R.K. (1989). The Gupta Empire. Delhi: Motilal Banarsi Dass Publishers Pvt Ltd. Mukherji, S.M., (1966). History of education in India. Vadodara: Acharya Book Depot.
- Naik, J.P. and Syed, N., (1974). A student's history of education in India. New Delhi: MacMillan.
- Rawat, P.L.(1989). History of Indian education. New Delhi: Ram Prasad & Sons. Website, www.mhrd.gov.in

Core Paper IX

CURRICULUM DEVELOPMENT

Learning Objectives:

On completion of this course, the students will

- Differentiate curriculum from courses of study, text book.
- Analyse bases and sources of curriculum.
- Describe different types of curriculum.
- Critically examine National curriculum framework- 2000 and 2005.
- Describe process of curriculum development and differentiate different models of curriculum development.
- Evaluate curriculum using different evaluation models.

UNIT 1: Curriculum

(i) Concept of syllabus, courses of study, text book and curriculum
(ii) Bases of curriculum- philosophical, sociological and psychological
(iii) Components of curriculum: Learning Objectives, Contents, Methods and Evaluation
(iv) Concept of Curriculum design

UNIT 2: Types of Curriculum

(i) Subject centered curriculum
(ii) Learner centered curriculum
(iii) Experience centered curriculum
(iv) Core curriculum

UNIT 3: Curriculum Organization

(i) Principles of curriculum construction
(ii) Selection and organization of content
(iii) Selection and Organization of learning experiences
(iv) National curriculum framework- 2005 and its guiding principles

UNIT 4: Curriculum Development and Evaluation

(i) Curriculum development- its process, role of local authority, state level agencies like SCERT, BSE and National Agencies like CBSE, NCERT
(ii) Tyler and Taba Model of curriculum development
(iii) Meaning and nature of curriculum evaluation

PRACTICAL

- Content Analysis of any text book of elementary level

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Ornstein, A.C. & Hunkins, E (1998). *Curriculum. Foundations, Principles and Issues*. Boston: Allyn & Bacon, Boston.
- Oliva, P.F. (2001). *Developing the curriculum* (Fifth Ed.). New York, NY: Longman.
- Talla, M. (2012). *Curriculum Development: Perspectives, Principles and Issues.* New Delhi: Pearson Publications.

Reference Books

- Beane, J.A. ,Conrad, E.P. Jr. and Samuel JA, Jr. (1986). Curriculum planning and development, Boston: Allyn & Bacon.
- Brady, L. (1995). Curriculum development, New Delhi: Prentice Hall.
- Doll, R.C. (1996).Curriculum development: decesion-making and process, Boston: Allyn & Bacon. Krug, E.A.(1956). Curriculum planning. New York: Harper and Row

Publishers.

- Oliva, P.F. (2001). *Developing the curriculum* (Fifth Ed.). New York, NY: Longman.
- Pratt, D.(1980). Curriculum design and development. New York: Macmillan Publishing Co. Inc.
- Popham, W.J. (1993). Modern educational measurement. Englewood Cliffs, N.J.: Prentice Hall.
- Saylor, J.G., Alexander, W.M. and Lewis, A.J.(1981). Curriculum planning for better teaching and learning. New York: Holt Rienehart & Winston.
- Taba, H. (1962). Curriculum development-theory and practice. New York: Harcourt Brace, Jovanoich. Tanner, D. and Tanner, L.(1975) Curriculum development- theory and practice. New York: Macmillan Publishing Co. Inc.
- Tyler, R.W.(1941). Basic principles of curriculum and instruction .Chicago: University of Chicogo Press.

Core Paper X

GUIDANCE AND COUNSELLING

Learning Objectives:

On completion of this course, the students will

- State the concept, need, principles and bases of guidance.
- Use various tools and techniques of guidance in appropriate contexts.
- Explain the role of school in organizing different guidance programmes.
- State the concept, scope and type of counseling.
- Narrate the process, tools and techniques of counseling.
- Explain the qualities and role of a counselor.
- Describe different programmes for with differently abled children.
- Explain the role of teacher and head master in organizing different guidance programmes.

UNIT 1: CONCEPT OF GUIDANCE

(i) Meaning, nature and scope of guidance
(ii) Philosophical, psychological and sociological bases of guidance
(iii) Need, importance, purpose and scope of educational guidance in schools
(iv) Need, importance, purpose and scope of vocational guidance

UNIT 2: EDUCATIONAL GUIDANCE

(i) Basic data necessary for educational guidance
(ii) Basic principles and main types of pupil personnel records
(iii) Cumulative records in a guidance programme
(iv) Case study procedure in guidance

UNIT 3: CONCEPT OF COUNSELLING

(i) Meaning, nature and scope of counseling
(ii) Relationship between Guidance and Counselling
(iii) Different types of counseling
(iv) Steps and techniques of counseling
(v) Necessary qualities of a good counselor
(vi) Role of a counselor in secondary schools

UNIT 4: ORGANISATION OF GUIDANCE SERVICE

(i) Placement Service
(ii) Follow-up service
(iii) Individual inventory service
(iv) Occupational information service
(v) Launching school guidance programme

PRACTICAL-25

- Case Study of a Child with Special Needs or a child coming from socially disadvantaged background

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Goswami, Marami (2016). *Essentials of Guidance and Counselling*. New Delhi: Lakshi Publishers And Distributors.
- Kochhar. S.K. (2017). *Educational and Vocational Guidance in Secondary Schools*. New Delhi: Sterling Publishers
- Siddiqui, M.H. (2009). *Guidance And Counselling*. New Delhi: APH Publishing Corporation

Reference Books

- Sharma, R. N., & Sharma, R. (2013). *Guidance and counselling in India*. New Delhi: Atlantic Publishers and Distributors (P) Ltd.
- Bhatnagar,AshaGupta, Nirmala (Eds) (1999). Guidance and counseling: A theoretical perspective (Vol.I). New Delhi: Vikas
- Bhatnagar, Asha and Gupta, Nirmala (Eds) (1999). Guidance and counseling:A practical approach(Vol.II). New Delhi: Vikas.
- Dave, Indu (1984). The basic essentials of counseling. New Delhi: Sterling Pvt. Ltd.
- Gazda George R.M.(1989). Group counseling: A development approach. London: Allyn and Bacon. Gibson, R.L. & Mitchell, M.H. (1986). Introduction to guidance. New York: McMillan.
- Nugent, Frank A. (1990). An Introduction to the profession of counseling. Columbus: Merrill publishing Co.
- Pietrofesa, J.J., Bernstein, B.,and Stanford,S.(1980). Guidance: An introduction. Chicago: Rand McNally.
- Rao, S.N. (1981). Counseling psychology. New Delhi: Tata McGraw Hill.
- Saraswat, R.K. & Gaur, J.S.(1994). Manual for guidance counselors. New Delhi:

NCERT.

Core Paper XI
DEVELOPMENT OF EDUCATION IN ODISHA

Learning Objectives

On completion of the course the students will:

- Grasp the structure of educational system of Odisha
- State the function of institutions/units at the state and district levels
- Appreciate the contribution of Utkalmani Gopabandhu Das to the thoughts and
- Practices of Indian Education narrate the Learning Objectives and implementation process of the major education
- Schemes of central as well as state government being implemented in the state of Odisha
- Explain the role of various state and district level institutions in education
- Analyze the scenario of higher and technical education of Odisha
- Establish linkage between higher education and development of the state

UNIT 1: Status of Elementary Education

(i) History of primary education in Odisha
(ii) Efforts to Universalize Elementary Education: DPEP, SSA and Right to Education Act, 2009
(iii) Indicator wise position in terms of provision, enrolment, retention and achievement for elementary level programmes: NPEGEL and KGBV
(iv) Problem and issues in elementary education

UNIT 2: Status of Secondary and Higher Secondary Education

(i) History of secondary education in Odisha
(ii) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and its implementation in Odisha.
(iii) Role of BSE, Odisha- Problems and issues
(iv) Status of Higher Secondary Education and Role of CHSE; Problems and Issues
(v) Status of Higher Secondary Vocational Education-Problems and Issues

UNIT 3: Status of Higher Education

(i) History of Collegiate Education
(ii) Organization of higher education at the under graduation level and University level-Present status
(iii) RUSA and its implementation
(iv) Autonomous colleges and their functioning
(v) Problems and issues relating to higher education

UNIT 4: Status of Teacher Education

(i) History of Teacher Education in Odisha
(ii) Pre-service and In-service teacher education for elementary schools teachers
(iii) Pre-service and In-service teacher education for secondary school teachers
(iv) Role of DIET, CTE, IASE and SCERT
(v) Problems and issues in teacher education

Practical: 25 Marks

- Seminar Presentation (Each student has to present minimum two papers during this semester related to themes based on Core-11)

NB: It will be evaluated by both the Internal and External Examiners.

Text & Reference Books

- Govt. of Odisha, Department of S & ME (2011). *School Education at a Glance-2011-12*, Bhubaneswar
- Samal, J.K.(1984). History of Education in Odisha: 1905-1936, Sankar Bhattacharya, Punthi Pustak, 136/4B, Bidhan Sarani, Calcutta -700004 ;p-171
- Samal, J.K.(1989). History of Modern Orissa, Firma KLM private limited, 257B,B.B.Ganguly Street, Calcutta;p-188

Websites to be visited:

- *www.shodhganga.inflibnet.ac.in/bitstream/10603/.../08_chapter%202.pdf*: Education in Odisha- *1850-1900: Retrieved on dt.25.07.2012*
- *www.en.wikipedia.org/wiki/Odisha: Odisha - Wikipedia, the free encyclopedia/Retrieved on dt.25.07.2012*
- *www.newkerala.com/states-of-india/Odisha.php:* Odisha: Info on geography, history, government, districts, business ..: *Retrieved on dt.25.07.2012*
- *www.Odisha.gov.in/e-magazine/Odishareview/2011/Jan/engpdf/57-61.pdf:*
- Gopabandhu Das:The National Education Planner of Odisha*: Retrieved ondt.25.07.2012*
- www.dheOdisha.in/ *Higher Education Department - Online Admission - e-Admission for ...*: Retrieved on dt.25.07.2012
- www.Odisha.gov.in/highereducation/index.htm: *Higher Education Department.... - Government of Odisha*: Retrieved on dt.25.07.2012
- www.Odisha2020.org/home/Odisha-higher-education-task-force:*Odisha Higher Education Vision 2020*: Retrieved on dt.25.07.2012
- http://www.scertodisha.nic.in/
- http://www.chseodisha.nic.in/
- http://bseodisha.nic.in/
- http://mhrd.gov.in/rusa
- http://mhrd.gov.in/rmsa

Core Paper XII

INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION

Learning Objectives

On completion of this course, the student will:

- Explain the concept, nature and scope of ICT in education
- Explore ICT resources for Teaching and learning.
- Differentiate between Web1.0 and Web2.0
- Describe the importance of free and open source software in education
- Demonstrate the use of various application software in education.
- Develop the ability to use various tools connect the world
- Explain the content by using various subject tools.
- Explore tools and techniques of ICT for evaluation.

UNIT 1: Educational technology

(i) Meaning , nature and scope
(ii) Approaches to educational Technology: Hardware, Software and System Approach
(iii) Innovations in Educational Technology: Open Educational Resources (OER), Massive Open Online Course (MOOC) Learning Management System (LMS)
(iv) Importance of Educational Technology for the teacher and the student.

UNIT 2: ICT in Education

(i) Conceptual Understanding: Information Technology; Communication Technology; and Information and Communication Technology (ICT)
(ii) Relevance of ICT in Education
(iii) Nature and Scope of ICT in Education.
(iv) Content, Pedagogy and Technology Integration
(v) Challenges in Integrating ICT in Education
(vi) Use of Computers in Education- Computer Aided Learning

UNIT 3: Application of software and ICT assessment Tools in Education

(i) Word Processing Application
(ii) Spread sheet Application
(iii) Presentation Application
(iv) Free and Open Source Software (FOSS)
(v) Subject Tools: Digital Storytelling, Concept Map Software (C-Map)
(vi) Assessment Tools: Rubistar, Hot potatoes, E- portfolios

UNIT 4: Connecting with the World

(i) Use of browsers and search engines; choosing appropriate sites; search and retrieval of information and resources; Downloading, uploading and sharing information and resources;
(ii) Use and importance of Web 2.0 Tools: E-mail, Wikis, Social networking (WhatsApp, Twitter, Facebook and Blogging)
(iii) Use and importance of e-library, e-books, e-journals, Inflibnet.

PRACTICAL

- Development of an Objective Test using any assessment tool or development of a Rubric using Rubistar.

NB: It will be evaluated by both Internal and External examiners.

Text Books

- UNESCO (2002). *Information and communication technology in education: A curriculum for schools and programme of teacher development.* Paris: UNESCO.
- Kanvaria, V.K. (2014). *A Comprehension on Educational Technology and ICT for Education*. New Delhi: GBO.
- Vanaja and Rajasekar, S. (2016). *Information & Communication Technology (ICT) In Education*. New Delhi: Neelkamal

Reference books

- Senapaty, H.K. (2011). *Pedagogy-Technology Integration for the ProfessionalDevelopment of Teacher Educators.* Bhubaneswar: Regional Institute ofEducation, NCERT (Monograph).
- NCERT (2006). National Curriculum Framework 2005 Position Paper NationalFocus Group on Educational Technology. New Delhi: Author.
- Senapaty, H.K. (2009). *ICT Integrated Learning Materials on Basic School Subjectsfrom Constructivist Perspectives*. Bhubaneswar: Regional Institute ofEducation, NCERT (Monograph).
- Singh, L. C. (Ed.) (2010). *Educational Technology for Teachers and Educators.* NewDelhi: Vasunandi Publication.
  UNESCO(2008).*ICTCompetencyStandardsforTeachers:PolicyFramework.*Retrievedf rom http://portal.unesco.
  UNESCO (2002). Information and Communication Technologies in Teacher Education A Planning Guide. Paris: Author
  UNESCO (2005). How ICT can create new, open learning environments: Information and communication technologies in schools: A handbook for teachers. Paris: UNESCO.Mishra, S. (2008). Developing E-Learning Materials: Some Pedagogical Concerns. *Indian Journal of Open Learning*, 17 (2).

Core Paper XIII

CONTEMPORARY TRENDS AND ISSUES IN INDIAN EDUCATION

Learning Objectives

On completion of this course the students will:

- Understand the importance of pre-school and elementary school education. Analyze various problems and issues for ensuring quality education.
- State the importance of secondary education and analyze various problems and issues forensuring quality in secondary education.
- Enumerate the importance of higher education and analyze various problems and issues forensuring quality in higher education.
- Justify the importance of teacher education and analyze various problems and issues forensuring quality in teacher education.
- Analyze emerging concerns in Indian education.

UNIT 1: Pre-school and Elementary School Education

(i) Meaning, nature and importance of ECCE, problems and issues with regard to ECCE
(ii) Universalisation of Elementary Education: efforts to achieve UEE, SSA
(iii) Problems and issues in implementing Right to Education Act 2009.
(iv) Problems and issues in bringing the community to school, role of SMC
(v) Problems in ensuring equity and quality of elementary education

UNIT 2: Secondary and Higher Secondary Education

(i) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and ensuring secondary education for all.
(ii) Role of School Management and Development Committee (SMDC)
(iii) Shifting the teaching learning process from teacher centered to learner centered and activity based classroom –problems and issues
(iv) Problems and issues with regard to vocationalisation of secondary and higher secondary education
(v) Examination reforms at the secondary level
(vi) Widening the access to secondary education through National Open School

UNIT 3: Higher Education and Teacher Education

(i) Challenges in Higher education- expansion, quality and inclusion
(ii) Role of RUSA and NAAC for quality assurance in Higher education
(iii) Higher education through open and distance learning mode
(iv) Elementary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009
(v) Secondary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009

UNIT 4: Emerging Concerns

(i) Examination system: defects and reforms for making examination system flexible (internal assessment and semester system , grading, open book examination, online examination)

(ii) Choice Based Credits System (CBCS): Concept, Learning Objectives, importance, problems and issues.
(iii) Human Rights Education: Concept, Learning Objectives, importance, problems and issues.
(iv) Life-Skill Education: Concept, Learning Objectives, importance, problems and issues.
(v) Peace Education: Concept, Learning Objectives, importance, problems and issues.

PRACTICAL

- Study of perception of Stakeholder's of Education on any of the current issues based on Pass DSE-1 and concerns, and reporting.

NB: It will be evaluated both by the Internal and External Examiners.

Text Books

- Kumar, Chanchal & Sachedeva, M.S. (2017). *Vision of Secondary Education In India in the context of 21st century*. Twentyfirst Century Publications; First Edition edition (2015)
- Pathak, K. R. (2007). *Education in the Emerging* India. New Delhi: Atlantic Publishers**.**
- Saxena, V. (2011). *Contemporary trends in education: A handbook for educators*. New
- Delhi: Pearson.

Reference Books

- Broudy, H.S. (1977) *Types of knowledge and purposes of education*. In R.C. Anderson, R.J., Spiro and W.E. Montanaque (Eds.) Schooling and the acquisition of knowledge (PP. Hillsdale, NJ: Erlbaum.
- Bruner, J.S. (1996). *The culture of education*. Cambridge, M.A.: Harvard University Press.
- Butchvarov, P. (1970). *The concept of knowledge*. Evanston, Illinois, North Western University Press.
- Dearden R. F. (1984). *Theory and practice in Education*. Routledge K Kegan & Paul.
- Delors, Jacques, et al; (1996). *Learning: the Treasure within report of the international commission on education for 21st century*, UNESCO.
- Illich, I. (1996). *Deschooling society*. Marion Boyers, London.
- Matheson, David (2004). *An Introduction to the study of education* (2 Ed.). David Fulton Publish.
- MHRD (2008). *Framework for implementation of Rashtriya Madhyamik Shiksha Abhiyan: A scheme for universalisation of access to and improvement of quality at the secondary stage.* New Delhi: Department of School Education and Literacy.
- MHRD (2011). *Sarva Shiksha Abhiyan: Framework for implementation based on the Right of Children to Free and Compulsory Education Act, 2009*. New Delhi: Department of School Education and Literacy.
- MHRD, (1992). *Programme of action*. Govt. of India, New Delhi.
- MHRD, Gov. of India (1992). *National policy on education* (revised) New Delhi: MHRD.

- Ministry of Law and Justice (2009). *Right to education Act 2009*. New Delhi: Govt of India.
- Naik, J.P. (1975). *Equality, quality and quantity: The elusive triangle of Indian education.* Allied Publications, Bombay.
- NCERT (2005). *National curriculum framework 2005*. New Delhi: NCERT.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- Slatterry, P. and Dana R. (2002). *Ethics and the foundations of education-Teaching Convictions in a postmodern world*. Allyn & Bacon.
- UN (2015). *The sustainable development goals (SDGs) – UNDP*. United Nations
- UNESCO (1998). *Educating for a sustainable future: A transdisciplinary vision for concerted action*. Paris: UNESCO.
- UNICEF (2000). *Defining quality in education*. New York: Programme Division (Education), Unicef.
- Wall, Edmund (2001). *Educational theory: philosophical and political Perspectives*. Prometheus Books.
- WHO (1991). *Comprehensive school health programme*. New Delhi: World Health Organization Regional Office.
- Winch, C. (1996). *Key concepts in the philosophy of education*. Routledge.
- Yadav, M. S. & Lakshmi, T. K. S. (1995). Education: Its disciplinary identity. *Journal of Indian Education,* XXI (*1*), 01-21.

Core Paper XIV

EDUCATIONAL MANAGEMENT AND LEADERSHIP

Learning Objectives

On completion of this course, the students will

- Describe the concept, types and importance of educational management.
- Spell out the structure of educational management at different levels - from national to institution leve
- Describe different aspects and importance of educational management.
- Describe the concept, theories and style of leadership in educational management.
- Analyze the concept, principles and structures of total quality management approach in education.

UNIT 1: Educational Management

(i) Concept of educational Management- meaning, nature, scope and principles
(ii) Process of educational Management- planning, execution, staffing, control, supervision, monitoring, evaluation and feedback
(iii) Types of Management:
(iv) Centralized and decentralized
(v) Authoritarian, democratic, dynamic/creative and laissez-faire
(vi) Educational Management in Odisha- structure and function with reference to school and mass education, and Higher education

UNIT 2: Aspects of Institutional Management

(i) Human, material and financial resource management
(ii) Management of curricular and co curricular programmes
(iii) Management of students' welfare, auxiliary services including students' health services
(iv) School development plan
(v) Working with SMC and SMDC

UNIT 3: Leadership in Education

(i) Leadership- meaning, nature and importance in education
(ii) Leadership : Functions and skills
(iii) Theories of leadership- Redden's 3-D theory, and Hersey and Blanchard's situational theory
(iv) Styles of leadership-participating style, delegating style, selling style and telling style, Herseyand Blanchard)

UNIT 4: Total Quality Management

(i) Total Quality Management(TQM)- meaning, nature and importance
(ii) Principles of TQM- Demming's and Jurana's
(iii) Planning for TQM in school and higher education
(iv) Quality Assurance in Higher Education

PRACTICAL

- Studying the role of SMC/SMDC in school management and reporting

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Kochar, S.K (2011). *School Administration and Management*. New Delhi: Sterling Publishers Private Limited.
- Bhatnagar, R. P. & Aggrawal V (2015). Educational Administration, Supervision, Planning and financing. Meerut: R Lal Book Depot.
- Mukhopadhyay, M. (2005). i. New Delhi: Sage

Reference Books

- Adolph and Turner Harold, E. *Supervision for change & Innovation*. Houghton Miffin Company.
- Anderson, C.A & Bowman, M.J (1971).*Educational management*, London, U.K: Frankas
- Ashima V, Deshmukh & Naik A.P (2010). *Educational management*. Girgaon, Mumbai: Himalaya Publishing House.
- Bhatnagar, R.P & Verma, I.B (1978). *Educational administration*. Meerut, India: Loyal Book Depot.
- Chau, Ta-Ngoc (2003): *Demographic aspects of educational planning.* Paris: International Institute for Educational Planning.
- Hariss, B. M (1963).*Supervisory behaviour in education*.USA: Englewood Cliffs.

- Kimbrough, S.Ralph, Michall & Nunnery. *Educational administration*. New York: Mc Millan Company.
- Livack, et al (1998).*Rethinking Decentralization in developing countries*. Washington, D.C, USA: World Bank.
- Mukerji, S.N. *Administration of educational planning and financ*e. Baroda, India: Acharya Book Depot.
- Naik, J.P. (1965): *Educational planning in India*. New Delhi, India: Allied.
- Naik, J.P. (1982): *The educational commission & after*. New Delhi, India: Allied.
- Newman and summer. *The process of management: concept, behaviour and practice*. New Delhi, India: Prentice Hall of India Pvt. Ltd.
- Oliva, O (19760. *Supervision for today's school*. New York, USA: Harper & Row.
- Ramani, K.V (2004). *A text book of educational management*. New Delhi, India: Dominant Publisher
- Safya, R & Saida, B.D *(1964). School administration and organisation.* Jalandhar, India: Dhanpat Rai & Sons
- Shukia, P.O (1983). *Administration in India*. New Delhi, India: Vikas Publication.
- Simon, Herbart A. *Administrative behaviour*. New York,USA :McMillan Company.
- Tilak, J.B.G. (1992). *Educational planning at grassroots*. New Delhi: India.
- Waber, Clarence A. *Fundamentals of educational leadership*. New York ,USA: Exposition Press.Buch, T. et al. (1980). Approaches to school management. London: Harper and Row.
- Chalam K.S. (2003): Introduction to Educational Planning and Management: New Delhi, Anmol Publications Pvt. Ltd.
- Chandrasekharan P. (1997): Educational Planning and Management. New Delhi: Sterling Publishers Pvt. Ltd.
- Deshmukh, A.V. & Naik, A.P.(2010). School administration and management. Mumbai.
- Glasser, William(1990). The quality school. New York, NY: Harper Collins Publishers, Inc.
- Government of India (1986/92). National policy on education. New Delhi: MHRD.
- Government of India (1992). Programme of action. New Delhi: MHRD.
- Gupta, S.K. & Gupta, S.91991). Educational administration and management. Indore: Manorama Prakashan.
- Hallak, J.(1990).Investing in the future:Setting educational priorities in the developing world. Paris: UNESCO.
- Kalra, Alka (1977). Efficient school management and role of principals. New Delhi: APH Publishing Corporation.
- Kochar, S.K. (2011). School administration and management. New Delhi: Sterling Mukhopadhyay, M. (2001). Total quality management in education. New Delhi: NIEPA.
- Shaeffer, S. (1991). Collaborating for educational change: The role of parents and the community in school improvement. Paris: UNESCO.
- Tyagi R.S. and Mahapatra P.C. (2000), Educational Administration in Orissa : New Delhi, National Institute of Educational Planning and Administration (NIEPA)
- Vashist, Savita(ed.) (1998). Encyclopaedia of school education and management. New Delhi: Kamal Publishing House.

Discipline Specific Elective Paper-I

(A student has to choose any one from Pedagogy of English and Odia under DSE-1)

A.PEDAGOGY OF LANGUAGE (ENGLISH)

Learning Objectives

On completion of this course, the student will

- Analyze the issues relating to place of English in school curriculum, acquisition of skills in English, realization of aims and Learning Objectives of learning English and language policy as conceived in NPE, 1986 and NCF – 2005
- Use various methods, approaches and strategies for teaching-learning English and transact various types of lesson plans covering all aspects of English language following different approaches
- Develop test items to assess learning in English and provide feedback as well as prepare enrichment materials
- Use the understanding of phonetics for facilitating students' speaking in English
- Plan appropriate pedagogical treatment of the prescribed contents for effective classroom transaction

UNIT 1: English in School Curriculum

(i) Language policy in India with reference to NPE 1986 and NCF 2005
(ii) Place of English as a compulsory subject in school curriculum (both at elementary and secondary levels)
(iii) Learning Objectives of learning English at elementary and secondary levels
(iv) English language skills –components, their independence and interdependence

UNIT 2: Approaches, Methods and Strategies of Teaching English

(i) Understanding of different methods and strategies: Bi-lingual Method, Translation Method, Direct Method, Structural Approach, Communicative Approach.
(ii) Listening Skill: Tasks for developing Listening Comprehension
(iii) Speaking Skill: Tasks for developing Speaking skills
(iv) Reading skill: Types of Reading, Strategies to develop reading comprehension
(v) Writing Skill: Strategies to improve writing skill, Qualities of good writing (simplicity, logicality and organization in writing)

UNIT 3: Transaction of Contents

(i) Teaching of Prose (detailed and non-detailed), poetry, grammar and composition – Approaches, Methods and Strategies
(ii) Pedagogic analysis :Content analysis- analysis of topics of English text book for identification of language items(new vocabulary, structural words, grammar components),learning Learning Objectives, methods and strategies, teaching learning materials including ICT materials
(iii) Preparing Lesson Plan following 5E and Interpretation Construction Design Model(ICON)
(iv) Preparation of Lesson Plans following Herbartian approach.

UNIT 4: Lesson Delivery Strategies and Assessment

(i) Lesson Delivery Strategies: Lecturing, Role play and Dramatization, Collaborative Approach, Ability Grouping, Group Work; Learning through Narratives and Discourses; Concept Mapping and Brain Storming

(ii) Techniques of Assessment in English : Continuous Assessment of Learners performance in English, preparation of different types of objective-based test items (Extended Response Type, Restrictive

PRACTICAL

- School Internship (Delivery of 5 Lessons following Herbatian/5E/ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Kohli, A.L (2010) *Techniques of teaching english.* New Delhi: Dhanpat Rai publishing Company
  Jain, R.K (1994). *Essentials of English teaching*, Agra: Vinod Pustak Mandir
- Sharma, K.L(1970) .*Methods of teaching English in India*. Agra : Laxmi Narayan Agrawal

Reference Books

- Agnihotri R. K. and Khanna A. L. (1994). *Second language acquisition: socio-cultural and linguistic aspects of English in India.* New Delhi: Sage Publications.
- Allen, H.B. (1965). *Teaching English as a second language: A book of readings*. New York: McGraw-Hill.
- Baruah, T.C (1984). *The English teacher's handbook.* New Delhi: Sterling Publishers Pvt.Ltd,
- Billows, F. L. (1975). *The techniques of language teaching.* London: Longman
- Bista, A.R(1965). *Teaching of English (Sixth Edition)*. Agra: Vinod Pustak Mandir
- Bright, J.A(1976). *Teaching English as second language.* London: Long Man Group
- Catarby, E. V (1986) *Teaching English as a foreign language in school curriculum India*, New Delhi: NCERT
- Hudelson, Sarah. (1995). *English as a second language teacher resource handbook. A practical guide for K-12 ESL programs.* California.: Corwin Press, Inc.
- Joyce , Bruce and Weil, Marsha (2003). *Models of teaching*. New Delhi: Prentice Hall of India Pvt. Ltd.
- Krishna Swamy, N. and Sri Raman, T. (1994). English teaching in India. Madras : T.R. Publication.
- Mukalel, Joseph C. (2009). *Approaches to English language teaching.* New Delhi: Discovery Publishing House Pvt Ltd.
- Pal, H.R and Pal, R(2006). *Curriculum – yesterday, today and tomorrow*, New Delhi: Shipra Publications
- Sachdeva, M.S. (1973). A new approach to teaching of english in India. Ludhiana : Prakash Brothers
- Shrivastava, B.D(1968). *Structural approach to the teaching of English*. Agra: Ramprasad and Sons

Discipline Specific Elective Paper-I

(A student has to choose ANY ONE from Pedagogy of English and Odia under DSE-1)

B. PEDAGOGY OF LANGUAGE (ODIA)

Learning Objectives

On completion of this course, the student will:

- State the importance and place of Odia as mother tongue in school curriculum.
- Develop the strategies to address the problems of Odia language acquisition in multilingual context.
- Use various strategies for facilitating the acquisition of language skills in Odia.
- Decide appropriate pedagogic approaches to transact different types of lessons in Odia.
- Prepare appropriate tools for comprehensive assessment of learning in Odia.
- Explain the fundamentals of Odia linguistics and their relevance in teaching learning Odia.
- Plan appropriate pedagogic treatment of the prescribed textual contents (in Odia) of classes IX and X.

UNIT 1: Odia as Mother Tongue in School Curriculum

(i) Importance of mother tongue in the life and education of an individual
(ii) Place of Odia as mother tongue in school curriculum in Odisha (both at elementary and secondary levels) in the context of language policy recommended by NPE, 1986 (three language formula) and NCF-2005
(iii) Learning Objectives of teaching-learning Odia at elementary and secondary levels
(iv) Inter-dependence of language skills in Odia and Strategies for facilitating acquisition of four-fold language skills in Odia

UNIT 2: Pedagogic Approaches to Teaching-Learning Odia

(i) Psychology of language learning and acquisition with reference to Odia as mother tongue.
(ii) Problems and issues related to acquisition of Odia language in multi-lingual context
(iii) Traditional versus modern methods of teaching-learning Odia.
(iv) Different approaches and strategies to the teaching-learning of : − Odia prose (detailed and non- detailed) , Odia poetry , Odia composition , Odia grammar .

UNIT 3: Curricular Activities in Odia

(i) Pedagogic analysis :
(ii) Content analysis- analysis of topics of Odia text book for identification of language items(new vocabulary, structural words, grammar components), learning Learning Objectives,
(iii) methods and strategies, teaching learning materials lncluding ICT materials, assessment strategies
(iv) Preparing Lesson Plans following Herbartian, 5E and Interpretation Construction Design Model(ICON)

UNIT 4: Assessment

(i) Types of Assessment-self assessment, peer assessment, teacher assessment, internal

assessment and external assessment

(ii) Techniques of Assessment in Odia : Continuous Assessment of Learners performance in Odia, preparation of different types of objective-based test items (Extended Response Type, Restrictive Response Type and Objective Type), preparation of check list, rating scale and rubric, Portfolio assessment in Odia

PRACTICAL

- School internship (delivery of 5 Lessons following Herbartian/5E/ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Barik, N. (2014). Odia shikshyadana paddhati. Cuttack: A.K.Mishra Publishers Pvt. Ltd.
- Kocchar, S.K. (2012). Teaching of Mother Tongue. Sterling Publishers, New Delhi.
- Mohanty, J., Barik, N. & Khandai, U. (1983). Odia sikshadana paddhati. Cuttack : Nalanda.
- Nayak, B.; Mohanty, J.(1999): Odia bhasa O Sahityara Bhitibhumi O Shikshyadan Padhati. Cuttack: Jagannath Process, Toni Road, Cutack-2.

Reference Books

- Daswani, C. J. Language Education in Multilingual India. New/Delhi (UNESCO)
- Dhal, G.B. (1974). Dhwani bijanana. Bhubaneswar : Odisha Rajya Pathya Pustaka Pranayana Sanstha.
- Dhal, G.B. (1972). English uchharana siksha. Cuttack : Friends Publisher.
- Mathur, S.A. Sociological Approach to Indian Education. Vinod Pustak Bhandar, Agra.
- Mohanty, B. (1970). Odia bhasara utpati O 65arma bikasha. Cuttack : Friends Publishers.
- Mohapatra, D. (1976). Odia Dhwani tattwa O sabdha sambhar. Cuttack : Grantha Mandir.
- Mohapatra, N. & Das, S. (1943). Sarbasara vykarana. Cuttack : New Student's Store
- Palmer, H.P. Principles of Language Teaching. George G. Harrep and Co. Ltd.
- Rybum, W.M.(1926). Suggestions for the Teaching of Mother Tongue. OUP.
- Saiyadain, K.G. Education and Social Order. Asia Publishing House, Bombay.

Discipline Specific Elective Paper-II

(A student has to choose ANY ONE from Pedagogy of Social Science and Mathematics under DSE-2)

A. PEDAGOGY OF SOCIAL SCIENCES

Learning Objectives

On completion of this course, the student will:

- State the meaning, scope and importance of Social science
- Specify the skills and competencies to formulate specific LEARNING OBJECTIVES for different History and Political Science lessons
- Identify the different methods and skills of teaching History and Political Science for transacting the contents effectively.
- Explain the importance of time sense and prepare / utilize timelines for effecting teaching of History
- Prepare Unit Plans and Lesson Plans in History and Political science
- Develop diagnostic achievement test, administer them and analyse the results for providing feedback

UNIT 1: Concept, Learning Objectives and Values Of Teaching Social Science

(i) Meaning, Nature and Scope of Social Science as NCF-2005
(ii) Learning Objectives of teaching Social Science at elementary and secondary levels
(iii) Importance of teaching Social Science In School Education
(iv) Identification of values/ competencies/ skills to be developed through Social Sciences

UNIT 2: Methods and Approaches to Teaching-Learning Social Science

(i) Story-telling
(ii) Narration-cum-discussion
(iii) Dramatization
(iv) Source Method
(v) Project method
(vi) Field Trips
(vii) Observation

UNIT 3: Curricular Activities in Social Sciences

Pedagogic analysis:

(i) Content analysis- analysis of topics of social science text book .
(ii) Learning Objectives,
(iii) methods and strategies,
(iv) teaching learning materials including ICT materials
(v) learning activities including student and teacher activities
(vi) assessment strategies
(vii) Preparing lesson plan following Herbart, 5E and Interpretation Construction Design Model(ICON)

UNIT 4: Development of Resource Materials and Assessment in Social Science

(i) Teaching-learning materials – Maps, Atlas, Globes, Charts, Graphs, Models, Filmstrips, T.V. Video, OHP, and Computer
(ii) Timeline – Concept, Aspects, Type and Use

(iii) Types of Assessment-self assessment, peer assessment, teacher assessment, internal assessment and external assessment
(iv) Techniques of Assessment in history and political science: Continuous Assessment of Learners performance in history and political science, preparation of different types of objective-based test-
(v) Items (Extended Response Type, Restrictive Response Type and Objective Type

PRACTICAL

- School internship (delivery of 5 Lessons following Herbatian /5E/ ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Kochhar, S.K. (1970). *Methods of Teaching Social Studies.* New Delhi, India: Sterling Publication.
- Mamgal, S.K. & Mangal, U. (2008). *Teaching of Social Studies*. New Delhi: PHI Learning Pvt, Ltd.
- Sharma, R.A. (2014). *Teaching of Sociaal Sceince*. Meerut: R Lal Book Depot.

Reference Books

- Kochhar, S.K. (1970). *Teaching of History*. New Delhi, India: Sterling Publishers Pvt. Ltd.
- Banks James, A. (1997). *Teaching Strategies for the Social Studies Enquiry, Valuing and Decision Making* . Massachusets,USA: Addition- Westely Publishing Co. Reading.
- Bining & Binning.(1952). *Teaching of Social Studies in Secondary Schools*. New York,USA: Mc Graw Hills.
- Burston,W.H.(1963). *Principles of History Teaching.* New Fetter Lance : Methuen & Co. Ltd.II.
- Burton W.H. (1972). Principles of history teaching, London: Methuen.
- Carretero, Mario, & Voss, James F. (Eds.) (1994). Cognitive and instructional processes in history and the social sciences. Hillsdale: Lawrence Erlbaum Associate.
- Choudhury, K.P. (1975).*The effective Teaching of History*. New Delhi,India: NCERT.
- Dhamiaja Neelam.(1993). *Multimedia Approaches in Teaching Social Studies*. New Delhi,India:Harmer Publishing House.
- Drake, Frederick D. & Lynn, R. Nelson (2005). Engagement in teaching history: Theory and practices for middle and secondary teachers. Columbus, OH: Pearson.
- Ghate, V.D. (1956). Teaching of history. Bombay: Oxford University Press. Gunnin, Dennis (1978). The teaching of history. Goom Helm Ltd. London.
- James H. (1953). *The Teaching of Social Studies in Secondary Schools*. . London,UK: Longman Green & Co.
- James, T. H., Arthur,J. and Hunt, M. (2001). Learning to teach history in the secondary school: A companion to school experience. London: Routledge Falme.
- Kochhar, S.K.(1970). *Teaching of political science*. New Delhi: Sterling Publishers
- NCERT. (1970). *Teaching of History of Secondary Schools*.New Delhi,India: Author.

- NCERT.(1966). *A Handbook for History Teachers*.Bombay:India: Allied Publishers.
- Taneja,V.R.(1970). *Fundamentals of Teaching Social Studies*. Mahendra Capital Publishers.
- Verma, O.P.(1984). New Delhi, India: Sterling Publishers Pvt. Ltd.
- Verma,O.P. & Vedanayagam E.G. *Geography Teaching.* New Delhi,India: Sterling Publishers Pvt. Ltd .
- Yagnik, K.S.(1966). *The Teaching of Social Studies in India*. Bombay,India: Orient Longman Ltd.

Discipline Specific Elective Paper-II

(A student has to choose ANY ONE from Pedagogy of Social Science and Mathematics under DSE-II)

B. PEDAGOGY OF MATHEMATICS

Learning Objectives

On completion of this course, the students will

- Narrate the evolution and nature of Mathematics and its importance in the school curriculum in the context of the recent curricular reforms.
- Use various methods and approaches of teaching and learning mathematics especially suitable for the secondary school classes.
- Plan lessons in Mathematics using traditional and constructivist approaches for effective classroom transactions.
- Develop and collect activities and resource materials for their use in enhancing the quality of learning Mathematics at the secondary level.
- Conduct continuous and comprehensive assessment for enhancing the quality of Mathematics learning.
- Explain the concepts in Mathematics included in the secondary school curriculum and make pedagogical analysis of those concepts

UNIT 1: Foundations of Mathematics Education

(i) Nature and Scope of Mathematics,
(ii) Learning of Mathematics: Importance of Mathematics at elementary and secondary level, Learning Objectives of teaching-learning Mathematics at the two levels,
(iii) Curriculum Reforms in School Mathematics: Rationale, Learning Objectives, principles, designs and materials in Mathematics, recent curricular reforms at the National and State levels (NCF 2005).

UNIT 2: Methods of Teaching-learning Mathematics

(i) Learning by Discovery: Nature and purpose of learning by discovery; guided discovery strategies in teaching Mathematical concepts.
(ii) Teaching for Understanding Proof: Proof by induction and deduction; proof by analysis and synthesis.
(iii) Problem Solving in Mathematics: Importance of problem solving in Mathematics,

Steps of problem solving in Mathematics.

(iv) Constructivist approaches: Self-learning and peer learning strategies, Collaborative strategies; 5E and ICON Models.

UNIT 3: Curricular Activities in Mathematics

(i) Pedagogic analysis :
(ii) Content analysis- analysis of topics of mathematics text book .
(iii) Learning Objectives,
(iv) methods and strategies,
(v) teaching learning materials including ICT materials
(vi) learning activities including student and teacher activities
(vii) assessment strategies
(viii) Process of preparing lesson plan following Herbatian, 5E and Interpretation Construction Design Model(ICON)

UNIT 4: Assessment In Mathematics

(i) Assessment of Mathematics learning: Unit test – Designing blue print, item construction, marking schemes.
(ii) Assessment for Mathematics Learning: Assignments, Projects and portfolios in Mathematics, group and collaborative assessment in Mathematics,
(iii) Non-testing methods of assessment of/for Mathematics Learning: Observation of learners in action, rating of participation in various Mathematics tasks and activities,
(iv) Diagnosis of difficulties in learning Mathematics concepts, Remediation of the difficulties, enrichment programmes in Mathematics learning –National Mathematics Talent Search, Mathematics Olympiad.
(v) Planning for continuous assessment of classroom learning in Mathematics.

PRACTICAL

- School internship (Delivery of 5 Lessons following Herbatian/5E/ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Sidhu, K.S (1985).*Teaching of mathematics*. New Delhi: Sterling publication.
- James, A. (2003). *Teaching of mathematics*. Neel Kamal Publication: Hyderabad.
NCERT (2011). *Pedagogy of mathematics for two year B.Ed. course*. New Delhi:

Reference Books

- Cooney, Thomas J. et al. (1975). Dynamics of Teaching Secondary School Mathematics. Boston: Houghton Mifflin.
- Cooper, B. (1985). *Renegotiating secondary school mathematics*. The Hamer Press: East Sussex.
- Michel. (1982). *Teaching mathematics*. Nicholos Publication Co: New York.
- NCF (2005). *National curriculum framework*. NCERT: New Delhi
- NCERT (2006). *Position paper: National focus group (NFG) on teaching Mathematics*. NCERT: New Delhi.

- NCERT (2005). *Position paper: national focus group (NFG) on examination reform*. NCERT: New Delhi.
  Scopes, P.G. (1973). *Mathematics in secondary schools- a teaching approach*. Cambridge: Cambridge University Press
- Driscoll,M., Egan, M., Nikula, J., & DiMatteo, R. W. (2007). Fostering geometric thinking: A guide for teachers, grades 6-10. Portsmouth, NH: Heinemann.
- Driscoll,M.(1999). Fostering algebraic thinking: A guide for teachers, grades 5-10. Portsmouth, NH: Heinemann.
- Grouws, D.A. (ed) (1992). Handbook of research on mathematics teaching and learning. New York: Macmillan Publishing.
- Malone, J. and Taylor, P. (eds) (1993). Constructivist interpretations of teaching and learning mathematics.
- Perth: Curtin University of Technology.
- Marshall, S.P. (1995). Schemes in problem-solving. New York: Cambridge University Press.
- Moon, B. & Mayes, A.S. (eds.) (1995). Teaching and learning in secondary school. London: Routledge.
- NCERT (1998). A textbook of content-cum-methodology of teaching mathematics. New Delhi: NCERT.
- NCERT (2005). National curriculum framework 2005. New Delhi:NCERT.
- NCERT (2006). Position paper: National focus group on teaching mathematics. New Delhi:NCERT.
- TESS India (2015). Key resources. The Open University U.K.(http//creativecommons.org/licences/ and http//www.tess-india.edu.in/)

Discipline Specific Elective Paper-III

(A student has to choose any one from A & B under DSE-III)

A. POLICY AND PRACTICES IN SCHOOL EDUCATION IN INDIA

Learning Objectives

On completion of this course, the student will:

- Analyse various policies on education for school education in India
- Evaluate progress of schools education
- Examine the problems in implementation of the policies on school education
- Explore status of women education and education for SC, ST and Minorities in Indian

UNIT 1: Policies in School Education

(i) National education policy, 1986, revised in 1992 and its corresponding document Programme of Action with reference to Elementary Education and Secondary Education.

(ii) Implementation of Elementary Education with reference to RTE Act-2009 and Policy issues.

(iii) Implementation of Secondary Education with reference to Rashtriya Madhyamik Siksha Abhiyan (RMSA) and policy issues
(iv) Guiding principles of NCF-2005 and curriculum revision at the school level.

UNIT 2: Policies for Vocationalisation of Education

(i) Vocationalisation of education- A policy analysis with reference to the report of Patel Committee (1977), Adisheshia Committee (1978) and National Policy on Education (1986) revised NPE (1992)
(ii) Vocational Education at Higher Secondary level: Policy challenges
(iii) Work education in schools –concept to implementation

UNIT 3: Policies for Inclusive Education

(i) Education of Children with Special Needs (CWSN): Policy perspectives with reference to NPE,1986, 1992, Mental Health Act, 1987, Persons with Disabilities Act, 1995, Rehabilitation Council of India Act, 1992, National Trust Act,1999
(ii) Inclusive education- Policies, Progress and Problems.

UNIT 4: Policy on Access and equity in Education

(i) Women's education and empowerment of women with reference to National Policy on Women Empowerment, , NPE-1986
(ii) Progress of Women Education and Problems.
(iii) Access and Equity in Education with focus to SC, ST and Minorities
(iv) Policy for SC children- Implementation, Progress and Problems.
(v) Policy for ST children- Implementation, Progress and Problems with reference to Mother Tongue based Multilingual Education
(vi) Policy for Minority Children- Implementation, Progress and Problems.

PRACTICAL

- Analysis of any Policy documents being implemented at School Education level

NB: It will be evaluated by both Internal and External examiners

Text Books

- Aggarwal, J.C. (2010). Landmarks in the history of modern Indian education (7th Ed) New Delhi: Vikash Publishing Pvt. Ltd.
- Rawat, P.L. (1989). History of Indian education New Delhi: Ram Prasad & Sons.

Reference Books

- Das, K.K. (1993). *Development of education in India*. New Delhi: Kalyani Publishers
- Dash,B.N. (1991). *Development of education in India*. New Delhi: Ajanta Prakashan
- Keay, F. E. & Mitra, Sukumar (1978). A history of education in India. New Delhi: Oxford University Press
- Mukherjee, R.K. (1988). Ancient Indian education. New Delhi: Motilal Banarsidass
- Mukherjee, R.K. (1989). The Gupta Empire. New Delhi: Motilal Banarsidass
- Naik, J.P. & Narullah, S. (1996). A student's history of education in India.New Delhi: Mc Millan India Ltd

- Ghosh, S.C. (1989). Education policy in India since warren Hastings, Calcutta: N-Prakashan.
- Reference Books
- Altekar, A.S. (1934), Education in ancient India, Banaras: Indian book Shop.
- Das Gupta, S.N. (1988). A history of Indian philosophy. (5 Vols.) Delhi: Motilal Banarasi Dass.
- MHRD, GOI (1986). National policy on education. New Delhi: The Author
- MHRD, GOI (1993). Learning without burden. Yashpal Committee Report (1993). New Delhi: The Author
- Ministry of Education, GOI (1964-66). Education and national development. (Report of education commission (1964-66). New Delhi: The Author
- Sen, Bimal (1989). Development of technical education in India and state policy-a historical perspective. Indian Journal of History of Science, 24 (2): 224-248, Indian National Science Academy.
- Sen, S.N. (1988). Education in ancient and medieval India. Indian Journal of History of Science, 23 (1): 1-32.
- Shanker, Uday (1984). Education of Indian teachers. New Delhi: Sterling Publishers Pvt. Ltd.
- Singh. R.P. (1970). Education in ancient and medieval India. Delhi: Arya Book Depot.Rao, K.Sudha (Ed.) (2002). Educational policies in India: Analysis and review of promise and performance. New Delhi: NUEPA.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- MHRD, Gov. of India (1986). *National policy on education.* New Delhi: GoI.
- MHRD, Gov. of India (1992), *National policy on education (*revised) New Delhi: GoI. MHRD, (1992), *Programme of action*., New Delhi: Govt. of India.
- NCTE (1998b). *Curriculum Framework for Quality Teacher Education.* New Delhi:NCTE.
- NCTE (2009). *National Curriculum Framework for Teacher Education TowardsPreparing Professional and Humane Teacher.* New Delhi:NCTE.
- Ministry of Law Justice (2009). The Right of Children to Free and Compulsory Education Act, 2009. *The Gazette of India*, Ministry of Law Justice, Govt. of India.
- Kurrien, J (1983). *Elementary Education in India*. New Delhi: Vikas. MHRD (). *Report to the People on Education 2011-12.* New Delhi: Author. MHRD (1986): *National Policy on Education*. New Delhi: MHRD.
- MHRD (2000). *Sarva Shiksha Abhiyan: A program for Universal Elementary Education A framework for implementation.* New Delhi: Author.
- Government of India, Ministry of Human Resource Development (2005), Report of the CABE Committee on Autonomy of Higher Education Institutions, Department of Secondary and Higher Education, New Delhi, June.

Websites to be referred:

- http://www.rehabcouncil.nic.in/
- writereaddata/RCI_Amendments_ACT.pdf
- http://socialjustice.nic.in/pwdact1995.php
- http://mhrd.gov.in/rmsa

Discipline Specific Elective Paper-III

(A student has to choose ANY ONE from A & B under DSE-III)

B. POLICY AND PRACTICES IN HIGHER EDUCATION IN INDIA

Learning Objectives

On completion of this course, the student shall:

- Analyse various policies on education for Higher education in India
- Evaluate progress of Higher education
- Examine the problems in implementation of the policies on higher education
- Explore status of higher education.
- Analyse role of various agencies of higher education in India.

UNIT 1: Policies in Higher Education

(i) NPE-1986, revised in 1992 and its corresponding document Programme of Action (POA) with reference to Higher Education.
(ii) Recommendations of National Knowledge Commission-2006.
(iii) Implementation of Policies, progress and problems.

UNIT 2: Future of Higher Education

(i) Rashtriya Uchattar Shiksha Abhiyan (RUSA)- goals, features, strategies and implementation- problems and issues.
(ii) Progress Higher Education in Odisha.
(iii) Autonomy and Accountability in Higher Education

UNIT 3: Curriculum and Assessment

(i) Curriculum issues in higher education
(ii) Choice Based Credits System, Semester system, Grading.
(iii) Role of UGC, NAAC and Accreditation
(iv) Quality Assurance in Higher Education
(v) ICT in Higher Education

UNIT 4: Educational Management System

(i) Funding and management of Higher Education
(ii) Open and Distance Learning System: Policy and Development-Role of IGNOU.
(iii) Research in higher education-problems and issues- Role of ICSSR, UGC, Association of Indian Universities
(iv) Capacity Building of Teachers in Higher Education.

PRACTICAL

- Analysis of any Policy Document being implemented in the field of Higher Education in India

NB: It will be evaluated by both Internal and External examiners

Text Books

- Rao, K.Sudha (Ed.) (2002). Educational policies in India: Analysis and review of promise and performance. New Delhi: NUEPA.

Reference Books

- Government of India, Ministry of Human Resource Development. 2011a. 'Indian Institutes of Development'. Available at http://mhrd.gov. in/itt_higher_english.
- Government of India, Ministry of Statistics and Programme Implementation. No date. NSS Survey Reports. Available at http:// mospi.nic.in/Mospi_New/site/inner. aspx?status=3&menu_id=31.
- Cheney, G. R., with B. B. Ruzzi and K. Muralidharan. 2005. India Education Report. NCEE (National Center on Education and the Economy). Available at http://www.ncee. org/wp-content/uploads/ 2013/10/ IndiaEducation-Report.pdf.
- UCG (University Grants Commission). 2008. Higher Education in India: Issues Related to Expansion, Inclusiveness, Quality and Finance. New Delhi: University Grants Commission. Available at http://www.ugc.ac.in/oldpdf/pub/report/12. pdf.
- Agarwal, P. 2006. 'Higher Education in India: The Need for Change'. ICRIER Working Paper No. 180, June. Delhi: Indian Council for Research on International Economic Relations.
- BhallaVeena& et al (1998), Accountability and Autonomy in Higher Education, AIU.
- Country paper (1998), Higher Education in India: Vision & Action, presented in UNESCO world conference of Higher Education in the Twenty-first century, Paris 5-9th Oct 1998, National Commission for Cooperation with UNESCO.
- UNESCO (1998), report on Higher Education in the Twentieth First Century Vision & Actions held at Paris 5-9th Oct 1998, UNESCO.
- Meek, V Lynn (2000), Diversity and marketisation of higher education: incompatible concepts? Higher Education Policy, 13 (2000), p-25 & 26.
- Government of India, Ministry of Human Resource Development (2005), Report of the CABE Committee on Autonomy of Higher Education Institutions, Department of Secondary and Higher Education, New Delhi, June.
- Tilak, J.B.G. (1996), "Higher Education under Structural Adjustment", Journal of Indian School of Political Economy 8 (2) (April-June): 266-93.
- UGC (2005), University Development in India: Basic Facts and Figures (1995-96 to 2001-02), University Grants Commission, Information & Statistics Bureau, New Delhi, November

Discipline Specific Elective Paper-IV

INCLUSIVE EDUCATION

Learning Objectives

On completion of the course the students shall be able to:

- Define meaning and scope of inclusive education.
- identify the assumptions of disability underlying current general and special education practices

- understand the various suggestions given by different recent commissions on education of children with disabilities for realizing the concept of "Universalization of Education";
- explore and utilize pedagogical approaches that can support students with a variety of learning profiles in respectful ways
- explain the meaning and implications of universal design in learning (UDL) for classroom pedagogy
- examine the different support services and collaboration for inclusive education

UNIT 1: Meaning, Genesis and Scope Inclusive Education

(i) Special education and inclusive education: Concept and Principles
(ii) Historical developments of special and inclusive education in India.
(iii) Medical and social models of disability
(iv) Examining the practice of labeling
(v) Social, psychological and educational contexts of inclusion

UNIT 2: Polices & Frameworks Facilitating Inclusive Education

(i) International Declarations: Universal Declaration of Human Rights (1948), World Declaration for Education for All (1990)
(ii) International Conventions: United Nations Convention of Rights of Persons with Disabilities (UNCRPD) (2006)
(iii) International Frameworks: Salamanca Framework (1994), Biwako Millennium Framework of Action (2002)
(iv) Constitutional Obligations; RCI Act 1992; PwD 1995 and NTA 1999; RTE-SSA and RPD Act. 2016.

UNIT 3: Understanding and Support Needs of Students with Disability

(i) Understanding and support needs of students with different Labels of Disability including: Autism, Learning Disabilities, Speech & Hearing Disability, Blindness, and Intellectual Disabilities in inclusive classroom.

UNIT 4: Frameworks, Support and Collaboration for Inclusive Education

(i) Universal Design for Learning: Multiple Means of Access, Expression, Engagement & Assessment
(ii) Principles of Differentiated Instruction and Assessment
(iii) Capacity Building of Teachers for Inclusive Education
(iv) Assistive Technology & Devices for Inclusive Education

PRACTICAL

- Visit to a centre for students with special needs (special school/special institute). Observe the process of teaching learning and write a report.

NB: It will be evaluated by both Internal and External examiners

Text Books

- Panda, K.C. (nd). *Education of Exceptional Children*
- Daniels, H. (1999) . *Inclusive education*. London: Kogan.

- Mangal, S.K. (2013). Exceptional Childred. New Delhi: PHI Learning Pvt. Ltd.

Reference Books

- Bartlett, L. D., & Weisentein, G. R. (2003). *Successful inclusion for educational leaders*. New Jersey: Prentice Hall.
- Deiner, P. L. (1993). *Resource for Teaching Children with Diverse Abilities*. Florida: Harcourt Brace and Company.
- Dessent, T. (1987). *Making Ordinary School Special*. Jessica Kingsley Pub.
- Gargiulo, R.M. *Special Education in Contemporary Society: An Introduction to Exceptionality*. Belmont: Wadsworth.
- Gartner, A., & Lipsky, D.D. (1997). *Inclusion and School Reform Transferring America's Classrooms*. Baltimore: P. H. Brookes Publishers.
- Giuliani, G.A. & Pierangelo, R. (2007). *Understanding, Developing and Writing IEPs*. Corwin press:Sage Publishers.
- Gore, M.C. (2004) . *Successful Inclusion Strategies for Secondary and Middle School Teachers,* Crowin Press, Sage Publications.
- Hegarthy, S. & Alur, M. (2002). *Education of Children with Special Needs: from Segregation to Inclusion*. Corwin Press, Sage Publishers.
- Karant, P., & Rozario, J. ((2003). *Learning Disabilities in India*. Sage Publications.
- Karten, T. J. (2007). *More Inclusion Strategies that Work*. Corwin Press, Sage Publications.
- King□Sears, M. (1994). *Curriculum□Based Assessment in Special Edcuation*. California: Singular Publications.
- Kluth, P. (2009). *The autism checklist: A practical reference for parents and teachers.* San Francisco, CA: Jossey-Bass.
- Lewis, R. B., & Doorlag, D. (1995). *Teaching Special Students in the Mainstream*. 4th Ed. New Jersey: Pearson.
- Rayner, S. (2007). *Managing Special and Inclusive Education*, Sage Publications.
- Rose, D. A., Meyer, A. & Hitchcock, C. (2005). *The Universally Designed Classroom: Accessible Curriculum and Digital Technologies.* Cambridge, MA: Harvard Education Press.
- Ryandak, D. L. & Alper, S. (1996). Curriculum Content for Students with Moderate and Severe Disabilities in Inclusive Setting. Boston, Allyn and Bacon.
- Thousand, J., Villa, R., & Nevin, A. (2007). *Differentiating instruction: Collaborative planning and teaching for universally designed learning*. Thousand Oaks, CA: Corwin Press.
- Turnbull, A., Turnbull, R., Turnbull, M., & Shank, D.L. (1995). *Exceptional Lives: Special Education in Today's Schools*. 2nd Ed. New Jersey: Prentice□Hall.Inc
- Udvari-Solner, A. & Kluth, P. (2008). *Joyful Learning: Active and collaborative learning in inclusive classrooms*. Thousand Oaks, CA: Corwin Press.

DSE Paper – IV

DISSERTATION/ RESEARCH PROJECT

(College can give this choice only for students with above 60% aggregate marks)

The students will select a research project on any Educational issue or problem or topic and prepare a report. The project will be prepared based on proposal already developed in Semester-III, Core-6.

Distribution of Marks will be as follows:

Item	**Total**
Report	75
Viva-voce	25
Total	**100**

The assessment of students' performance will be made jointly by the external and internal examiners.

Generic Elective Paper I

EDUCATIONAL PHILOSOPHY

Learning Objectives

On completion of this course, the learners shall be able to:

- State and analyse the meaning of education and form own concept on education

- Explain philosophy as the foundation of education
- Analyse aims of education
- Describe the essence of different formal philosophies and draw educational implications
- Compare and contrast Indian and western philosophies of education

UNIT 1: Education in Philosophical Perspective

(i) Etymological meaning of education

(ii) Narrower and broader meaning of education, Lifelong Education

(iii) Aims of Education- Individual and Social Aims of Education

(iv) Meaning and nature of philosophy

(v) Branches of Philosophy- Metaphysics, Epistemology and Axiology, and its educational implications

(vi) Functions of Philosophy in relation to education

UNIT 2: Formal Schools of Philosophy and their Educational Implications

(i) Idealism, Naturalism, Pragmatism with reference to:

(ii) Aims of Education, Curriculum, Methods of Teaching, Role of Teacher, Discipline

UNIT 3: Indian Schools of Philosophy and their Educational Implications

(i) Common Characteristics of Indian Philosophy

(ii) Sankhya, Vedanta, , Buddhism, Jainism with reference to:

(iii) Philosophical tenets, Aims of education, Curriculum, Methods of Teaching, Role of Teacher

UNIT 4: Educational Thought of Western and Indian Thinkers

(i) Plato

(ii) Dewey

(iii) Gopabandhu Das

(iv) Gandhi

(v) Tagore

(vi) Aurobindo

PRACTICAL

- Field visit to a seat of learning in the locality and prepare report.

NB: It will be evaluated by both the internal and External examiners.

Text Books

- Safaya, R.N. & Shaida, B.D. (2010). *Modern Theory and Principles of Education*. New Delhi: Dhanpatrai Publishing Company Pvt. Ltd. Nayak, B.K. (2018).
- Ravi, Samuel.S. (2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Nayak, B.K . (ND). *Text Book of Foundation of Education.* Cuttack, Odisha: Kitab Mhal.

Reference Books

- Aggrawal, J.C. (2013). Theory and principle of education. New Delhi: Vikash Publishing House Pvt Ltd.
- Anand, C.L. *et.al*. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dash, B.N. (2011) Foundation of education, New Delhi; Kalyani Publishers.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Krishnamurthy, J. (1953). Education and significance of life. New Delhi: B.I. Publications
- Kumar Krishna (1996). Learning from conflict. New Delhi: Orient Longman.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson. Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Peters, R.S. (1967). The Concept of education. London: Routledge Kegan & Paul. Radhakrishnan, S. Indian philosophy Vol. I and Vol. II
- Ross, James S.(1981). Ground work of educational theory.Delhi: Oxford University Press Rusk, Robert R., Philosophical bases of education, London: Oxford University Press.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling Publishers Pvt. Limited.
- Wingo, G. Max (1975). Philosophies of education. New Delhi: Sterling Publisher Pvt. Limited.

Generic Elective Paper II

EDUCATIONAL PSYCHOLOGY

Learning Objectives

On completion of this course, the students will:

- Explain the concept of educational psychology and its relationship with psychology.
- Understand different methods of educational psychology.
- Explain the concepts of growth and development of child and adolescence, and underlined general principles of growth and development.
- Describe briefly the periods and the typical characteristics ofgrowth and development during childhood and adolescence.
- Explain the theory of cognitive development and its educational implications.
- State the different forms and characteristics of individual differences and the ways of meeting the classroom issues arising out of the differences.
- Identify the learning needs during the different stages of development and adopt appropriate strategies in and out of school to meet the learning needs.

UNIT 1: Educational Psychology in Developmental Perspective

(i) Meaning, nature, scope and relevance of educational psychology
(ii) Methods of educational psychology- observation, experimentation, and case study
(iii) Application of educational psychology in understanding learner
(iv) Growth and Development-Concept, difference between growth and development, and principles of growth and development
(v) Characteristics of development during adolescence in different areas:
(vi) Physical, social, emotional and intellectual (with reference to Piaget)

UNIT 2: Intelligence, Creativity and Individual difference

(i) Individual difference-concept, nature, factors and role of education
(ii) Intelligence- meaning and nature of intelligence, concept of I.Q, theories of intelligence- Two factor theories, Guildford's structure of intelligence (SI) model, Gardner's multiple theory of intelligence.
(iii) Measurement of intelligence- individual and group test, verbal, non-verbal test
(iv) Creativity- meaning, nature and stages of creative thinking, strategies for fostering creativity

UNIT 3: Learning and Motivation

(i) Learning- meaning, nature and factors of learning
(ii) Theories of learning with experiment and educational implications-
(iii) Classical conditioning, operant conditioning, insightful learning and constructivist approach to learning
(iv) Motivation – concepts, types, and techniques of motivation

UNIT 4: Personality and Mental health

(i) Personality- meaning and nature of personality
(ii) Theories- type theory(Jung), trait theory(Allport)

(iii) Assessment of personality- subjective, objective and projective techniques
(iv) Mental health-concept, factors affecting mental health and role of teacher, mental health of teacher.
(v) Adjustment mechanism: Concept and Types

PRACTICAL

- Case study of an exceptional child and reporting

N.B: It will be evaluated by both the Internal and External examiners**.**

Text Books

- Chauhan, S.S. (1978). *Advanced educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Mangal, S.K. (2002). *Advanced educational psychology*. New Delhi: Prentice Hall of India.
- Woolfolk, A. (2015). *Educational psychology (9th Ed.)*. New Delhi: Pearson Publication

Reference Books

- Aggarwal, J.C. (2014). Essentials of Educational Psychology. New Delhi: Vikas Publishing House Pvt. Ltd.
- Attri, A.K. (2015). *Psychology of development and learning*. New Delhi: APH Publishing Corporation.
- Bernard, P.H. (1970). *Mental Health in the class room*. New York: McGraw Hill.
- Biehier, R.F. & Snowman, J., (1997). *Psychology applied to teaching*. New York: Houghton MIflin.
- Bigge, M.L., *Psychological foundations of education*, Harper and Row, New York, 1985.
- Chandraiah,K.(2011). *Emotional intelligence*. New Delhi: APH Publishing Corporation.
- Dececco, J.P. & Crawford, W.R. (1997). *Psychology of learning and institution*. New Delhi: Prentice Half of India.
- Good T., (1990). *Educational psychology*. Longman, New York, 1990.
- Lindgren, H.C. (1980). *Educational psychology in the classroom*. New York: Oxford University Press.
- Mouly, G.J. (1982). *Psychology for teaching*. Allyn & Bacon, Boston.
- Rothstein, P.R. (1990). *Educational psychology*. New York: McGraw Hill..
- Salvin, R, (1990). *Educational psychology: theory into practice,* N.J.: Prentice hall, Englewood Cliffs,
- Snowman and Biehler **(---).** *Psychology applied to teaching*……..
- Sprint hall, RC. & Sprint hall, NA, (1990). *Educational psychology, development approach*, New York: McGraw Hill.

Generic Elective Paper III

CONTEMPORARY TRENDS AND ISSUES IN INDIAN EDUCATION

Learning Objectives

On completion of this course the students will

- Understand the importance of pre-school and elementary school education. Analyze various problems and issues for ensuring quality education.
- State the importance of secondary education and analyze various problems and issues forensuring quality in secondary education.
- Enumerate the importance of higher education and analyze various problems and issues forensuring quality in higher education.
- Justify the importance of teacher education and analyze various problems and issues forensuring quality in teacher education.
- Analyze emerging concerns in Indian education.

UNIT 1: Pre-school and Elementary School Education

(i) Meaning, nature and importance of ECCE, problems and issues with regard to ECCE
(ii) Universalization of Elementary Education: efforts to achieve UEE, SSA
(iii)Problems and issues in implementing Right to Education Act 2009.
(iv)Problems and issues in bringing the community to school, role of SMC
(v) Problems in ensuring equity and quality of elementary education

UNIT 2: Secondary and Higher Secondary Education

(i) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and ensuring secondary education for all.
(ii) Role of School Management and Development Committee (SMDC)
(iii)Shifting the teaching learning process from teacher centered to learner centered and activity based classroom –problems and issues
(iv)Problems and issues with regard to vocationalisation of secondary and higher secondary education
(v) Examination reforms at the secondary level
(vi)Widening the access to secondary education through National Open School

UNIT 3: Higher Education and Teacher Education

(i) Challenges in Higher education- expansion, quality and inclusion
(ii) Role of RUSA and NAAC for quality assurance in Higher education
(iii)Higher education through open and distance learning mode
(iv)Elementary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009
(v) Secondary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009

UNIT 4: Emerging Concerns

(i) Examination system: defects and reforms for making examination system flexible (internal assessment and semester system , grading, open book examination, online examination)
(ii) Choice Based Credits System (CBCS):Concept, Learning Objectives, importance, problems and issues.
(iii) Human Rights Education: Concept, Learning Objectives, importance, problems and issues.
(iv) Life-Skill Education: Concept, Learning Objectives, importance, problems and issues.
(v) Peace Education: Concept, Learning Objectives, importance, problems and issues.

PRACTICAL

- Study of Perception of Stakeholder's of Education on any of the current issues and concerns, and reporting.

NB: It will be evaluated both by the Internal and External Examiners.

Text Books

- Kumar, Chanchal & Sachedeva, M.S. (2017). *Vision of Secondary Education In India in the context of 21st century*. Twentyfirst Century Publications; First Edition edition (2015)
- Pathak, K. R. (2007). *Education in the Emerging* India. New Delhi: Atlantic Publishers**.**

  Saxena, V. (2011). Contemporary trends in education: A handbook for educators. New Delhi: Pearson.

Reference Books

- Broudy, H.S. (1977) *Types of knowledge and purposes of education*. In R.C. Anderson, R.J., Spiro and W.E. Montanaque (Eds.) Schooling and the acquisition of knowledge (PP. Hillsdale, NJ: Erlbaum.
- Bruner, J.S. (1996). *The culture of education*. Cambridge, M.A.: Harvard University Press.
- Butchvarov, P. (1970). *The concept of knowledge*. Evanston, Illinois, North Western University Press.
- Dearden R. F. (1984). *Theory and practice in Education*. Routledge K Kegan & Paul.
- Delors, Jacques, et al; (1996). *Learning: the Treasure within report of the international commission on education for 21st century*, UNESCO.
- Illich, I. (1996). *Deschooling society*. Marion Boyers, London.
- Matheson, David (2004). *An Introduction to the study of education* (2 Ed.). David Fulton Publish.
- MHRD (2008). *Framework for implementation of Rashtriya Madhyamik Shiksha Abhiyan: A scheme for universalisation of access to and improvement of quality at the secondary stage.* New Delhi: Department of School Education and Literacy.
- MHRD (2011). *Sarva Shiksha Abhiyan: Framework for implementation based on the Right of Children to Free and Compulsory Education Act, 2009*. New Delhi: Department of School Education and Literacy.
- MHRD, (1992). *Programme of action*. Govt. of India, New Delhi.

- MHRD, Gov. of India (1992). *National policy on education* (revised) New Delhi: MHRD.
- Ministry of Law and Justice (2009). *Right to education Act 2009*. New Delhi: Govt of India.
- Naik, J.P. (1975). *Equality, quality and quantity: The elusive triangle of Indian education.* Allied Publications, Bombay.
- NCERT (2005). *National curriculum framework 2005*. New Delhi: NCERT.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- Slatterry, P. and Dana R. (2002). *Ethics and the foundations of education-Teaching Convictions in a postmodern world*. Allyn & Bacon.
- UN (2015). *The sustainable development goals (SDGs) – UNDP*. United Nations
- UNESCO (1998). *Educating for a sustainable future: A transdisciplinary vision for concerted action*. Paris: UNESCO.
- UNICEF (2000). *Defining quality in education*. New York: Programme Division (Education), Unicef.
- Wall, Edmund (2001). *Educational theory: philosophical and political Perspectives*. Prometheus Books.
- WHO (1991). *Comprehensive school health programme*. New Delhi: World Health Organization Regional Office.
- Winch, C. (1996). *Key concepts in the philosophy of education*. Routledge.
- Yadav, M. S. & Lakshmi, T. K. S. (1995). Education: Its disciplinary identity. *Journal of Indian Education,* XXI (*1*), 01-21.

Generic Elective Paper IV

EDUCATIONAL ASSESSMENT AND EVALUATION

Learning Objectives

On completion of this course, the students will.

- State the nature, purpose and types of educational assessment and evaluation.
- Develop and use different types of tools and techniques for continuous and comprehensive assessment of learning in the school situation.
- Explain the importance of assessment for learning and its processes for enhancing the quality of learning and teaching.
- Describe the characteristic of a good test.
- Analyze the trends and issues in learning and learner assessment.
- Analyze and interpret results of the assessment using standard score.
- Illustrate the principles of test construction in education.

UNIT 1: Assessment and Evaluation in Education

(i) Understanding the meaning and purpose of test, measurement, assessment and evaluation
(ii) Scales of measurement- nominal, ordinal, interval and ratio
(iii) Types of test- teacher made and standardized
(iv) Approaches to evaluation- placement, formative, diagnostic and summative
(v) Types of evaluation- norm referenced and criterion referenced
(vi) Concept and nature of continuous and compressive evaluation

UNIT 2: Instructional Learning Objectives

(i) Taxonomy of instructional Learning Objectives with special reference to cognitive domain
(ii) Criteria of selecting appropriate Learning Objectives, and stating of general and specific instructional Learning Objectives
(iii) Relationship of evaluation procedure with Learning Objectives
(iv) Difference between objective based objective type test and objective based essay type test

UNIT 3: Tools and Techniques of Assessment and construction of Test

(i) Steps of test construction: planning, preparing, trying out and evaluation
(ii) Principles of construction of objective type test items- matching, multiple choice, completion and true – false
(iii) Principles of construction of essay type test
(iv) Non- standardized tools: Observation schedule, interview schedule, rating scale, check list, portfolio and rubrics.

UNIT 4: Characteristics of a good Test

(i) Validity-concept, types and methods of validation
(ii) Reliability- concept and methods of estimating reliability
(iii) Objectivity- concept and methods of estimating objectivity
(iv) Usability- concept and factors ensuring usability

PRACTICAL

- Construction of Unit test on a school subject based on Blueprint and Reporting.

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C. (1997). *Essentials of examination system, evaluation, tests and measurement*. New Delhi: Vikas Publishing House Pvt Ltd.
  Gronlund, N.E. (2003). *Assessment of student Achievement*. Boston: Allyn & Bacon
- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Anastasi, A.(1976). Psychological testing. New York: Macmillan Publishing Co.
- Anderson, L.W. (2003). Classroom assessment: Enhancing the quality of teacher decision making.
- Banks, S.R. (2005). *Classroom assessment: issues and PRACTICES*. Boston: Allyn & Bacon.
- Blooms, B.S.(1956). *Taxonomy of educational Learning Objectives*. New York: Longman Green and Company
- Cohen, R.J., Swerdlik, M.E., & Phillips, S.M. (1996). *Psychological testing and assessment. an introduction to the tests and measurement*. California: Mayfield Publishing Co.
- Earl, L.M. (2006). *Assessment as learning: using classroom assessment to maximize*

student learning. Thousand Oaks, California: Corwin Press

- Hopkins, KD. (1998). *Educational and psychological measurement and evaluation.* Boston: Allyn and Bacon.
- Linn, R.L. & Gronlund, N.E. (2000). *Measurement and assessment in teaching.* London: Merrill Prentice Hall.
- Macmillan, J.H. (1997). *Classroom assessment, principles and practice for effective instruction.* Boston: Allyn and Bacon
- Mohan, R. (2016). *Measurement evaluation and assessment in education*. Delhi: PHI Learning Pvt. Ltd.
- National Council of Educational Research and Training (2006). *Position paper: Examination Reforms.* New Delhi: NCERT
- Noll, N.H. S cannell, D.P. & Craig, RC. (1979). *Introduction to educational measurement.* Boston: Houghton Miffin.

Course structure of UG Education Pass

Semester	Course	Course Name	Credits	Total marks

I	DSC-I DSC-I Practical	Educational philosophy	04 02	75 25
II	DSC-II DSC-II Practical	Educational psychology	04 02	75 25
III	DSC-III DSC-III Practical	Educational sociology	04 02	75 25
IV	DSC-IV DSC-IV Practical	Changing pedagogical perspective	04 02	75 25
V	DSE-I DSE-I Practical	Contemporary trends and issues in Indian education	04 02	75 25
VI	DSE-II DSE-II Practical	Educational assessment and evaluation	04 02	75 25
			30	**600**

Education Papers for PASS students

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper - Midterm : 15 marks, End term : 60 marks, Practical: 25 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper – 40 hours + 20 hours practical

Discipline Specific Core Paper I

EDUCATIONAL PHILOSOPHY

Learning Objectives

On completion of this course, the learners shall be able to:

- State and analyse the meaning of education and form own concept on education
- Explain philosophy as the foundation of education
- Analyse aims of education
- Describe the essence of different formal philosophies and draw educational implications
- Compare and contrast Indian and western philosophies of education

UNIT 1: Education in Philosophical Perspective

(i) Etymological meaning of education

(ii) Narrower and broader meaning of education, Lifelong Education

(iii) Aims of Education- Individual and Social Aims of Education

(iv) Meaning and nature of philosophy

(v) Branches of Philosophy- Metaphysics, Epistemology and Axiology, and its educational implications

(vi) Functions of Philosophy in relation to education

UNIT 2: Formal Schools of Philosophy and their Educational Implications

(i) Idealism, Naturalism, Pragmatism with reference to:

(ii) Aims of Education, Curriculum, Methods of Teaching, Role of Teacher, Discipline

UNIT 3: Indian Schools of Philosophy and their Educational Implications

(i) Common Characteristics of Indian Philosophy

(ii) Sankhya, Vedanta, , Buddhism, Jainism with reference to:

(iii) Philosophical tenets, Aims of education, Curriculum, Methods of Teaching, Role of Teacher

UNIT 4: Educational Thought of Western and Indian Thinkers

(i) Plato

(ii) Dewey

(iii)Gopabandhu Das

(iv)Gandhi

(v) Tagore

(vi)Aurobindo

PRACTICAL

- Field visit to a seat of learning in the locality and prepare report.

NB: It will be evaluated by both internal and External examiners.

Text Books

- Safaya, R.N. & Shaida, B.D. (2010). *Modern Theory and Principles of Education*. New Delhi: Dhanpatrai Publishing Company Pvt. Ltd. Nayak, B.K. (2018).
- Ravi, Samuel.S. (2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Nayak, B.K (2012). *Text Book of Foundation of Education*. Cuttack, Odisha: Kitab Mhal.

Reference Books

- Aggrawal, J.C. (2013). Theory and principle of education. New Delhi: Vikash Publishing House Pvt Ltd.
- Anand, C.L. *et.al*. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dash, B.N. (2011) Foundation of education, New Delhi; Kalyani Publishers.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/'92). National policy on education. New Delhi: MHRD.
- Krishnamurthy, J. (1953). Education and significance of life. New Delhi: B.I. Publications
- Kumar Krishna (1996). Learning from conflict. New Delhi: Orient Longman.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th

Edn.). Boston: Houghton Mifflin Co.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson. Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Peters, R.S. (1967). The Concept of education. London: Routledge Kegan & Paul. Radhakrishnan, S. Indian philosophy Vol. I and Vol. II
- Ross, James S.(1981). Ground work of educational theory.Delhi: Oxford University Press Rusk, Robert R., Philosophical bases of education, London: Oxford University Press.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling Publishers Pvt. Limited.
- Wingo, G. Max (1975). Philosophies of education. New Delhi: Sterling Publisher Pvt.Limited.

Discipline Specific Core Paper II

EDUCATIONAL PSYCHOLOGY

Learning Objectives

On completion of this course, the students will:
- Explain the concept of educational psychology and its relationship with psychology.
- Understand different methods of educational psychology.
- Describe the theoretical perspectives of educational psychology.
- Explain the concepts of growth and development of child and adolescence, and underlined general principles of growth and development.
- Describe briefly the periods and the typical characteristics ofgrowth and development during childhood and adolescence.
- Explain the theory of cognitive development and its educational implications.
- State the different forms and characteristics of individual differences and the ways of meeting the classroom issues arising out of the differences.
- Identify the learning needs during the different stages of development and adopt appropriate strategies in and out of school to meet the learning needs.

UNIT 1: Educational Psychology in Developmental Perspective

(i) Meaning, nature, scope and relevance of educational psychology
(ii) Methods of educational psychology- observation, experimentation, and case study
(iii) Application of educational psychology in understanding learner
(iv) Growth and Development-Concept, difference between growth and development, and principles of growth and development
(v) Characteristics of development during adolescence in different areas:
(vi) Physical, social, emotional and intellectual (with reference to Piaget)

UNIT 2: Intelligence, Creativity and Individual difference

(i) Individual difference-concept, nature, factors and role of education
(ii) Intelligence- meaning and nature of intelligence, concept of I.Q, theories of intelligence- Two factor theories, Guildford's structure of intelligence (SI) model, Gardner's multiple theory of intelligence.
(iii) Measurement of intelligence- individual and group test, verbal, non-verbal test
(iv) Creativity- meaning, nature and stages of creative thinking, strategies for fostering creativity

UNIT 3: Learning and Motivation

(i) Learning- meaning, nature and factors of learning
(ii) Theories of learning with experiment and educational implications-
(iii) Classical conditioning, operant conditioning, insightful learning and constructivist approach to learning
(iv) Motivation – concepts, types, and techniques of motivation

UNIT 4: Personality and Mental health

(i) Personality- meaning and nature of personality
(ii) Theories: type theory and trait theory
(iii) Assessment of personality- subjective, objective and projective techniques
(iv) Mental health-concept, factors affecting mental health and role of teacher, mental health of teacher.
(v) Adjustment Mechanism: Concept and Types

PRACTICAL

- Administration and interpretation of any psychological test relating to Intelligence OR Personality

N.B: It will be evaluated by both the Internal and External examiners.

Text Books

- Chauhan, S.S. (1978). *Advanced educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Mangal, S.K. (2002). *Advanced educational psychology*. New Delhi: Prentice Hall of India.
- Aggarwal, J.C. (2014). *Essentials of educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.

Reference Books

- Woolfolk, A. (2015). Educational psychology (9th Ed.). New Delhi: Pearson Publication
- Attri, A.K. (2015). Psychology of development and learning. New Delhi: APH Publishing Corporation.
- Bernard, P.H. (1970). Mental Health in the class room. New York: McGraw Hill.
- Biehier, R.F. & Snowman, J., (1997). Psychology applied to teaching. New York:

Houghton Mifflin.
- Bigge, M.L., Psychological foundations of education, Harper and Row, New York, 1985.
- Chandraiah,K.(2011). Emotional intelligence. New Delhi: APH Publishing Corporation.
- Dececco, J.P. & Crawford, W.R. (1997). Psychology of learning and institution. New Delhi: Prentice Half of India.
- Good T., (1990). Educational psychology. Longman, New York, 1990.
- Lindgren, H.C. (1980). Educational psychology in the classroom. New York: Oxford University Press.
- Mouly, G.J. (1982). Psychology for teaching. Allyn & Bacon, Boston.
- Salvin, R, (1990). Educational psychology: theory into practice, N.J.: Prentice hall, Englewood Cliffs,
- Sprint hall, RC. & Sprint hall, NA, (1990). Educational psychology, development approach, New York: McGraw Hill

Discipline Specific Core Paper III

EDUCATIONAL SOCIOLOGY

Learning Objectives

On completion of this course, the students will:

- State the relationship between education and society.
- Understand the meaning of Educational Sociology and function of education as a social system.
- State different agencies of education and their functions.
- Justify the importance of education for social change.
- Describe the role of education in modernization and globalization.
- Describe the function of education to ensure equality and equity.

UNIT 1: Education and Society

(i) Relationship between education and society, school as a miniature society
(ii) Educational Sociology- Concept, nature, scope and importance;
(iii) Relationship between education and sociology.
(iv) Education as a process of Socialization.
(v) Education and Politics, Education and Economic Development

UNIT 2: Agencies of Education

(i) Family- Importance, functions and role for education and socialization of the children
(ii) School - Importance, functions and role for education and socialization of the children
(iii) Society- Importance, functions and role for education and socialization of the children
(iv) Mass Media- Importance, functions and role for education and socialization of the children

UNIT 3: Education, Social change and Modernization

(i) Concept of social change and factors affecting Social Change
(ii) Education as an instrument of social change and social control
(iii) Concept and Attributes of modernization
(iv) Education for accelerating the process of modernization
(v) Impact of Globalization, Liberalization, and Privatization on Education

UNIT 4: Equalization of Educational opportunities for ensuring equity and Inclusion

(i) Concept of equality, equity and inclusion: its educational implication
(ii) Ensuring equality in the Education of SC and ST
(iii) Education for Women Empowerment
(iv) Inclusive Education with reference to children with special needs (CWSN)

PRACTICAL

- Field Visit: Study of a social unit (Home/School/Village/slum) and reporting.

NB: It will be evaluated by both the internal and external examiners

Text Books

- Aggrawal, J.C.(2013). *Theory and principle of education*. New Delhi: Vikash Publishing House Pvt Ltd.
- NCERT (2014). Basics in Education. New Delhi: Author.
- Pathak, R. P. (2012). *Philosophical and sociological principles of education*. Delhi: Pearson. Pathak

Reference Books

- Anand, C.L. et.al. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
  Ravi, Samuel.S.(2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/'92). National policy on education. New Delhi: MHRD.
  Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Safaya, R.N. & Shaida, B.D. (2010), Modern theory and principles of education. New Delhi: Dhanpati Publising Company Pvt. Ltd.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.

Saraswati, T.S. (Ed.) (1999). Culture, socialization and human development. Theory, research and applications in India. New Delhi: Sage Publication.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling Publishers Pvt. Limited.

Discipline Specific Core Paper IV

CHANGING PEDAGOGICAL PERSPECTIVE

Learning Objectives

- On completion of this course, the students will:
- Explain the concept of pedagogy
- Differentiate pedagogy from other allied concepts
- Explain different teaching task with example
- Establish relationship between teaching and learning
- List out different approaches and methods of teaching
- Prepare a lesson plan following different designs

UNIT 1: Concept of Teaching and Learning

(i) Meaning and definition of teaching and learning
(ii) Relationship between teaching and learning
(iii) Variables involved in teaching task: independent, dependent and intervening
(iv) Phases of teaching: Pre- active, inter- active and post- active
(v) Levels of teaching: memory, understanding and reflective
(vi) Lesson plan design- The Herbartian steps, 5 E and ICON design model

UNIT 2: Theories of Teaching

(i) Meaning and nature of teaching theory
(ii) Types of teaching theories:
(iii) Formal theories of teaching- communication theory of teaching
(iv) Descriptive theories of teaching– Gagne's hierarchical theory of instruction and Bruner's cognitive theory of instruction
(v) Normative theories of teaching - Mitra's psychological theory of teaching and Clarke's general theory of teaching

UNIT 3: Principles and maxims of teaching

(i) General principles of teaching
(ii) Psychological principles of teaching
(iii) Maxims of teaching
(iv) Core teaching skills: Introducing the lesson, explaining, illustrating with examples, stimulus variation, and reinforcement, questioning, and probing questions, closure.

UNIT 4: Approaches and methods of Teaching

(i) Concept of approach, method, strategy and techniques
(ii) Methods of teaching: inductive-deductive, analytic- synthetic, problem solving and project
(iii) Shift in focus from teaching to learning- constructivist approach to learning

PRACTICAL

- Preparation of Rating Scale/ Observation Schedule and evaluate a classroom teaching and reporting.

NB: It will be evaluated by both the internal and external examiners

Text Books

- Mangal, S.K. and Mangal, U.(2010). Essentials of Educational Technology. New Delhi, PHI Learning Pvt. Limited.
- Walia, J.S. (2013). *Educational Technology*. Jalandhar, Punjab: Ahim Publications.
- Sharma, R.A.(1986). *Technology of Teaching*. International Publishing House, Meerut.

Reference Books

- Aggarwal, J.C.(1995). Essentials of Educational Technology, Vikash Publishing House, New Delhi
- Chauhan, S.S.(1995). Innovations of teaching learning process, Vikash Publishing House, New Delhi
- Kochar, S.K.(2011) Methods and Techniques of teaching, Sterling Publisher Pvt. Ltd., New Delhi
- Mangal, S.K.(1988) Foundations of Educational Technology, Ludhiana, Tandan Publications
- Nageswar Rao, S., Sreedhar, P. & Rao, B.(2007). Methods and techniques of teaching, Sonali Publications, New Delhi
- Oliver,R.A. (1963) Effective teaching, JM Dent & Sons
- Pathak, R.P. & Chaudhary, J. (2012) Educational Technology, Pearson, New Delhi
- Ryburn, W.M.(1955) Principles of Teaching, Geoffrey Cembridge, OUP
- Sampath,K, Pannir Salvam,A.,& Santhanam, S.(1981) introduction to Educational Technology, Sterling Publisher, New Delhi

Discipline Specific Elective Paper I

CONTEMPORARY TRENDS AND ISSUES IN INDIAN EDUCATION

Learning Objectives

On completion of this course the students will

- Understand the importance of pre-school and elementary school education. Analyze various problems and issues for ensuring quality education.
- State the importance of secondary education and analyze various problems and issues forensuring quality in secondary education.
- Enumerate the importance of higher education and analyze various problems and issues forensuring quality in higher education.
- Justify the importance of teacher education and analyze various problems and issues forensuring quality in teacher education.
- Analyze emerging concerns in Indian education.

UNIT 1:Pre-school and Elementary School Education

(i) Meaning, nature and importance of ECCE, problems and issues with regard to ECCE
(ii) Universalization of Elementary Education: efforts to achieve UEE, SSA
(iii)Problems and issues in implementing Right to Education Act 2009.
(iv)Problems and issues in bringing the community to school, role of SMC
(v) Problems in ensuring equity and quality of elementary education

UNIT 2: Secondary and Higher Secondary Education

(i) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and ensuring secondary education for all.
(ii) Role of School Management and Development Committee (SMDC)
(iii)Shifting the teaching learning process from teacher centered to learner centered and activity based classroom –problems and issues
(iv)Problems and issues with regard to vocationalisation of secondary and higher secondary education
(v) Examination reforms at the secondary level
(vi)Widening the access to secondary education through National Open School

UNIT 3: Higher Education and Teacher Education

(i) Challenges in Higher education- expansion, quality and inclusion
(ii) Role of RUSA and NAAC for quality assurance in Higher education
(iii)Higher education through open and distance learning mode
(iv)Elementary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009
(v) Secondary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009

UNIT 4: Emerging Concerns

(i) Examination system: defects and reforms for making examination system flexible (internal assessment and semester system , grading, open book examination, online

examination)

(ii) Choice Based Credits System(CBCS):Concept, Learning Objectives, importance, problems and issues.

(iii) Human Rights Education: Concept, Learning Objectives, importance, problems and issues.

(iv) Life-Skill Education: Concept, Learning Objectives, importance, problems and issues.

(v) Peace Education: Concept, Learning Objectives, importance, problems and issues.

PRACTICAL

- Study of perception of Stakeholder's of Education on any of the current issues based on Pass DSE-1 and concerns, and reporting.

NB: It will be evaluated both by the Internal and External Examiners.

Text Books

- Kumar, Chanchal & Sachedeva, M.S. (2017). *Vision of Secondary Education In India in the context of 21st century*. Twentyfirst Century Publications; First Edition edition (2015)
- Pathak, K. R. (2007). *Education in the Emerging* India. New Delhi: Atlantic Publishers**.**
- Saxena, V. (2011). *Contemporary trends in education: A handbook for educators*. New Delhi: Pearson.

Reference Books

- Broudy, H.S. (1977) *Types of knowledge and purposes of education*. In R.C. Anderson, R.J., Spiro and W.E. Montanaque (Eds.) Schooling and the acquisition of knowledge (PP. Hillsdale, NJ: Erlbaum.
- Bruner, J.S. (1996). *The culture of education*. Cambridge, M.A.: Harvard University Press.
- Butchvarov, P. (1970). *The concept of knowledge*. Evanston, Illinois, North Western University Press.
- Dearden R. F. (1984). *Theory and practice in Education*. Routledge K Kegan & Paul.
- Delors, Jacques, et al; (1996). *Learning: the Treasure within report of the international commission on education for 21st century*, UNESCO.
- Illich, I. (1996). *Deschooling society*. Marion Boyers, London.
- Matheson, David (2004). *An Introduction to the study of education* (2 Ed.). David Fulton Publish.
- MHRD (2008). *Framework for implementation of Rashtriya Madhyamik Shiksha Abhiyan: A scheme for universalisation of access to and improvement of quality at the secondary stage.* New Delhi: Department of School Education and Literacy.
- MHRD (2011). *Sarva Shiksha Abhiyan: Framework for implementation based on the Right of Children to Free and Compulsory Education Act, 2009*. New Delhi: Department of School Education and Literacy.
- MHRD, (1992). *Programme of action*. Govt. of India, New Delhi.
- MHRD, Gov. of India (1992). *National policy on education* (revised) New Delhi: MHRD.

- Ministry of Law and Justice (2009). *Right to education Act 2009*. New Delhi: Govt of India.
- Naik, J.P. (1975). *Equality, quality and quantity: The elusive triangle of Indian education.* Allied Publications, Bombay.
- NCERT (2005). *National curriculum framework 2005*. New Delhi: NCERT.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- Slatterry, P. and Dana R. (2002). *Ethics and the foundations of education-Teaching Convictions in a postmodern world*. Allyn & Bacon.
- UN (2015). *The sustainable development goals (SDGs) – UNDP*. United Nations
- UNESCO (1998). *Educating for a sustainable future: A transdisciplinary vision for concerted action*. Paris: UNESCO.
- UNICEF (2000). *Defining quality in education*. New York: Programme Division (Education), Unicef.
- Wall, Edmund (2001). *Educational theory: philosophical and political Perspectives*. Prometheus Books.
- WHO (1991). *Comprehensive school health programme*. New Delhi: World Health Organization Regional Office.
- Winch, C. (1996). *Key concepts in the philosophy of education*. Routledge.
- Yadav, M. S. & Lakshmi, T. K. S. (1995). Education: Its disciplinary identity. *Journal of Indian Education,* XXI (*1*), 01-21.

Discipline Specific Elective Paper II

EDUCATIONAL ASSESSMENT AND EVALUATION

Learning Objectives

On completion of this course, the students will.

- State the nature, purpose and types of educational assessment and evaluation.
- Develop and use different types of tools and techniques for continuous and comprehensive assessment of learning in the school situation.
- Explain the importance of assessment for learning and its processes for enhancing the quality of learning and teaching.
- Describe the characteristic of a good test.
- Analyze the trends and issues in learning and learner assessment.
- Analyze and interpret results of the assessment using standard score.
- Illustrate the principles of test construction in education.

UNIT 1: Assessment and Evaluation in Education

(i) Understanding the meaning and purpose of test, measurement, assessment and evaluation
(ii) Scales of measurement- nominal, ordinal, interval and ratio
(iii) Types of test- teacher made and standardized
(iv) Approaches to evaluation- placement, formative, diagnostic and summative
(v) Types of evaluation- norm referenced and criterion referenced
(vi) Concept and nature of continuous and compressive evaluation

UNIT 2: Instructional Learning Objectives

(i) Taxonomy of Instructional Learning Objectives with special reference to cognitive domain
(ii) Criteria of selecting appropriate Learning Objectives, and stating of general and specific instructional Learning Objectives
(iii) Relationship of evaluation procedure with Learning Objectives
(iv) Difference between objective based, objective type test and objective based essay type test

UNIT 3: Tools and Techniques of Assessment and construction of Test

(i) Steps of test construction: planning, preparing, trying out and evaluation
(ii) Principles of construction of objective type test items- matching, multiple choice, completion and true – false
(iii) Principles of construction of essay type test
(iv) Non- standardized tools: Observation schedule, interview schedule, rating scale, check list, portfolio and rubrics.

UNIT 4: Characteristics of a Good Test

(i) Validity-concept, types and methods of validation
(ii) Reliability- concept and methods of estimating reliability
(iii) Objectivity- concept and methods of estimating objectivity
(iv) Usability- concept and factors ensuring usability

PRACTICAL

- Construction of Unit test on a school subject based on blueprint and reporting.

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C. (1997). *Essentials of examination system, evaluation, tests and measurement*. New Delhi: Vikas Publishing House Pvt Ltd.
- Goswami, M. (2011). *Measurement and evaluation in psychology and education*. Hyderabad: Neelkamal Publishers
  Gronlund, N.E. (2003). *Assessment of student Achievement*. Boston: Allyn & Bacon
- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Anastasi, A.(1976). Psychological testing. New York: Macmillan Publishing Co.
- Anderson, L.W. (2003). Classroom assessment: Enhancing the quality of teacher decision making.
- Banks, S.R. (2005). *Classroom assessment: issues and PRACTICES.* Boston: Allyn & Bacon.
- Blooms, B.S.(1956). *Taxonomy of educational Learning Objectives*. New York: Longman Green and Company
- Cohen, R.J., Swerdlik, M.E., & Phillips, S.M. (1996). *Psychological testing and*

assessment. an introduction to the tests and measurement. California: Mayfield Publishing Co.

- Earl, L.M. (2006). *Assessment as learning: using classroom assessment to maximize student learning*. Thousand Oaks, California: Corwin Press
- Hopkins, KD. (1998). *Educational and psychological measurement and evaluation.* Boston: Allyn and Bacon.
- Linn, R.L. & Gronlund, N.E. (2000). *Measurement and assessment in teaching.* London: Merrill Prentice Hall.
- Macmillan, J.H. (1997). *Classroom assessment, principles and practice for effective instruction.* Boston: Allyn and Bacon
- Mohan, R. (2016). *Measurement evaluation and assessment in education*. Delhi: PHI Learning Pvt. Ltd.
- National Council of Educational Research and Training (2006). *Position paper: Examination Reforms.* New Delhi: NCERT
- Noll, N.H. S cannell, D.P. & Craig, RC. (1979). *Introduction to educational measurement.* Boston: Houghton Miffin.

STATE MODEL SYLLABUS FOR UNDERGRADUATE COURSE IN ODIA

+3, Arts, Science & Commerce

(Under Choice Based Credit System)

ପସନ୍ଦ ଓ ଆସ୍ଥାଭିତ୍ତିକ ପାଠ୍ୟଖସଡ଼ା : ସ୍ନାତକ (ଓଡ଼ିଆ ସମ୍ମାନ)

୨୦୧୯-୨୦

CBCS : BA (Hons.) 2019-20

Core Course – ପ୍ରଧାନ ପାଠ୍ୟାଂଶ

ମୋଟ୍ ପତ୍ର ସଂଖ୍ୟା – ୧୪

ପ୍ରତ୍ୟେକ ପତ୍ର – ୧୦୦ ମୂଲ୍ୟାଙ୍କ ବିଶିଷ୍ଟ (୨୦ ନମ୍ବର ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃ ପର୍ଯ୍ୟାୟ ପରୀକ୍ଷା + ୮୦ ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମାନକ ଅନ୍ତିମ ପରୀକ୍ଷା)

ସମ୍ମାନ : ଜଣେ ସ୍ନାତକ – ସମ୍ମାନର (ଅନର୍ସ) ବିଦ୍ୟାର୍ଥୀ – ମୋଟ୍ ୧୪୦୦ ନମ୍ବରର ପରୀକ୍ଷା ଦେବେ ।

କ) **ଅତି କମ୍‌ରେ (ମୋଟ୍) ୫୦ଟି କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (ପିରିୟଡ୍)ରେ ଗୋଟିଏ ପତ୍ରର ପାଠଦାନ ଶେଷ ହେବ । ଗୋଟିଏ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ ବା ପିରିୟଡ୍-୪୫ ମିନିଟ)**

ଖ) **ପ୍ରତ୍ୟେକ ପତ୍ର ୪ ଗୋଟି ୟୁନିଟ୍ / ଏକକ / ଉପାଂଶରେ ବିଭକ୍ତ ହୋଇଛି ।**

ଗ) **ପ୍ରତ୍ୟେକ ପତ୍ର ୬ ଆସ୍ଥାଭିତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (୪ + ୨ କ୍ରେଡିଟ୍) ପାଇବେ । ଗୋଟିଏ ଆସ୍ଥାଭତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟର ମହତ୍ତ୍ୱ ହେଉଛି – ୧୦ ପିରିୟଡ୍ ସହିତ ସମାନ ।**

ମୋଟ ୧୪ ଗୋଟି ସମ୍ମାନ ପତ୍ରର ଆସ୍ଥାମୂଲ୍ୟାଙ୍କ (କ୍ରେଡିଟ୍) ହେଉଛି – ୧୪ x ୬ (୪ + ୨) = ୮୪ । ଏଥିମଧ୍ୟରୁ ୧୪ x ୪ = ୫୬ ତାତ୍ତ୍ୱିକ ପାଠ (Theory) ରହିବ ।

ଘ) ପରୀକ୍ଷା ପର୍ଯ୍ୟାୟକ୍ରମ (Semester) ଓ ପ୍ରସ୍ତାବିତ ପାଠ ଯୋଜନା :

ପ୍ରଥମ ଶିକ୍ଷାବର୍ଷ

୧ମ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୧ମ ଓ ୨ୟ ପତ୍ର - ୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର
(୧ମ ଓ ୨ୟ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)

୨ୟ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୩ୟ / ୪ର୍ଥ ପତ୍ର ୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର
(୩ୟ ଓ ୪ର୍ଥ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)

ଦ୍ୱିତୀୟ ଶିକ୍ଷାବର୍ଷ

୩ୟ ପର୍ଯ୍ୟାୟ

ତିନୋଟି ପତ୍ର ୫ମ, ୬ଷ୍ଠ ଓ ୭ମ ପତ୍ର (୫ମ, ୬ଷ୍ଠ, ୭ମ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)
୧୦୦+୧୦୦+୧୦୦= ୩୦୦ ନମ୍ବର

୪ର୍ଥ ପର୍ଯ୍ୟାୟ

ତିନୋଟି ପତ୍ର ୮ମ, ୯ମ ଓ ୧୦ମ ପତ୍ର- (୮ମ, ୯ମ, ୧୦ମ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)

୧୦୦+୧୦୦+୧୦୦= ୩୦୦ ନମ୍ବର

ତୃତୀୟ ଶିକ୍ଷାବର୍ଷ

୫ମ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୧୧ଶ ଓ ୧୨ଶ ପତ୍ର (୧୧ଶ, ୧୨ଶ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)

୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର

୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୧୩ଶ ଓ ୧୪ଶ ପତ୍ର (୧୩ଶ, ୧୪ଶ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)

୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର

ଶିକ୍ଷା ଅବଧି ୬ଟି ପରୀକ୍ଷା ୧୪ଗୋଟି ମୋଟ = ୧୪୦୦ ନମ୍ବର

୩ ବର୍ଷ ୬ଟି ପର୍ଯ୍ୟାୟ ପତ୍ର

3 years Course	Total Semester-6	Total paper 14	Total number 1400	Total credits 14×6 (4+2) = 84

ବିଦ୍ୟାର୍ଥୀମାନଙ୍କ ମୁକ୍ତ ମେଧାବୃତ୍ତି ପରୀକ୍ଷା ପାଇଁ ସେମାନଙ୍କ ପସନ୍ଦ ଓ ବୋଧଜ୍ଞାନମୂଳକ ଦୀର୍ଘ ଓ ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପରୀକ୍ଷା ନିମନ୍ତେ ଉପସ୍ଥାପନା କରାଯିବ ।

ନମ୍ବର / ମୂଲ୍ୟାଙ୍କ ବିଭାଜନ ପଦ୍ଧତି :

୧. ପ୍ରତ୍ୟେକ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ ବା ପ୍ରତ୍ୟେକ ପତ୍ର – ୧୦୦ ନମ୍ବର ବିଶିଷ୍ଟ

୨. ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃପରୀକ୍ଷା – ୨୦ ନମ୍ବର

ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମୁଖ୍ୟ ପରୀକ୍ଷା – ୮୦ ନମ୍ବର

୩. ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମୁଖ୍ୟ ପରୀକ୍ଷା ନିମନ୍ତେ ନିମ୍ନମତେ ପ୍ରଶ୍ନ ହେବ :

କ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତ୍ୟେକ ଏକକରୁ ୨ଟି କରି ୮ଟି ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀ ସେଥିରୁ ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । ପ୍ରତ୍ୟକଏକକରୁ ଗୋଟିଏ ଲେଖାଏଁ ପ୍ରଶ୍ନର ଉତ୍ତରଦେବା ବାଧତାମୂଳକ । (୪ X ୧୫ = ୬୦ ନମ୍ବର)

ଖ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତି ଏକକରୁ ୧୫ଟି ୨ ନମ୍ବର ବିଶିଷ୍ଟ ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ ; ବିଦ୍ୟାର୍ଥୀ ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (୨ X ୧୦ = ୨୦)

ବିଶେଷ ଦ୍ରଷ୍ଟବ୍ୟ –

ଓଡ଼ିଆ ସମ୍ମାନ ୧୧ଶ ପତ୍ର, ୧୨ଶ ପତ୍ର, ୧୩ଶ ପତ୍ର ଓ ୧୪ଶ ପତ୍ର ଥିବା ପ୍ରତ୍ୟେକ ପତ୍ରର ପଞ୍ଚମ ଏକକର ପ୍ରକଳ୍ପ ପାଇଁ ୨୦ ନମ୍ବର ଓ ଅନ୍ତଃ ପରୀକ୍ଷା ପାଇଁ ୧୦ ନମ୍ବର ରହିବ ।

କ) ମୋଟ୍ ନମ୍ବର - ୧୦୦

ଖ) ଅନ୍ତଃ ପରୀକ୍ଷା - ୨୦ ଓ ମୁଖ୍ୟ ପରୀକ୍ଷା – ୬୦

ଗ) ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି – ୨୦

ଘ) ମୁଖ୍ୟ ପରୀକ୍ଷାରେ ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରଥମ ଚାରୋଟି ଏକକରୁ ଦୁଇଟି ଲେଖାଏଁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୮ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡିବ; ସେଥିରୁ ପ୍ରତ୍ୟେକ ଏକକରୁ ଗୋଟିଏ ଲେଖାଏଁ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବା ବାଧ୍ୟତାମୂଳକ । (୧୫ X ୪ = ୬୦)

ଙ) ପ୍ରଥମ ୪ଟି ଏକକରୁ ୨ନମ୍ବର ବିଶିଷ୍ଟ ୧୫ଟି ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡିବ । ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (୧୦ X ୨ = ୨୦)

ପ୍ରକଳ୍ପଗୁଡିକ ସାହିତ୍ୟଭିତ୍ତିକ ହେବା ଆବଶ୍ୟକ । ବିଭାଗମୁଖ୍ୟଙ୍କ ଅନୁମୋଦନକ୍ରମେ ବିଭାଗର ସମସ୍ତ ଅଧ୍ୟାପକ ଓ ଅଧ୍ୟାପିକାଙ୍କ ମଧ୍ୟରେ ଦିଗ୍‌ଦର୍ଶନ ନିମନ୍ତେ ସମାନ ଭାବରେ ବାଣ୍ଟିଦିଆଯିବ ।

ଭୂମିକା।

ସ୍ନାତକ ଶ୍ରେଣୀରେ ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟ ସମ୍ବନ୍ଧୀୟ ପାଠଦାନ ନିମନ୍ତେ ଏହି ପାଠ୍ୟଖସଡ଼ାଟି ପ୍ରସ୍ତୁତ ହୋଇଛି । ଏହାର ପ୍ରସ୍ତୁତି କ୍ଷେତ୍ରରେ ବିଶ୍ୱବିଦ୍ୟାଳୟ ଆୟୋଗଙ୍କ ପ୍ରାୟୋଜିତ "ପସନ୍ଦ ଓ ଆସ୍ଥାଭିତ୍ତିକ ନୂତନ ପାଠ୍ୟବିନ୍ୟାସ ପଦ୍ଧତି"କୁ ଗ୍ରହଣ କରାଯାଇଛି । ଏହି ପାଠ୍ୟଖସଡ଼ାଟି ସଦ୍ୟତମ ଭାଷା-ସାହିତ୍ୟ ସମ୍ବନ୍ଧୀୟ ଜ୍ଞାନ ବ୍ୟବସ୍ଥା ଓ ଚଳନ୍ତି ସମୟର ଉପଯୋଗିତାକୁ ଗ୍ରହିଁ ପ୍ରସ୍ତୁତ ହୋଇଛି । ଏହା ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟର ଉନ୍ମେଷ, ବିକାଶ ସହିତ ଏହାର ସାଂପ୍ରତିକ ସ୍ଥିତି, ବ୍ୟାକରଣ ଓ ଭାଷାତାତ୍ତ୍ୱିକ ବୈଶିଷ୍ଟ୍ୟ ସଂପର୍କରେ ସବିଶେଷ ଧାରଣା ପ୍ରଦାନ କରିବ । ଓଡ଼ିଆ ସାହିତ୍ୟର ବ୍ୟାବହାରିକ ଦିଗ ଓ ମହତ୍ତ୍ୱ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଓଡ଼ିଆ ସାହିତ୍ୟର ବିବିଧ ରୂପ, ସାହିତ୍ୟ-ଧାରା ଓ ବିଶିଷ୍ଟ ସାହିତ୍ୟ-ଲେଖକଙ୍କ ବହି ସହିତ ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ଅବଗତ କରିବାରେ ପାଠ୍ୟଖସଡ଼ାଟି ସହାୟକ । ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟକୁ ସର୍ବଭାରତୀୟ ଭାଷା ଓ ସାହିତ୍ୟ ତଥା ଅନ୍ତର୍ଜାତୀୟ ସାହିତ୍ୟ ବିଦ୍ୟା ସହିତ ବିଦ୍ୟାର୍ଥୀମାନଙ୍କୁ ପରିଚିତ କରାଇବାରେ ଏହା ବିଦ୍ୟାର୍ଥୀଙ୍କ ଉପଯୋଗୀ ହୋଇପାରିବ ।

ପାଠ୍ୟକ୍ରମର ସାରାଂଶ – ସଂରଚନା।
Structure of B.A. (Honours) Odia Under CBCS

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ (Core Course) : 14

ପ୍ରତ୍ୟେକ ପତ୍ରର କ୍ରେଡ଼ିଟସ୍ / ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬ (୬୦ ପିରିଅଡ଼ସ୍)

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧ (Core Course – 1) ପ୍ରାଚୀନ ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ :
(ଚର୍ଯ୍ୟାପଦଠାରୁ ପଞ୍ଚସଖା ପର୍ଯ୍ୟନ୍ତ)
୧ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬ (୬୦ ପିରିଅଡ଼ସ୍)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୨ (Core Course – 2) ମଧ୍ୟଯୁଗୀୟ ଓଡ଼ିଆ ସାହିତ୍ୟ :
(ପ୍ରାକ୍‌ରୀତି, ରୀତି ଓ ଗୀତି ସାହିତ୍ୟ)
୨ୟ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୩ (Core Course – 3) ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟ (ସ୍ୱାଧୀନତା ପୂର୍ବବର୍ତ୍ତୀ)
୩ୟ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୪ (Core Course – 4) ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ସାହିତ୍ୟ
୪ର୍ଥ ପତ୍ର - ମୂଲ୍ୟାଙ୍କ = ୪ + ୨ = ୬

ତୃତୀୟ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୫ (Core Course – 5) ଭାଷାର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ
୫ମ ପତ୍ର- ସମୟ ନିର୍ଘଣ୍ଟ ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୬ (Core Course – 6) ଓଡ଼ିଆ ଭାଷାର ବୈଶିଷ୍ଟ୍ୟ ଓ ବିବିଧତା
ଷଷ୍ଠ ପତ୍ର- ସମୟ ନିର୍ଘଣ୍ଟ ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୭ (Core Course – 7) ଓଡ଼ିଆ ବ୍ୟାବହାରିକ ବ୍ୟାକରଣ
ସପ୍ତମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୮ (Core Course – 8) ଓଡ଼ିଆ ଲୋକ ସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟ

୮ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୯ (Core Course – 9) ପ୍ରାଚ୍ୟ ଓ ପାଶ୍ଚାତ୍ୟ ସାହିତ୍ୟ ତତ୍ତ୍ୱ

୯ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୧୦ (Core Course-10) ଓଡ଼ିଆ ପଦ୍ୟ ସାହିତ୍ୟ (ପ୍ରାଚୀନରୁ ସ୍ୱାଧୀନତା ପର୍ଯ୍ୟନ୍ତ)

୧୦ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପଞ୍ଚମ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ- ୧୧ (Core Course - 11) ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା

୧୧ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ- ୧୨ (Core Course -12) ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ (ଗଳ୍ପ ଓ ଉପନ୍ୟାସ)

୧୨ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ଷଷ୍ଠ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ- ୧୩ (Core Course -13) ଓଡ଼ିଆ ଗଦ୍ୟ ସାହିତ୍ୟ (ପ୍ରବନ୍ଧ, ଆତ୍ମଜୀବନୀ, ଭ୍ରମଣକାହାଣୀ)

୧୩ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ- ୧୪ (Core Course- 14) ଓଡ଼ିଆ ଭାଷାର ବ୍ୟାବହାରିକ ପ୍ରୟୋଗ

୧୪ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ **(Detail Syllabus)**

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ **(Semester – 1)**

ମୂଳ ପାଠ : ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ- ୧ (Core Course - 1) **: ପ୍ରାଚୀନ ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ**

ପ୍ରଥମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ପ୍ରାକ୍-ସାରଳା ସାହିତ୍ୟ (ଚର୍ଯ୍ୟାଗୀତିକା ଓ ନାଥ ସାହିତ୍ୟ)
ସାମାଜିକ, ଧାର୍ମିକ, ସାହିତ୍ୟିକ ଓ ଭାଷାତାତ୍ତ୍ୱିକ ମୂଲ୍ୟାୟନ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ସାରଳା ସାହିତ୍ୟର ସାମାଜିକ, ସାଂସ୍କୃତିକ ଓ ସାହିତ୍ୟିକ ମୂଲ୍ୟ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ବଳରାମ ଦାସ ଓ ଜଗନ୍ନାଥ ଦାସ (ବିଶେଷ ଅଧ୍ୟୟନ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଅନନ୍ତ ଦାସ, ଯଶୋବନ୍ତ ଦାସ ଓ ଅଚ୍ୟୁତାନନ୍ଦ ଦାସ (ବିଶେଷ ଅଧ୍ୟୟନ)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ – ସୂର୍ଯ୍ୟନାରାୟଣ ଦାଶ (୧ମ ଓ ୨ୟ ଭାଗ) – ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୨. ଓଡିଆ ସାହିତ୍ୟର ଆଦିପର୍ବ – ସୁରେନ୍ଦ୍ର ମହାନ୍ତି – କଟକ ଷ୍ଟୁଡେଣ୍ଟସ ଷ୍ଟୋର୍, କଟକ
୩. ଚର୍ଯ୍ୟା ଗୀତିକା- ଖଗେଶ୍ୱର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୪. ଓଡ଼ିଶାର ନାଥ ସାହିତ୍ୟ - ବଂଶୀଧର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୫. ଓଡ଼ିଆ ସାହିତ୍ୟର ସଂକ୍ଷିପ୍ତ ପରିଚୟ - ବୃନ୍ଦାବନ ଚନ୍ଦ୍ର ଆଚାର୍ଯ୍ୟ,ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୬. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ, ପ୍ରଥମ ଭାଗ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୭. ଓଡିଆ ସାହିତ୍ୟର ମଧ୍ୟପର୍ବ – ସୁରେନ୍ଦ୍ର ମହାନ୍ତି – କଟକ ଷ୍ଟୁଡେଣ୍ଟସ ଷ୍ଟୋର୍, କଟକ
୮. ପଞ୍ଚସଖା ଓଡ଼ିଆ ସାହିତ୍ୟ - ଦେବେନ୍ଦ୍ର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୯. ଓଡ଼ିଆ ସାହିତ୍ୟର ଉନ୍ମେଷ ଓ ଉତ୍ତରଣ - ଦେବେନ୍ଦ୍ର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୧୦. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ, ବଂଶୀଧର ମହାନ୍ତି (୧ମ ଓ ୨ୟ ଭାଗ), ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୨ (Core Course - 2) : ମଧ୍ୟଯୁଗୀୟ ଓଡ଼ିଆ ସାହିତ୍ୟ
ଦ୍ୱିତୀୟ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ମଧ୍ୟଯୁଗୀୟ ଓଡ଼ିଆ ସାହିତ୍ୟର ପୃଷ୍ଠଭୂମି (ସାମାଜିକ, ସାଂସ୍କୃତିକ, ରାଜନୀତିକ ଓ ଧର୍ମୀୟ ପୃଷ୍ଠଭୂମି)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ମଧ୍ୟଯୁଗୀୟ କାବ୍ୟର ଆଙ୍ଗିକ ବୈଚିତ୍ର୍ୟ
(ବିଷୟ ବିନ୍ୟାସ, ଭାଷା, ଛନ୍ଦ ବୈଚିତ୍ର୍ୟ, ବର୍ଣ୍ଣନା ବୈଚିତ୍ର୍ୟ ଓ ଆଳଂକାରିକତା)

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ମଧ୍ୟଯୁଗୀୟ କାବ୍ୟର ଆତ୍ମିକ ବିଭବ
(ରସ, ସୌନ୍ଦର୍ଯ୍ୟଚେତନା ଓ ଭାବାଦର୍ଶ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ମଧ୍ୟଯୁଗୀୟ ଓଡିଆ ଗୀତି ପରମ୍ପରା (ଚଂପୂ, ଚଉପଦୀ, ଚଉତିଶା, ଭଜନ ଓ ଜଣାଣ)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ – ସୂର୍ଯ୍ୟନାରାୟଣ ଦାଶ (୪ର୍ଥ ଭାଗ) – ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୨. ଭଞ୍ଜୀୟ କାବ୍ୟ ଭାବନା – ବେଣୀ ମାଧବ ପାଢୀ, ବ୍ରହ୍ମପୁର
୩. ଉପେନ୍ଦ୍ର ଭଞ୍ଜ ସାହିତ୍ୟ ଏକ ଅଧ୍ୟୟନ - ଜୟକୃଷ୍ଣ ମିଶ୍ର, ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭବନେଶ୍ୱର
୪. ମଧ୍ୟକାଳୀନ ଓଡ଼ିଆ ସାହିତ୍ୟ – କୃଷ୍ଣ ଚରଣ ସାହୁ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ

୫. ଭଞ୍ଜ ସାହିତ୍ୟର ବିଭା ଓ ବିଭବ - ସଚ୍ଚିଦାନନ୍ଦ ମିଶ୍ର, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର
୬. ଓଡିଆ ଗୀତିକାବ୍ୟ- ଜାନକୀବଲ୍ଲଭ ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ
୭. କାବ୍ୟକୌଶଳ- ସୁଦର୍ଶନ ଆଚାର୍ଯ୍ୟ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (Semester – II)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୩ (Core Course - 3) **: ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟ**
ତୃତୀୟ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟର ପୃଷ୍ଠଭୂମି ଓ ନବଜାଗରଣ
(ଇଂରାଜୀ ଶିକ୍ଷା ବିସ୍ତାର, ପତ୍ରପତ୍ରିକା ପ୍ରକାଶନ, ମୁଦ୍ରଣଯନ୍ତ୍ର ପ୍ରତିଷ୍ଠା ଓ ଭାଷା ସୁରକ୍ଷା ଆନ୍ଦୋଳନ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟର ପ୍ରମୁଖ ସ୍ରଷ୍ଟା
(ରାଧାନାଥଙ୍କ କାବ୍ୟ, ଗଙ୍ଗାଧରଙ୍କ କାବ୍ୟ, ମଧୁସୂଦନ ରାଓଙ୍କ କବିତା ଓ ଫକୀରମୋହନଙ୍କ ଉପନ୍ୟାସ ଓ ଗଳ୍ପ)

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ସାହିତ୍ୟରେ ସତ୍ୟବାଦୀଧାରା

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡ଼ିଆ ସାହିତ୍ୟରେ ସବୁଜଧାରା ଓ ପ୍ରଗତିବାଦୀ ଧାରା

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ (୧୮୦୩-୧୯୨୦) ନଟବର ସାମନ୍ତରାୟ, ବାଣୀ ଭବନ, ଭୁବନେଶ୍ୱର
୨. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ – ପ୍ରେମାନନ୍ଦ ମହାପାତ୍ର, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ
୩. ମେହେର ସାହିତ୍ୟରେ ମାନବୀୟ ମହନୀୟତା- ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ
୪. କାବ୍ୟଶିଳ୍ପୀ ଗଙ୍ଗାଧର - ଗୋବିନ୍ଦଚନ୍ଦ୍ର ଉଦ୍‌ଗାତା
୫. ଓଡିଆ ସାହିତ୍ୟରେ ରାଧାନାଥ ଓ ସତ୍ୟବାଦୀ ଯୁଗ, ପ୍ର. ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ
୬. ସବୁଜରୁ ସାଂପ୍ରତିକ - ନିତ୍ୟାନନ୍ଦ ଶତପଥୀ, ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୭. ଓଡ଼ିଆ ସାହିତ୍ୟର ପ୍ରଗତିବାଦୀ ଧାରା – ବିଜୟ କୁମାର ଶତପଥୀ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୪ (Core Course - 4) **: ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ସାହିତ୍ୟ**
ଚତୁର୍ଥ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ କବିତା

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ଗଦ୍ୟ ସାହିତ୍ୟ (ପ୍ରବନ୍ଧ, ଜୀବନୀ, ଆତ୍ମ ଜୀବନୀ ଓ ସମାଲୋଚନା)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସବୁଜରୁ ସାଂପ୍ରତିକ - ନିତ୍ୟାନନ୍ଦ ଶତପଥୀ, ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ

୨. ସତୁରୀରୁ ସହସ୍ରାବ୍ଦୀ - ନିତ୍ୟାନନ୍ଦ ଶତପଥୀ

୩. ଶହେ ବର୍ଷର ଓଡ଼ିଆ କ୍ଷୁଦ୍ରଗଳ୍ପ ଏକ ତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ - କବିତା ବାରିକ, ବିଦ୍ୟାପୁରୀ, କଟକ

୪. ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ - ସଂକଳନ - ପଠାଣି ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ (୧ମ ଓ ୨ୟ ଭାଗ) ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର, କଟକ

୫. ଓଡ଼ିଆ କ୍ଷୁଦ୍ର ଗଳ୍ପର ଇତିବୃତ୍ତ - ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ବୁକ୍ସ ଆଣ୍ଡ୍ ବୁକ୍ସ, କଟକ

୬. ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡିଆ ସାହିତ୍ୟର ଭୂମି ଓ ଭୂମିକା- ସଂ. ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଓଡିଶା ବୁକ୍ଷ୍ଟୋର, କଟକ

୭. ଓଡ଼ିଆ ନାଟକର ଉତ୍ତର ଆଧୁନିକ ପର୍ବ – ହେମନ୍ତ କୁମାର ଦାସ, ବିଦ୍ୟାପୁରୀ, କଟକ

୮. ସ୍ୱାଧୀନତତ୍ତୋର ଓଡିଆ ନାଟକ- ନାରାୟଣ ସାହୁ, ଓ. ରା. ପା. ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୯. ଓଡିଆ ନାଟ୍ୟସାହିତ୍ୟ - ସର୍ବେଶ୍ୱର ଦାସ, ଓ. ରା. ପା. ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୧୦. ଓଡିଆ ନାଟକର ଉଦ୍ଭବ ଓ ବିକାଶ - ରତ୍ନାକର ଚଇନି,

୧୧. ଓଡିଆ ଐତିହାସିକ ନାଟକର ମୂଳସୂତ୍ର - ନୀଳାଦ୍ରିଭୂଷଣ ହରିଚନ୍ଦନ

୧୨. ନାଟକର ବ୍ୟାପ୍ତି ଓ ଦୀପ୍ତି - ସଂଘମିତ୍ରା ମିଶ୍ର, ଅଗ୍ରଦୂତ, କଟକ

୧୩. ନାଟ୍ୟସୃଷ୍ଟି ଓ ନାଟ୍ୟଦୃଷ୍ଟି -ବିଷ୍ଣୁପ୍ରିୟା ଓତା, ଶିଶୁକଲମ, ଭୁବନେଶ୍ୱର

୧୪. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ – ବାଉରୀ ବନ୍ଧୁ କର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୧୫. ଓଡ଼ିଆ ଚରିତ ସାହିତ୍ୟ – ଲାବଣ୍ୟ ନାୟକ

୧୬. ଓଡ଼ିଆ ସମାଲୋଚନା ସାହିତ୍ୟ - ଅସିତ କବି

ତୃତୀୟ ପର୍ଯ୍ୟାୟ (Semester – III)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୫ (Core Course - 5) : ଓଡ଼ିଆ ଭାଷା ଓ ଲିପିର ଐତିହାସିକ ବିକାଶକ୍ରମ

ପଞ୍ଚମ ପତ୍ର :

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ ଭାଷାର ଉଦ୍ଭବ ଓ ବିକାଶକ୍ରମ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଓଡ଼ିଆ ଲିପିର ଐତିହାସିକ ବିବର୍ତ୍ତନ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ଅଭିଲେଖର ଭାଷା (ଶିଳାଲେଖ, ତାମ୍ରଲେଖ ଓ ପ୍ରାଚୀନ ସନନ୍ଦ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଚର୍ଯ୍ୟାପଦ ଓ ସାରଳା ସାହିତ୍ୟର ଭାଷା

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ଭାଷାର ଉନ୍ମେଷ ଓ ବିକାଶ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୨. ଓଡ଼ିଆ ଧ୍ୱନିତତ୍ତ୍ୱ ଓ ଶବ୍ଦ ସଂଭାର - ଧନେଶ୍ୱର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୩. ଓଡ଼ିଆ ଭାଷା ଓ ଲିପିର କ୍ରମବିକାଶ – କୁଞ୍ଜ ବିହାରୀ ତ୍ରିପାଠୀ, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୪. ଓଡିଆ ଭାଷାତ ୍ୱର ରୂପଚିତ୍ର, ନଟବର ଶତପଥୀ, ବିଜୟିନୀ ପବ୍ଲିକେଶନ, କଟକ

୫. ଧ୍ୱନିବିଜ୍ଞାନ, ଗୋଲୋକ ବିହରୀ ଧଳ, ଓ. ରା. ପା. ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୬ (Core Course - 6) : ଭାଷାର ସଂଜ୍ଞା ସ୍ୱରୂପ, ଓଡିଆ ଭାଷାର ବୈଶିଷ୍ଟ୍ୟ ଓ ବିବିଧତା।

ଷଷ୍ଠ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଭାଷାର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଭାଷା ଉତ୍ପତ୍ତି ସମ୍ପର୍କୀୟ ବିଭିନ୍ନ ସିଦ୍ଧାନ୍ତ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ଭାଷାର ଆଞ୍ଚଳିକ ରୂପ

୪ର୍ଥ ଏକକ/ୟୁନିଟ୍ – ୪ : ଓଡ଼ିଆ ଭାଷା ଉପରେ ବିଭିନ୍ନ ଭାଷାର ପ୍ରଭାବ (ଦ୍ରାବିଡ଼, ଅଷ୍ଟ୍ରିକ୍ ଯାବନିକ ଓ ଇଂରାଜୀ)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଭାଷାବିଜ୍ଞାନର ରୂପରେଖ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୨. ଭାଷାଶାସ୍ତ୍ର ପରିଚୟ – ଗୋଲୋକ ବିହାରୀ ଧଳ, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୩. ଓଡିଆ ଭାଷାର ସୃଷ୍ଟି ଓ ବିକାଶ – ଉପେନ୍ଦ୍ର ପ୍ରସାଦ ଦଳାଇ, ଏ.କେ.ମିଶ୍ର ପବ୍ଲିଶର୍ସ, କଟକ

୪. ଓଡ଼ିଆ ଭାଷାର ଉନ୍ମେଷ ଓ ବିକାଶ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୫. ଭାଷା ଭାବନା, ସଂ. ବିଜୟଲକ୍ଷ୍ମୀ ମହାନ୍ତି, ବିଦ୍ୟାପ୍ରକାଶନୀ, ଭୁବନେଶ୍ୱର

୬. ଓଡ଼ିଆ ଭାଷା ଓ ଭାଷା ବିଜ୍ଞାନ - ଦେବୀ ପ୍ରସନ୍ନ ପଟ୍ଟନାୟକ, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୭ (Core Course - 7) : ଓଡ଼ିଆ ବ୍ୟାବହାରିକ ବ୍ୟାକରଣ

୭ମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ ବର୍ଣ୍ଣ ବିଚାର, ବାକ୍ୟର ଗଠନ ରୀତି ଓ ପ୍ରକାରଭେଦ ।

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : କାରକ, ବିଭକ୍ତି, କୃଦନ୍ତ ଓ ତଦ୍ଧିତ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଉପସର୍ଗ, ସନ୍ଧି ଓ ସମାସ

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡିଆ ଶବ୍ଦସମ୍ଭାର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିୟୁ ଷ୍ଟୁଡେଣ୍ଟ ଷ୍ଟୋର୍, କଟକ
୨. ଆଧୁନିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ - ଧନେଶ୍ୱର ମହାପାତ୍ର, କିତାବ ମହଲ, କଟକ
୩. ବ୍ୟାବହାରିକ ଓଡିଆ ବ୍ୟାକରଣ, ବିଜୟ ପ୍ରସାଦ ମହାପାତ୍ର, ବିଦ୍ୟାପୁରୀ, କଟକ
୪. ଓଡିଆ ଭାଷା ଚର୍ଚ୍ଚାର ପରଂପରା, ପ୍ରଫେସର ଗଗନେନ୍ଦ୍ର ନାଥ ଦାସ, ଓଡିଆ ଗବେଷଣା ପରିଷଦ, କଟକ

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ (Semester – IV)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୮ (Core Course - 8) : (ଓଡ଼ିଆ ଲୋକସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟ)

ଅଷ୍ଟମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଲୋକ ସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଓଡ଼ିଆ ଲୋକଗୀତର ସ୍ୱରୂପ, ପ୍ରକାରଭେଦ ଓ ବିଭିନ୍ନ ଦିଗ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ଲୋକକାହାଣୀର ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୪ର୍ଥ ଏକକ/ୟୁନିଟ୍ – ୪: ଓଡ଼ିଆ ଲୋକନାଟକର ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ (ପାଲା, ଦାସକାଠିଆ, ଦଣ୍ଡନାଚ, ଛଉନାଚ, ଲୀଳା, ଦଧି, ଡାଲଖାଇ ଓ କରମା)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଲୋକଧାରା, ଲୋକସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟ – କୁମୁଦ ରଞ୍ଜନ ପାଣିଗ୍ରାହୀ, ସୁଖ୍‌ଦୁଖ୍ ପବ୍ଲିକେଶନ, ସମ୍ବଲପୁର
୨. ଲୋକସଂସ୍କୃତି ଓ ଲୋକ ସାହିତ୍ୟ – କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ବିଦ୍ୟାପୁରୀ, କଟକ
୩. ଲୋକସାହିତ୍ୟ ତତ୍ତ୍ୱ- ଶ୍ୟାମ ସୁନ୍ଦର ମହାପାତ୍ର, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୪. ଓଡ଼ିଆ ଲୋକଗୀତି ସଂଚୟନ - କୁଞ୍ଜବିହାରୀ ଦାଶ, ବିଶ୍ୱ ଭାରତୀ ପ୍ରକାଶନ
୫. ପଲ୍ଲୀଗୀତି ସଞ୍ଚୟନ - କୁଞ୍ଜବିହାରୀ ଦାଶ, (୧ମ- ୨ୟ ଓ ୩ୟ ଭାଗ)
୬. ଲୋକସଂସ୍କୃତି-ଲୋକସାହିତ୍ୟ - ନାରାୟଣ ସାହୁ, ଚିନ୍ମୟ ପ୍ରକାଶନ, କଟକ
୭. ଓଡ଼ିଶାର ଦଣ୍ଡ ନାଟ - ସନ୍ତୋଷ କୁମାର ଶତପଥୀ, କେଦାର ପ୍ରିଣ୍ଟିଙ୍ଗ୍ ପ୍ରେସ୍, ଭୁବନେଶ୍ୱର
୮. ଓଡ଼ିଆ ଲୋକନାଟ୍ୟ - କଲଚରାଲ ଏକାଡେମୀ, ରାଉରକେଲା
୯. ପଶ୍ଚିମ ଓଡିଶାର ଲୋକସଂସ୍କୃତି, ଡ. ସୁଶୀଳ କୁମାର ବାଗ୍
୧୦. ପଶ୍ଚିମ ଓଡିଶାର ଲୋକଗୀତ, ଦ୍ୱାରିକାନାଥ ନାୟକ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୧୧. ଲୋକବିଶ୍ୱାସ ଓ ଲୋକାଚାର, ଡ. ସଦାନନ୍ଦ ନାୟକ, ବିଜୟ ବୁକ୍ ଷ୍ଟୋର୍, ବ୍ରହ୍ମପୁର
୧୨. ଉଛଳ ଗାଉଁଲି ଗୀତ, ଚକ୍ରଧର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୧୩. ଉଛଳ ଗ୍ରାମ୍ୟ ଗୀତି – ଚକ୍ରଧର ମହାପାତ୍ର, ଓଡିଆ ସାହିତ୍ୟ ଏକାଡେମୀ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୯ (Core Course - 9) : ସାହିତ୍ୟ ତତ୍ତ୍ୱ (ପ୍ରାଚ୍ୟ ଓ ପାଶ୍ଚାତ୍ୟ)

୯ମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ରସ ଓ ଧ୍ୱନି

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ରୀତି, ବକ୍ରୋକ୍ତି ଓ ଅଳଂକାର

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କ୍ଲାସିସିଜିମ୍, ରୋମାଣ୍ଟିସିଜିମ୍

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ପ୍ରତୀକବାଦ, ଚିତ୍ରକଳ୍ପ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଅଳଙ୍କାର ପ୍ରସଙ୍ଗ – ଗୋବିନ୍ଦ ଚନ୍ଦ୍ର ଉଦ୍‌ଗାତା, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୨. ଭାରତୀୟ ସାହିତ୍ୟ ତତ୍ତ୍ୱ– ବନମାଳୀ ରଥ,ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୩. ଓଡ଼ିଆ କାବ୍ୟ କୌଶଳ – ସୁଦର୍ଶନ ଆଚାର୍ଯ୍ୟ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୪. ପାଶ୍ଚାତ୍ୟ ସାହିତ୍ୟ ଓ ସମୀକ୍ଷା ତତ୍ତ୍ୱ – କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ପ୍ରାଚୀ ସାହିତ୍ୟ ପ୍ରତିଷ୍ଠାନ, କଟକ
୫. ସାହିତ୍ୟର ସୂଚୀପତ୍ର, ବିଭୂତି ପଟ୍ଟନାୟକ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ- ୧୦ (Core Course - 10) : ଓଡ଼ିଆ କବିତା ପ୍ରାଚୀନରୁ ଆଧୁନିକ

୧୦ମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ସାରଳା ମହାଭାରତ (ଦୁର୍ଯ୍ୟୋଧନଙ୍କ ରକ୍ତନଦୀ ସନ୍ତରଣ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଭାଗବତ (୨୪ ଗୁରୁ ପ୍ରସଙ୍ଗ) - ଜଗନ୍ନାଥ ଦାସ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦୀନକୃଷ୍ଣ ଦାସଙ୍କ ରସକଲ୍ଲୋଳ(୧ମ ଛାନ୍ଦ) ଓ ଉପେନ୍ଦ୍ରଭଞ୍ଜଙ୍କ କୋଟିବ୍ରହ୍ମାଣ୍ଡ ସୁନ୍ଦରୀ (୧ମ ଛାନ୍ଦ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଆଧୁନିକ କବିତା

ମହାଯାତ୍ରା (ସପ୍ତମ ସର୍ଗ)- ଅମର୍ଷୀଙ୍କ ଉଦ୍‌ବୋଧନ (ରାଧାନାଥ ରାୟ)

ମଙ୍ଗଳେ ଅଇଲା ଉଷା – ଗଙ୍ଗାଧର ମେହେର

ବନ୍ଦୀର ସାନ୍ଧ୍ୟ ଅନୁଚିନ୍ତା - ଗୋପବନ୍ଧୁ ଦାସ

ପ୍ରତିମା ନାୟକ - ସଚ୍ଚିଦାନନ୍ଦ ରାଉତରାୟ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସାରଳା ମହାଭାରତ (ଗଦା ପର୍ବ-ସାରଳା ଦାସ)
୨. ଅବଧୂତ ଓ ଯଦୁରାଜା ସମ୍ବାଦ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ
୩. କହେ କୃଷ୍ଣଦାସ କବି – କୃଷ୍ଣଚରଣ ସାହୁ, ବିଦ୍ୟାପୁରୀ, କଟକ
୪. ରସକଲ୍ଲୋଳ, ସଂପାଦନା – ଦେବେନ୍ଦ୍ର ମହାନ୍ତି
୫. ଦୁର୍ଲଭ ଦୀନକୃଷ୍ଣ - ଡ. ଜ୍ୟୋତିରଞ୍ଜନ ସାମଲ, ବିଜୟିନୀ ପବ୍ଲିକେସନ୍, କଟକ
୬. ତପସ୍ୱିନୀ ଓ ମେହେର ସାହିତ୍ୟ – ଗୌରୀ କୁମାାର ବ୍ରହ୍ମା

ପଞ୍ଚମ ପର୍ଯ୍ୟାୟ (Semester – V)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୧ (Core Course - 11) : ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା

୧୧ଶ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ରକ୍ତମାଟି - କାଳୀଚରଣ ପଟ୍ଟନାୟକ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ନନ୍ଦିକା କେଶରୀ - ମନୋରଞ୍ଜନ ଦାସ କିମ୍ବା ତଟନିରଞ୍ଜନା – ବିଜୟ ମିଶ୍ର
୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ କିମ୍ବା ଭୁଖା- ମଙ୍ଗଳୁଚରଣ ବିଶ୍ୱାଳ
୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଏକାଙ୍କିକା- ସ୍ମୃତି ବିଭ୍ରାଟ - ପ୍ରାଣବନ୍ଧୁ କର ଓ ଛଦ୍ମବେଶୀ - ବିଶ୍ୱଜିତ୍ ଦାସ
୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ରକ୍ତମାଟି - କାଳୀଚରଣ ପଟ୍ଟନାୟକ
୨. ନନ୍ଦିକା କେଶରୀ-ମନୋରଞ୍ଜନ ଦାସ କିମ୍ବା ତଟନିରଞ୍ଜନା – ବିଜୟ ମିଶ୍ର
୩. କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ କିମ୍ବା ଭୁଖା- ମଙ୍ଗଳୁଚରଣ ବିଶ୍ୱାଳ
୪. ଅଶ୍ରୁ ନୁହେଁ ଅନଳ, ହେମନ୍ତ କୁମାର ଦାସ
୫. ସ୍ୱାଧୀନୋତ୍ତୋର ଓଡିଆ ନାଟକର ମନସ୍ତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ, ରଶ୍ମିତା ରାଉତରାୟ, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ
୬. ସାହିତ୍ୟ ସାଧକ ମଙ୍ଗଳୁଚରଣ ବିଶ୍ୱାଳ – ଗୌରିଦାସ ପ୍ରଧାନ
(ଚତୁର୍ଥ ପତ୍ର ନିମନ୍ତେ ପ୍ରଦତ୍ତ ସହାୟକ ପୁସ୍ତକଗୁଡିକ ଅନୁସରଣୀୟ ।)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୨ (Core Course - 12) : (ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ)

୧୨ଶ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ କଥାସାହିତ୍ୟର ବିକାଶକ୍ରମ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି କିମ୍ବା ନୟନତାରା - ଦୟାନିଧି ମିଶ୍ର

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଗଳ୍ପ ସାହିତ୍ୟ

ପାଠ୍ୟ ଗଳ୍ପ: ଦେବତାର ବିଧାତା – ଗୋଦାବରୀଶ ମହାପାତ୍ର

ମାଂସର ବିଳାପ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ

ମଧୁବନର ମେୟର - ମନୋଜ ଦାସ

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫: ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ, ସଂ ପଠାଣି ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୨. ଓଡ଼ିଆ କ୍ଷୁଦ୍ରଗଳ୍ପର ଉନ୍ମେଷ ଓ ଉତ୍ତରଣ – ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୩. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି

୪. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ ଭିନ୍ନ ଦୃଷ୍ଟି ଭିନ୍ନ ବ୍ୟାଖ୍ୟା, ପଞ୍ଚାନନ ମିଶ୍ର, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ

୧. ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି କିମ୍ବା ନୟନତାରା - ଦୟାନିଧି ମିଶ୍ର

୨. କଥାଶିଳ୍ପୀ ମନୋଜ ଦାସ - ଶତ୍ରୁଘ୍ନ ପାଣ୍ଡବ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୩. ମନସ୍ୱୀ ମନୋଜ - ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୪. ଓଡିଆ ଉପନ୍ୟାସର ସମାଜତାତ୍ତ୍ୱିକ ଆଲୋଚନା - କଇଳାଶ ପଟ୍ଟନାୟକ, ବିଦ୍ୟାପୁରୀ, କଟକ

ଷଷ୍ଠ ପର୍ଯ୍ୟାୟ (Semester – VI)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୩ (Core Course - 13) : ଓଡ଼ିଆ ଗଦ୍ୟ ସାହିତ୍ୟ

୧୩ଶ ପତ୍ର

୧ମ ଏକକ/ୟୁନିଟ୍ – ୧ : ଆତ୍ମ ଜୀବନୀ, ଭ୍ରମଣ କାହାଣୀ ଓ ସମାଲୋଚନା ତତ୍ତ୍ୱ (ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ମୋ ଫୁଟା ଡଙ୍ଗାର କାହାଣୀ - ଫତୁରାନନ୍ଦ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩: ପଶ୍ଚିମ ଆଫ୍ରିକାରେ ଓଡ଼ିଆ ଢେଙ୍କି - ଭୁବନେଶ୍ୱର ବେହେରା

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ପ୍ରବନ୍ଧ - ଭାଷା ଓ ଜାତୀୟତା - ଗୋପବନ୍ଧୁ ଦାସ

ମୁଁ ସତ୍ୟଧର୍ମା କହୁଛି – ଚନ୍ଦ୍ରଶେଖର ରଥ

ବିବେକାନନ୍ଦ : ଏକ ଗୁହାମୁକ୍ତିର ପ୍ରୟାସ - ଚିତ୍ତରଂଜନ ଦାସ

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫: ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ମୋ ପୁଂଟା ଡଙ୍ଗାର କାହାଣୀ - ପଂତୁରାନନ୍ଦ

୨. ପଶ୍ଚିମ ଆଫ୍ରିକାରେ ଓଡ଼ିଆ ଢ଼େଙ୍କି - ଭୁବନେଶ୍ୱର ବେହେରା

୩. ଜୀବନୀ ସାହିତ୍ୟ ଏକ ଅଧ୍ୟୟନ - ପଠାଣି ପଟ୍ଟନାୟକ, ଓଡ଼ିଶା ପା.ପୁ.ପ୍ର.ଓ.ପ୍ର.ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୪. ସମାଲୋଚନାର ଦିଗଦିଗନ୍ତ - ଖଗେଶ୍ୱର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୫. ସାହିତ୍ୟ ଓ ସମାଲୋଚନା - କୁଞ୍ଜବିହାରୀ ଦାଶ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୪ (Core Course - 14) : **ଓଡ଼ିଆ ଭାଷାର ବ୍ୟାବହାରିକ ପ୍ରୟୋଗ**

୧୪ଶ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଭାଷଣ କଳା, ଦଳଗତ ଆଲୋଚନା ଓ ସାକ୍ଷାତକାର

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ସମ୍ବାଦ ପ୍ରସ୍ତୁତି, ଫିଚର୍ ରଚନା ଓ ବିଜ୍ଞାପନ ପ୍ରସ୍ତୁତି

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କାର୍ଯ୍ୟାଳୟରେ ଓଡ଼ିଆ ଲିଖନ ବିଧି

ନଥି ପ୍ରସ୍ତୁତି, ଅନୁବିଧି, ଟିପ୍ପଣୀ, ପ୍ରସ୍ତାବ, ଅନୁମୋଦନ, ଚିଠା ପ୍ରସ୍ତୁତି, ଅଧିସୂଚନା, ବିଜ୍ଞପ୍ତି, ଘୋଷଣା ଲିଖନ, ପତ୍ରଲିଖନ (ବ୍ୟକ୍ତିଗତ, ବ୍ୟାବସାୟିକ ଓ ସମ୍ପାଦକଙ୍କୁ ପତ୍ର)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡ଼ିଆ ଭାଷାର କମ୍ପ୍ୟୁଟରୀକରଣ, ସଫ୍ଟୱେୟାର୍ ଏବଂ ହାର୍ଡୱେୟାର, ଓଡ଼ିଆ ଫଂଣ୍ଟସ୍,କୀ-ବୋର୍ଡ, ୱାଡ ପ୍ରୋସେସିଂ, ବନାନ ଓ ବ୍ୟାକରଣଯାଞ୍ଚକ ପ୍ରକ୍ରିୟା, ଓଡ଼ିଆରେ ଇଣ୍ଟରନେଟ୍‌ର ବ୍ୟବହାର, ଓଡ଼ିଆ ସାମାଜିକ ୱେବ୍‌ସାଇଟ୍

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫: ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ବିରଞ୍ଚି ନାରାୟଣ ସାମଲ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ

୨. ଭାଷଣ କଳା ଓ ଅନ୍ୟାନ୍ୟ ପ୍ରସଙ୍ଗ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୩. ସମ୍ବାଦପତ୍ର ଓ ଗଣମାଧ୍ୟମ - ମୃଣାଳ ଚାଟାର୍ଜୀ, ଶେଫାଳୀ କମ୍ୟୁନିକେଶନ, ସଞ୍ଚାରମାର୍ଗ, ଢେଙ୍କାନାଳ

୪. ପ୍ରାୟୋଗିକ ଭାଷା ଓ ବିଜ୍ଞାପନର ଦିଗବିଦିଗ - କେ.ବି. ପଟ୍ଟନାୟକ, ଓ.ରା.ପା.ପ୍ର.ଓ.ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୫. ସଂଯୋଗ ଅନୁବିଧି-ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ

୬. କାର୍ଯ୍ୟାଳୟ ନଥି - ଓଡ଼ିଆ ଭାଷା ପ୍ରତିଷ୍ଠାନ, ଭୁବନେଶ୍ୱର

୭. ଓଡ଼ିଆରେ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା – ରୁଦ୍ରନାରାୟଣ ମହାପାତ୍ର, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୮. ଓଡ଼ିଆ ଭାଷାରେ କମ୍ପ୍ୟୁଟରର ପ୍ରୟୋଗ - ସୁଧୀର ଚନ୍ଦ୍ର ମହାନ୍ତି, ଏ.କେ. ମିଶ୍ର ପବ୍ଲିକେଶନ, ଭୁବନେଶ୍ୱର
୯. କମ୍ପ୍ୟୁଟରରେ ଓଡିଆ ଭାଷାର ବ୍ୟବହାର ଓ ପ୍ରୟୋଗ, ରୁଦ୍ରପ୍ରସାଦ ମିଶ୍ର, ଆଜିଅନ୍ତା ପବ୍ଲିଶର୍ସ, ଜଗତସିଂହପୁର

ଶୃଙ୍ଖଳାକୈନ୍ଦ୍ରିକ ଇଚ୍ଛାଧୀନ ପାଠ – ଓଡ଼ିଆ

Discipline Specific Elective – Odia DSE

ସାଧାରଣ (Pass) ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

୫ମ ଓ ୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ (Semester – V, VI)

୫ମ ପର୍ଯ୍ୟାୟ (Semester – V) : ପ୍ରଥମ ଓ ଦ୍ୱିତୀୟ ପତ୍ର

୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର

୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ (Semester – VI) : ତୃତୀୟ ପତ୍ର ଓ ଚତୁର୍ଥ ପତ୍ର

୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର

(୨୦ ନମ୍ବର ଅନ୍ତଃ ପରୀକ୍ଷା ଓ ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା = ୧୦୦ ନମ୍ବର)

ଚତୁର୍ଥ ପତ୍ର - ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି ୧୦୦ ନମ୍ବର

(ଅନୁବାଦ ବା ସଂପାଦନା ବା ଓଡିଆ ସଂସ୍କୃତି ଉପରେ ଅନ୍ୟୂନ ୫୦ ପୃଷ୍ଠା ମଧ୍ୟରେ ନିବନ୍ଧଟି ଲେଖିବାକୁ ହେବ ।)

(୮୦ ନମ୍ବର ପ୍ରକଳ୍ପ ଲେଖା + ୨୦ ନମ୍ବର ସାକ୍ଷାତକାର ପରୀକ୍ଷା= ୧୦୦ ନମ୍ବର)

ମୋଟ୍ - ୪୦୦ ନମ୍ବର

ମୂଲ୍ୟାଙ୍କନ ବିଭାଜନ ପଦ୍ଧତି

(କ) ପ୍ରତ୍ୟେକ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍) ରୁ ୧୫ଟି ୨ ନମ୍ବର ବିଶିଷ୍ଟ ଅତି ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ସେଥିରୁ ଯେକୌଣସି ୧୦ ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (୨x୧୦=୨୦)

(ଖ) ପ୍ରତ୍ୟେକ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍)ରୁ ଅନ୍ତତଃ ୨ଟି ଲେଖାଏଁ ମୋଟ ୮ଟି ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ସେଥିରୁ ଯେକୌଣସି ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ପଡିବ । (୧୫ x ୪=୬୦)

(ଗ) ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃ ପର୍ଯ୍ୟାୟ ପରୀକ୍ଷା – (୨୦ ନମ୍ବର)

ମୋଟ୍ ମୂଲ୍ୟାଙ୍କ – ୧୦୦ ନମ୍ବର

ଭୂମିକା :

ଏହି ପାଠ୍ୟକ୍ରମଟି ବିଦ୍ୟାର୍ଥୀମାନଙ୍କୁ ଓଡ଼ିଶାର ସାମାଜିକ, ସାଂସ୍କୃତିକ ଓ ଐତିହାସିକ ବିବର୍ତ୍ତନ ବିଷୟରେ ଜ୍ଞାନ ଆହରଣ ପାଇଁ ସୁଯୋଗ ସୃଷ୍ଟିକରିବ । ଓଡ଼ିଆ ସାହିତ୍ୟରେ ସମାଜ ଓ ସଂସ୍କୃତିର ପ୍ରତିଫଳନ, ସାହିତ୍ୟର ବିବିଧତା ଏବଂ କମ୍ପ୍ୟୁଟରଭିତ୍ତିକ ବିଦ୍ୟା ଶିକ୍ଷଣ ଦିଗକୁ ଧ୍ୟାନ ଦିଆଯାଇ ଏହା ପ୍ରସ୍ତୁତ ହୋଇଛି ।

ଏହି ପାଠ୍ୟକ୍ରମରେ ମୋଟ ୪ ଗୋଟି ପାଠ୍ୟ ବାଧତାମୂଳକ । ସମ୍ମାନ (Hons) ଶ୍ରେଣୀର ଛାତ୍ରଛାତ୍ରୀମାନେ ଏହି ଚାରୋଟିଯାକ ପାଠ୍ୟ ପଢ଼ିବେ । ଏଥିମଧ୍ୟରୁ ଗୋଟିଏ ପାଠ୍ୟକୁ ଆଧାର କରି ତା' ସହିତ ଅନ୍ୟ ବିଦ୍ୟାକୁ ସଂଯୋଗ କରି ଷଷ୍ଠ ପର୍ଯ୍ୟାୟ (ସେମିଷ୍ଟର-୬) ପରୀକ୍ଷା ବେଳକୁ ପ୍ରକଳ୍ପ (୫୦ ପୃଷ୍ଠା ମଧ୍ୟରେ) ପ୍ରସ୍ତୁତ କରିବେ । ପ୍ରକଳ୍ପଟି ୪ର୍ଥ ପତ୍ର ଭାବରେ ବିବେଚିତ ହେବ ।

ଇିଶେଷ୍ୟ ଦ୍ରଷ୍ଟବ୍ୟ: ସାଧାରଣ (Pass) ଶ୍ରେଣୀର ଛାତ୍ରଛାତ୍ରୀମାନେ ପାଠ୍ୟ-୧ କୁ ୫ ପର୍ଯ୍ୟାୟରେ DSE-IA କିମ୍ବା DSE-IIA ଭାବେ ଏବଂ ପାଠ୍ୟ-୨କୁ ଷଷ୍ଠ ପର୍ଯ୍ୟାୟରେ DSE-IB କିମ୍ବା DSE-IIB ଭାବେ ପଢିବେ ।

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ

ମୋଟ ୪ ଗୋଟି ପାଠ୍ୟ

ପତ୍ର ସଂଖ୍ୟା - ୪

ପ୍ରତ୍ୟେକ ପତ୍ର - ୧୦୦ ନମ୍ବର (୨୦ ନମ୍ବର ଅନ୍ତଃପରୀକ୍ଷା + ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା)

ସମୟ ନିର୍ଘଣ୍ଟ = ୬ x ୪ = ୨୪

ପ୍ରତ୍ୟେକ ପତ୍ର ପାଇଁ ୪୦ଟି ପିରିୟଡ୍, ପ୍ରତି ପିରିୟଡ୍ – ୪୫ ମିନିଟ

୫ମ ଓ ୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ (ସେମିଷ୍ଟର – ୦୫ ଓ ୦୬)

ପାଠ୍ୟ-୧ / Course-1 : ଓଡ଼ିଶାର ସାଂସ୍କୃତିକ ଇତିହାସ ଓ ଓଡ଼ିଆ ସାହିତ୍ୟ (Pass)

(ସମୟ ନିର୍ଘଣ୍ଟ ୪+୨=୬)

୧ମ ଏକକ : ଓଡ଼ିଶାର ସଂକ୍ଷିପ୍ତ ଇତିହାସ ।

୨ୟ ଏକକ : ଓଡ଼ିଶାରେ ବୌଦ୍ଧ ସଂସ୍କୃତି, ଶୈବ ସଂସ୍କୃତି ଓ ବୈଷ୍ଣବ ସଂସ୍କୃତି ।

୩ୟ ଏକକ : ଶ୍ରୀଜଗନ୍ନାଥ ସଂସ୍କୃତି ଓ ଆଦିବାସୀ ସଂସ୍କୃତି ।

୪ର୍ଥ ଏକକ : ଓଡ଼ିଆ ଓଷା ବ୍ରତ ଓ ପର୍ବପର୍ବାଣି ।

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧. ଓଡ଼ିଶାର ସାଂସ୍କୃତିକ ଇତିହାସ - ସଂସ୍କୃତି ବିଭାଗ, ଓଡ଼ିଶା

୨. ଓଡ଼ିଶାର ସାଂସ୍କୃତିକ ଇତିହାସ - ପ୍ରବୋଧ କୁମାର ମିଶ୍ର, ବିଦ୍ୟାପୁରୀ, କଟକ

୩. ଓଡ଼ିଆ ସାହିତ୍ୟର ସାମାଜିକ ଓ ସାଂସ୍କୃତିକ ଇତିହାସ - ଚିତ୍ତରଞ୍ଜନ ଦାସ, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୪. ଓଡ଼ିଶାର ଧର୍ମଧାରା - କାହ୍ନୁଚରଣ ମିଶ୍ର, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୫. ବୈଷ୍ଣବ ସାହିତ୍ୟ ତତ୍ତ୍ୱ - ଆଶୁତୋଷ ପଟ୍ଟନାୟକ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୬. ଓଡ଼ିଆ ସାହିତ୍ୟରେ ଶୈବଧର୍ମ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୭. ଓଡ଼ିଆ ସାହିତ୍ୟରେ ଶ୍ରୀଜଗନ୍ନାଥ - ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୮. ଲୀଳାମୟ ନୀଳାଦ୍ରୀଶ - ସଂପାଦନା, ଭୁବନେଶ୍ୱର ଭଞ୍ଜ ଭାରତୀ (୧ମ ଭାଗ ଓ ୨ୟ ଭାଗ)

୯. ଓଡ଼ିଆ ବ୍ରତ ସାହିତ୍ୟ - ଅରବିନ୍ଦ ପଟ୍ଟନାୟକ, ଓଡ଼ିଶା ସାହିତ୍ୟ ଏକାଡେମୀ

୧୦. ଓଡିଶାର ଧର୍ମଧାରା, ଡ. ପ୍ରଦୀପ୍ତ କୁମାର ପଣ୍ଡା
୧୧. ଲୋକଧର୍ମ ଓ ଲୋକସାାହିତ୍ୟ, ଡ. ସଦାନଂଦ ନାୟକ, ବିଜୟ୍ ବୁକ୍ ଷ୍ଟୋର୍, ବ୍ରହ୍ମପୁର

ପାଠ୍ୟ-୨ / Course – 2 : ଓଡ଼ିଆ ଶିଶୁ ସାହିତ୍ୟ ଓ ବିଜ୍ଞାନଭିତ୍ତିକ ସାହିତ୍ୟ (Pass)

୧ମ ଏକକ : ଓଡ଼ିଆ ଶିଶୁ ସାହିତ୍ୟର ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ଓଡ଼ିଆ ବିଜ୍ଞାନଭିତ୍ତିକ ସାହିତ୍ୟର ସ୍ୱରୂପ ଓ ବିକାଶଧାରା

୩ୟ ଏକକ : ପୃଥିବୀ ବାହାରେ ମଣିଷ - ଗୋକୁଳାନନ୍ଦ ମହାପାତ୍ର

୪ର୍ଥ ଏକକ : ବିଚିତ୍ର ବିଶ୍ୱ - ଦେବକାନ୍ତ ମିଶ୍ର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧. ଓଡ଼ିଆ ଶିଶୁ ସାହିତ୍ୟର ଇତିବୃତ୍ତ - ମନୀନ୍ଦ୍ର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୨. ପୃଥିବୀ ବାହାରେ ମଣିଷ - ଗୋକୁଳାନନ୍ଦ ମହାପାତ୍ର
୩. ବିଚିତ୍ର ବିଶ୍ୱ - ଦେବକାନ୍ତ ମିଶ୍ର
୪. ଓଡିଆ ସାହିତ୍ୟ, ମହେଶ୍ୱର ମହାନ୍ତି
୫. ଆଧୁନିକ ଶିଶୁ ଓଡିଆ ସାହିତ୍ୟ –ଜାନକୀ ବଲ୍ଲଭ ମହାନ୍ତି, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ

ପାଠ୍ୟ-୩ / Course – 3 : ଓଡ଼ିଆ ପଦ୍ୟ ସାହିତ୍ୟ (Pass)

୧ମ ଏକକ : ଜଗନ୍ନାଥ ଜଣାଣ - କବିସୂର୍ଯ୍ୟ ବଳଦେବ ରଥ
ଆକାଶ ପ୍ରତି - ମଧୁସୂଦନ ରାଓ
ଯାତ୍ରା ସଂଗୀତ - ବୈକୁଣ୍ଠନାଥ ପଟ୍ଟନାୟକ
ମୌସୁମୀ - ରାଧାମୋହନ ଗଡ଼ନାୟକ

୨ୟ ଏକକ : କ୍ଷୁଦ୍ରଗଳ୍ପ
ଡିମିରି ଫୁଲ – ଅଖିଳ ମୋହନ ପଟ୍ଟନାୟକ
ଭଙ୍ଗା ଖେଳନା - କିଶୋରୀ ଚରଣ ଦାଶ
ଅନ୍ଧ ରାତିର ସୂର୍ଯ୍ୟ - ମହାପାତ୍ର ନୀଳମଣି ସାହୁ
ବାସି ମଡ଼ା - ସୁରେନ୍ଦ୍ର ମହାନ୍ତି

୩ୟ ଏକକ : ପ୍ରବନ୍ଧ ଓ ସମାଲୋଚନା
ମହାସ୍ରୋତ - ବିଶ୍ୱନାଥ କର
ଚିତ୍ରଗ୍ରୀବର ଉଚିତ ଅଭିମାନ - ଗୋଲୋକ ବିହାରୀ ଧଳ

ତିନୋଟି ସମାଲୋଚନା – ବାଉରୀବନ୍ଧୁ କର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୪ର୍ଥ ଏକକ : ଉପନ୍ୟାସ - ମାଟିର ମଣିଷ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧. ଓଡ଼ିଆ ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ, ସଂ ପଠାଣୀ ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୨. କାଳିନ୍ଦୀ ଚରଣଙ୍କ କଥାସାହିତ୍ୟ – ବିଷ୍ଣୁପ୍ରିୟା ଓତା, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୩. ଓଡିଆ ପ୍ରବନ୍ଧ ସାହିତ୍ୟ - ବାଉରୀବନ୍ଧୁ କର

୪. ଓଡିଆ ସମାଲୋଚନା ସାହିତ୍ୟ - ଓଡିଶା ସାହିତ୍ୟ ଏକାଡେମୀ

୫. ମାଟିର ମଣିଷ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ

ପାଠ୍ୟ-୪/ **Course – 4 : ପ୍ରବନ୍ଧ ପ୍ରସ୍ତୁତି ଓ ଉପସ୍ଥାପନା (Pass)**

ସନ୍ଦର୍ଭ ଲିଖନ - ୮୦ + ମୌଖିକ - ୨୦ = ୧୦୦

ଅନୁବାଦ ବା ସଂପାଦନା ବା ଓଡିଆ ସଂସ୍କୃତି ଉପରେ ଅନ୍ୟୁନ ୫୦ ପୃଷ୍ଠା ମଧ୍ୟରେ ନିବନ୍ଧ ପ୍ରସ୍ତୁତି।

କିମ୍ବା

(ସମାଲୋଚନା, ଅନୁବାଦ, ସମ୍ପାଦନା, ଗବେଷଣା)

୧. ପ୍ରଥମ ଏକକ : ସମାଲୋଚନାର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୨. ଦ୍ୱିତୀୟ ଏକକ : ଅନୁବାଦର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୩. ତୃତୀୟ ଏକକ : ସମ୍ପାଦନା ବିଧି

୪. ଚତୁର୍ଥ ଏକକ : ଗବେଷଣା ପ୍ରବିଧି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଗବେଷଣା ଅନୁବାଦ ସମ୍ପାଦନା କଳା – ସଂ ନାରାୟଣ ସାହୁ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ

୨. ଗବେଷଣା ପ୍ରବିଧି - ଡ. ସୁବୋଧ ଚାଟାର୍ଜୀ, ବିଦ୍ୟାପୁରୀ, କଟକ

୩. ଗବେଷଣା ପ୍ରକରଣ: ସଂପାଦନା ଓ ଅନୁବାଦ ପ୍ରବିଧି - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ ଓ ନିର୍ମଳା କୁମାରୀ ରାଉତ

ଅନ୍ତର୍ବିଷୟ ଇଚ୍ଛାଧୀନ ପାଠ – ଓଡ଼ିଆ

Generic Electives (GE) - Course - Odia

ସୂଚନା : ଅନ୍ୟ ସଜ୍ଞାନର ବିଦ୍ୟାର୍ଥୀ ଏଥିମଧ୍ୟରୁ ୨ଗୋଟି କିମ୍ବା ୪ଗୋଟି ପତ୍ର ଅଧ୍ୟୟନ କରିପପାରିବେ ; କିନ୍ତୁ ପାସ୍ ବିଦ୍ୟାର୍ଥୀ ଏଥିମଧ୍ୟରୁ ୧ମ ଓ ୨ୟ ପତ୍ରକୁ ଯଥାକ୍ରମେ ୫ମ ଓ ୬ଷ୍ଠ ପର୍ଯ୍ୟାୟରେ ପଢିବେ ।

୧. ପତ୍ର ସଂଖ୍ୟା - ୪

୨. ପ୍ରତ୍ୟେକ ପତ୍ର - ୧୦୦ ନମ୍ବର ବିଶିଷ୍ଟ, ମୋଟ୍ -୪୦୦ ନମ୍ବର

୩. ପ୍ରତ୍ୟେକ ପତ୍ରରେ ୪ଗୋଟି ଏକକ ରହିବ ।

ନମ୍ବର ବିଭାଜନ ବିଧି :

କ) ପ୍ରତ୍ୟେକ ପତ୍ରର ମୋଟ ନମ୍ବର – ୧୦୦

ଖ) ଅନ୍ତଃପରୀକ୍ଷା – ୨୦ ଓ ମୁଖ୍ୟ ପରୀକ୍ଷା – ୮୦

(ଗ) ମୁଖ୍ୟ ପରୀକ୍ଷାରେ ପ୍ରତ୍ୟେକ ଏକକରୁ ଦୁଇଟି ଲେଖାଏଁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ପସନ୍ଦମୂଳକ ବୋଧଜ୍ଞାନମାପକ ୮ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡ଼ିବ । ୮ ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନରୁ ୪ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

(୧୫ x ୪ = ୬୦)

(ଘ) ସମସ୍ତ ଏକକରୁ ୨ ନମ୍ବର ବିଶିଷ୍ଟ ଲକ୍ଷଜ୍ଞାନମୂଳକ ୧୫ଟି ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ମୋଟ ୧୫ ଗୋଟି ପ୍ରଶ୍ନରୁ ୧୦ ଗୋଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ ।

(୨ x ୧୦ = ୨୦)

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ **(Semester – I)**

ପାଠ୍ୟ – ୧ / ପତ୍ର - ୧ (Core Course - 1): ଗଣମାଧ୍ୟମ, ବେତାର କଳା ଓ ବିଜ୍ଞାପନ କଳା

୧ମ ଏକକ : ଗଣମାଧ୍ୟମ ଓ ତା'ର ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ବିଜ୍ଞାପନର ପରିଭାଷା, ପରିସର ଓ ଉଦ୍ଦେଶ୍ୟ

୩ୟ ଏକକ : ସ୍ରମ୍ଭ ଲିଖନ ଓ ଫିଚର ଲିଖନ

୪ର୍ଥ ଏକକ : ପତ୍ରଲିଖନ (ବାଣିଜ୍ୟିକ, କାର୍ଯ୍ୟାଳୟ ଭିତ୍ତିକ, ବ୍ୟକ୍ତିଗତ ଓ ସମ୍ପାଦକଙ୍କୁ ପତ୍ର)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ସାହିତ୍ୟକୁ ଆକାଶବାଣୀର ଦାନ - ବ୍ରଜମୋହନ ମହାନ୍ତି, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର
୨. ସମ୍ବାଦପତ୍ର ଓ ଗଣମାଧ୍ୟମ -ମୃଣାଳ ଚାଟାର୍ଜୀ, ଶେଫାଳୀ କମ୍ୟୁନିକେଶନ, ଢେଙ୍କାନାଳ
୩. ସମ୍ବାଦ ଓ ସାମ୍ବାଦିକତା – ଚନ୍ଦ୍ରଶେଖର ମହାପାତ୍ର, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୪. ସଂଯୋଗ ଅନୁବିଧି,-ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ
୫. ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ବିରଞ୍ଚି ନାରାୟଣ ସାମଲ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍
୬. ଯୋଗାଯୋଗର ଭାଷା – ସୁଧୀର ଚନ୍ଦ୍ର ମହାନ୍ତି, ପ୍ରାଚୀ ପ୍ରକାଶନ, କଟକ

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (Semester – II)

ପାଠ୍ୟ – ୨ / ପତ୍ର - ୨ (Core Course -2) : ସାହିତ୍ୟ ଅଧ୍ୟୟନ

୧ମ ଏକକ : ଗଳ୍ପ ସାହିତ୍ୟ
ବୁଢ଼ା ଶଙ୍ଖାରି - ଲକ୍ଷ୍ମୀକାନ୍ତ ମହାପାତ୍ର
ମାଗୁଣୀର ଶଗଡ଼ - ଗୋଦାବରୀଶ ମହାପାତ୍ର
ଶିକାର - ଭଗବତୀ ଚରଣ ପାଣିଗ୍ରାହୀ

୨ୟ ଏକକ : ଉପନ୍ୟାସ ସାହିତ୍ୟ
ଶାସ୍ତି - କାହ୍ନୁଚରଣ ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୩ୟ ଏକକ : ନାଟକ
ଶେଷ କଥା - ଡକ୍ଟର ନାରାୟଣ ସାହୁ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୪ର୍ଥ ଏକକ : ରମ୍ୟ ରଚନା
ବାଇ ମହାନ୍ତି ପାଞ୍ଜି (ପ୍ରଥମ ବିଡ଼ା) - ଗୋପାଳ ଚନ୍ଦ୍ର ପ୍ରହରାଜ
ବଟୁଆ - ଗୋବିନ୍ଦ ତ୍ରିପାଠୀ
ସାଧୁ ସଙ୍ଗ - ଚୌଧୁରୀ ହେମକାନ୍ତ ମିଶ୍ର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. କାହ୍ନୁଚରଣ ବିଶେଷାଙ୍କ, କୋଣାର୍କ, ଓଡିଶା ସାହିତ୍ୟ ଏକାଡେମୀ
୨. ଓଡିଆ କ୍ଷୁଦ୍ରଗଳ୍ପର ଇତିହାସ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩. ଓଡିଆ କଥାସାହିତ୍ୟର କଥା ଓ ରମ୍ୟରଚନା, ମହାପାତ୍ର ନୀଳମଣି ସାହୁ, ଓଡଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୪. ଶାସ୍ତି - କାହ୍ନୁଚରଣ ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୫. ଉତ୍ତର ସତୁରୀ ଓଡିଆ ନାଟକ, ହେମନ୍ତ କୁମାର ଦାସ, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ
୬. ଶେଷ କଥା - ନାରାୟଣ ସାହୁ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

ତୃତୀୟ ପର୍ଯ୍ୟାୟ (Semester – III)

ପାଠ୍ୟ – ୩ / ପତ୍ର – ୩ (Core Course -3): ପ୍ରାଚୀନ, ମଧ୍ୟଯୁଗ ଓ ଆଧୁନିକ ଓଡିଆ ସାହିତ୍ୟ

୧ମ ଏକକ : ସାରଳା ମହାଭାରତରେ କାହାଣୀ
ସତ୍ୟଆତ୍ମ
ତୁଳସୀବଣ ବାଘ
ଗଙ୍ଗା ବୋଇଲେ ଥିବି ଗାଂଗୀ ବୋଇଲେ ଯିବି

୨ୟ ଏକକ : ବଳରାମ ଦାସ ଓ ଜଗନ୍ନାଥ ଦାସଙ୍କ କାହାଣୀ
ବଳରାମ ଦାସଙ୍କ ବଉଳା ଅଧ୍ୟାୟ ଓ ମୃଗୁଣୀ ସ୍ତୁତି
ଜଗନ୍ନାଥ ଦାସଙ୍କ କପୋତ ଉପାଖ୍ୟାନ ଓ ପିଙ୍ଗଳା ଉପାଖ୍ୟାନ

୩ୟ ଏକକ : ମଧ୍ୟକାଳୀନ ସାହିତ୍ୟ ସ୍ରଷ୍ଟାଙ୍କ ସଂକ୍ଷିପ୍ତ ପରିଚୟ
ଦୀନକୃଷ୍ଣ ଦାସ, ଅଭିମନ୍ୟୁ ସାମନ୍ତସିଂହାର, କବିସମ୍ରାଟ ଉପେନ୍ଦ୍ର ଭଞ୍ଜ
କବିସୂର୍ଯ୍ୟ ବଳଦେବ ରଥ

୪ର୍ଥ ଏକକ : ଆଧୁନିକ ଯୁଗର ସାହିତ୍ୟ ସ୍ରଷ୍ଟାଙ୍କ ସଂକ୍ଷିପ୍ତ ପରିଚୟ
ରାଧାନାଥ ରାୟ, ଫକୀର ମୋହନ ସେନାପତି, ଗଙ୍ଗାଧର ମେହେର, ମାୟାଧର ମାନସିଂହ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ - ମାୟାଧର ମାନସିଂହ, ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୨. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ – ସୂର୍ଯ୍ୟନାରାୟଣ ଦାଶ (୨ୟ ଓ ୩ୟ ଭାଗ) – ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୩. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ (୧୮୦୩-୧୯୨୦) ନଟବର ସାମନ୍ତରାୟ, ବାଣୀ ଭବନ, ଭୁବନେଶ୍ୱର
୪. ଆଲୋକ ଓ ଅମୃତର କବି ଗଙ୍ଗାଧର: ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ପଢାପଢି, ଭୁବନେଶ୍ୱର

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ (Semester – IV)

ପାଠ୍ୟ – ୪ / ପତ୍ର – ୪ (Core Course - 4): ଓଡ଼ିଆ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା

୧ମ ଏକକ / ୟୁନିଟ୍-୧ : କମ୍ପ୍ୟୁଟର କ'ଣ ଓ କାହିଁକି
କମ୍ପ୍ୟୁଟର ର ବିଭିନ୍ନ ଅଂଶବିଶେଷ ଓ କାର୍ଯ୍ୟ

୨ୟ ଏକକ/ ୟୁନିଟ୍-୨ : ୟୁନିକୋଡ ମାଧ୍ୟମରେ ଓଡ଼ିଆ ଡିଟିପି ଶିକ୍ଷା

୩ୟ ଏକକ/ ୟୁନିଟ୍-୩: ଇଣ୍ଟରନେଟ୍‌ରେ ଓଡ଼ିଆ ଚିଠି
ଇଣ୍ଟରନେଟ୍‌ରେ ସାମାଜିକ ଗଣମାଧ୍ୟମର ବ୍ୟବହାର

୪ର୍ଥ ଏକକ/ ୟୁନିଟ୍-୪ : ପାୱାର୍ ପଏଣ୍ଟ ସ୍ଲାଇଡ୍ ପ୍ରସ୍ତୁତି, ଟେବୁଲସ୍, ଫିଗରସ୍ ଏବଂ ପିକ୍‌ଚରସ ଏକ୍‌ସେଲ୍‌ର ବ୍ୟବହାର ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ମୌଳିକ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା - ଦେବକାନ୍ତ ମିଶ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୨. ଓଡ଼ିଆରେ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା – ରୁଦ୍ରନାରାୟଣ ମହାପାତ୍ର, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୩. ଓଡ଼ିଆ ଭାଷାରେ କମ୍ପ୍ୟୁଟର୍‌ର ପ୍ରୟୋଗ - ସୁଧୀର ଚନ୍ଦ୍ର ମହାନ୍ତି, ଏ.କେ. ମିଶ୍ର ପବ୍ଲିକେଶନ, ଭୁବନେଶ୍ୱର

୪. କମ୍ପ୍ୟୁଟରରେ ଓଡିଆ ଭାଷାର ବ୍ୟବହାର ଓ ପ୍ରୟୋଗ – ରୁଦ୍ରପ୍ରସାଦ ମିଶ୍ର, ଆଜିଅନ୍ତା ପବ୍ଲିଶର୍ସ, ଜଗତସିଂହପୁର

୫. କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା – ରାନୁ ବନିକ୍, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

ପାଠ୍ୟକ୍ରମର ସାରାଂଶ – ସଂରଚନା

Structure of B.A. Pass (DSC-Odia) Under CBCS

ପ୍ରଧାନ ପାଠ୍ୟ (Core Course) : ୪
ପ୍ରତ୍ୟେକ ପତ୍ରର କ୍ରେଡ଼ିଟିସ୍ = ୪ + ୨ = ୬

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ : (Ist Semester)

ପ୍ରଧାନ ପାଠ୍ୟ - ୧ (Core Course – 1) ଓଡ଼ିଆ କବିତା ପ୍ରାଚୀନରୁ ଆଧୁନିକ
ପ୍ରଥମ ପତ୍ର – **କ୍ରେଡ଼ିଟିସ୍ =** ୪ + ୨ = ୬

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ : (2ndSemester)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୨ (Core Course – 2) ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା
୨ୟ ପତ୍ର - **କ୍ରେଡ଼ିଟିସ୍ =** ୪ + ୨ = ୬

ତୃତୀୟ ପର୍ଯ୍ୟାୟ : (3rd Semester)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୩ (Core Course – 3) ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ
୩ୟ ପତ୍ର- **କ୍ରେଡ଼ିଟିସ୍ =** ୪ + ୨ = ୬

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ : (4th Semester)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୪ (Core Course - 04) ବ୍ୟାବହାରିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ
୪ର୍ଥ ପତ୍ର - **କ୍ରେଡ଼ିଟିସ୍ =** ୪ + ୨ = ୬

CBCS : B.A. (PASS) 2019-20

ପସନ୍ଦ ଓ ଆସ୍ଥାଭତ୍ତିକ ପାଠ୍ୟଖସଡ଼ା : ସ୍ନାତକ (ଓଡ଼ିଆ ଇଚ୍ଛାଧୀନ)

2019-20

Core Course – ପ୍ରଧାନ ପାଠ୍ୟ

ମୋଟ ପତ୍ର ସଂଖ୍ୟା – ୦୪ (Four Paper – Discipline-1/ Four Paper – Discipline-2)

ପ୍ରତ୍ୟେକ ପତ୍ର – ୧୦୦ ନମ୍ବର ବିଶିଷ୍ଟ (୨୦ ନମ୍ବର ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃ ପର୍ଯ୍ୟାୟ ପରୀକ୍ଷା + ୮୦ ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମାନକ ପରୀକ୍ଷା)

ଇଚ୍ଛାଧୀନ ଓଡ଼ିଆ : ଜଣେ ସ୍ନାତକ – (ଇଚ୍ଛାଧୀନ)– ମୋଟ୍ ୪୦୦ ନମ୍ବରର ପରୀକ୍ଷା ଦେବେ ।

କ) ଅତି କମ୍‌ରେ (ମୋଟ୍) ୫୦ଟି କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (ପିରିୟଡ୍)ରେ ଗୋଟିଏ ପତ୍ରର ପାଠଦାନ ଶେଷ ହେବ । ଗୋଟିଏ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ ବା ପିରିୟଡ୍-୪୫ ମିନିଟ)

ଖ) ପ୍ରତ୍ୟେକ ପତ୍ର ୪ ଗୋଟି ୟୁନିଟ୍ (ଏକକ) ଉପାଂଶରେ ବିଭକ୍ତ ।

ଗ) ପ୍ରତ୍ୟେକ ପତ୍ର ୬ ଆସ୍ଥାଭିତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (୪ + ୨ କ୍ରେଡିଟ୍) ବିଶିଷ୍ଟ । ଗୋଟିଏ ଆସ୍ଥାଭିତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟର ମହତ୍ତ୍ୱ ହେଉଛି – ୧୦ ପିରିୟଡ୍ ସହିତ ସମାନ ।

ମୋଟ୍ ୪ ଗୋଟି ଇଚ୍ଛାଧୀନ ପତ୍ରର କ୍ରେଡିଟ୍ ହେଉଛି – ୪ x ୬ (୪ + ୨) = ୨୪ ।

ଘ) ପର୍ଯ୍ୟାୟ (Semester) ଓ ପ୍ରସ୍ତାବିତ ପାଠ ଯୋଜନା :

ପ୍ରଥମ ଶିକ୍ଷାବର୍ଷ

୧ମ ପର୍ଯ୍ୟାୟ ୧ମ -ପତ୍ର	୧୦୦ ନମ୍ବର
୨ୟ ପର୍ଯ୍ୟାୟ ୨ୟ -ପତ୍ର	୧୦୦ ନମ୍ବର

ଦ୍ୱିତୀୟ ଶିକ୍ଷାବର୍ଷ

୩ୟ ପର୍ଯ୍ୟାୟ ୩ୟ -ପତ୍ର	୧୦୦ ନମ୍ବର
୪ର୍ଥ ପର୍ଯ୍ୟାୟ ୪ର୍ଥ - ପତ୍ର	୧୦୦ ନମ୍ବର

ଙ) ନମ୍ବର / ମୂଲ୍ୟାଙ୍କ ବିଭାଜନ ପଦ୍ଧତି :

ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃପରୀକ୍ଷା	– ୨୦ ନମ୍ବର
ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମୁଖ୍ୟ ପରୀକ୍ଷା	– ୮୦ ନମ୍ବର

ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ପରୀକ୍ଷାରେ ନିମ୍ନମତେ ପ୍ରଶ୍ନ ପଡ଼ିବ :

କ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତ୍ୟେକ ଏକକରୁ ବିକଳ୍ପ ସହ ୮ଟି ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀ ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (୧୫ x ୪ = ୬୦ ନମ୍ବର)

ଖ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତ୍ୟେକ ଏକକରୁ ୧୫ଟି ୨ ନମ୍ବର ବିଶିଷ୍ଟ ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (୨ x ୧୦ = ୨୦)

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ **(Detail Syllabus)**

(କ) ପ୍ରଥମ ପର୍ଯ୍ୟାୟ **(Semester – 1) DSC 1/2 A**

ପ୍ରଥମ ପତ୍ର: ଓଡ଼ିଆ କବିତା ପ୍ରାଚୀନରୁ ଆଧୁନିକ

ପ୍ରଧାନ ପାଠ (Core Course -1): ଓଡିଆ ସାହିତ୍ୟ ପ୍ରାଚୀନରୁ ଆଧୁନିକ

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ସାରଳା ମହାଭାରତ (ଦୁର୍ଯ୍ୟୋଧନଙ୍କ ରକ୍ତନଦୀ ସନ୍ତରଣ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଭାଗବତ (୨୪ ଗୁରୁ ପ୍ରସଙ୍ଗ) - ଜଗନ୍ନାଥ ଦାସ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦୀନକୃଷ୍ଣ ଦାସଙ୍କ ରସକଲ୍ଲୋଳ(୧ମ ଛାନ୍ଦ) ଓ ଉପେନ୍ଦ୍ରଭଞ୍ଜଙ୍କ କୋଟିବ୍ରହ୍ମାଣ୍ଡ ସୁନ୍ଦରୀ (୧ମ ଛାନ୍ଦ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଆଧୁନିକ କବିତା

ମହାଯାତ୍ରା (ସପ୍ତମ ସର୍ଗ)- ଅମର୍ଷୀଙ୍କ ଉଦ୍‌ବୋଧନ, ରାଧାନାଥ ରାୟ

ମଙ୍ଗଳେ ଅଇଲା ଉଷା – ଗଙ୍ଗାଧର ମେହେର

ବନ୍ଦୀର ସାନ୍ଧ୍ୟ ଅନୁଚିନ୍ତା - ଗୋପବନ୍ଧୁ ଦାସ

ପ୍ରତିମା ନାୟକ - ସଚ୍ଚିଦାନନ୍ଦ ରାଉତରାୟ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୭. ସାରଳା ମହାଭାରତ (ସାରଳା ଦାସ)

୧. ଅବଧୂତ ଓ ଯଦୁରାଜା ସମ୍ବାଦ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ

୧. କହେ କୃଷ୍ଣଦାସ କବି – କୃଷ୍ଣଚରଣ ସାହୁ, ବିଦ୍ୟାପୁରୀ, କଟକ

୨. ରସକଲ୍ଲୋଳ, ସଂପାଦନା – ଦେବେନ୍ଦ୍ର ମହାନ୍ତି

୩. ଦୁର୍ଲଭ ଦୀନକୃଷ୍ଣ, ଜ୍ୟୋତିରଞ୍ଜନ ସାମଲ, ବିଜୟିନୀ ପବ୍ଲିକେସନ୍, କଟକ

(ଖ) ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (Semester – II) DSC 1/2 B

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୨ (Core Course - 2) : ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା।

ଦ୍ୱିତୀୟ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ରକ୍ତମାଟି - କାଳୀଚରଣ ପଟ୍ଟନାୟକ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ନନ୍ଦିକା କେଶରୀ -ମନୋରଞ୍ଜନ ଦାସ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଏକାଙ୍କିକା- ସ୍ମୃତି ବିଭ୍ରାଟ - ପ୍ରାଣବନ୍ଧୁ କର ଓ ଛଦ୍ମବେଶୀ - ବିଶ୍ୱଜିତ୍ ଦାସ

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଅଭିଯାନ - କାଳୀଚରଣ ପଟ୍ଟନାୟକ

୨. ନନ୍ଦିକା କେଶରୀ-ମନୋରଞ୍ଜନ ଦାସ କିମ୍ବା ତଟନିଚଂଜନା – ବିଜୟ ମିଶ୍ର

୩. କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ କିମ୍ବା ଭୁଖା –ମଂଗଲୁ ଚରଣ ବିଶ୍ୱାଳ

୪. ଅଶ୍ରୁ ନୁହେଁ ଅନଳ, ହେମନ୍ତ କୁମାର ଦାସ

୫. ସ୍ୱାଧୀନୋତ୍ତରର ଓଡିଆ ନାଟକର ମନସ୍ତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ, ରଶ୍ମିତା ରାଉତରାୟ, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ

୬. ସାହିତ୍ୟସାଧକ ମଙ୍ଗଳୁଚରଣ – ଗୌରିଦାସ ପ୍ରଧାନ

(ଚତୁର୍ଥ ପତ୍ର ନିମନ୍ତେ ପ୍ରଦତ୍ତ ସହାୟକ ପୁସ୍ତକଗୁଡିକ ଅନୁସରଣୀୟ ।)

ତୃତୀୟ ପର୍ଯ୍ୟାୟ (Semester – III) DSC 1/2 C

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୩ (Core Course - 3) : ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ

ତୃତୀୟ ପତ୍ର :

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ କଥାସାହିତ୍ୟର ବିକାଶକ୍ରମ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି କିମ୍ବା ନୟନତାରା -ଦୟାନିଧି ମିଶ୍ର

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଗଳ୍ପ ସାହିତ୍ୟ

ପାଠ୍ୟ ଗଳ୍ପ: ଦେବତାର ବିଧାତା – ଗୋଦାବରୀଶ ମହାପାତ୍ର

ମାଂସର ବିଳାପ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ

ମଧୁବନର ମେୟର - ମନୋଜ ଦାସ

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ, ସଂ ପଠାଣି ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୨. ଓଡ଼ିଆ କ୍ଷୁଦ୍ରଗଳ୍ପର ଉନ୍ମେଷ ଓ ଉତ୍ତରଣ – ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୩. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି

୪. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ ଭିନ୍ନ ଦୃଷ୍ଟି ଭିନ୍ନ ବ୍ୟାଖ୍ୟା, ପଞ୍ଚାନନ ମିଶ୍ର, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ

୫. ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି

୬. ନୟନତାରା - ଦୟାନିଧି ମିଶ୍ର

୭. କଥାଶିଳ୍ପୀ ମନୋଜ ଦାସ, ଶତ୍ରୁଘ୍ନ ପାଣ୍ଡବ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୮. ମନସ୍ୱୀ ମନୋଜ, ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୯. ଓଡିଆ ଉପନ୍ୟାସର ସମାଜତାତ୍ତ୍ୱିକ ଆଲୋଚନା, କଇଳାଶ ପଟ୍ଟନାୟକ, ବିଦ୍ୟାପୁରୀ, କଟକ

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ (Semester – IV)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୪ (Core Course - 4) : ବ୍ୟାବହାରିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ (DSC 1/2 D)

୪ର୍ଥ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ ବର୍ଣ୍ଣ ବିଚାର, ବାକ୍ୟର ଗଠନ ରୀତି ଓ ପ୍ରକାରଭେଦ ।

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : କାରକ, ବିଭକ୍ତି, କୃଦନ୍ତ ଓ ତଦ୍ଧିତ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଉପସର୍ଗ, ସନ୍ଧି ଓ ସମାସ

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡିଆ ଶବ୍ଦସମ୍ଭାର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିୟୁ ଷ୍ଟୁଡେଣ୍ଟ ଷ୍ଟୋର୍, କଟକ

୨. ଆଧୁନିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ - ଧନେଶ୍ୱର ମହାପାତ୍ର, କିତାବ ମହଲ, କଟକ

୩. ବ୍ୟାବହାରିକ ଓଡିଆ ବ୍ୟାକରଣ, ବିଜୟ ପ୍ରସାଦ ମହାପାତ୍ର, ବିଦ୍ୟାପୁରୀ, କଟକ

୪. ଓଡ଼ିଆ ଭାଷାର ଉନ୍ମେଷ ଓ ବିକାଶ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
ଓଡିଆ ଭାଷା ଚର୍ଚ୍ଚାର ପରଂପରା, ଗଗନେନ୍ଦ୍ର ନାଥ ଦାସ, ଓଡିଆ ଗବେଷଣା ପରିଷଦ, କଟକ

ଦକ୍ଷତାବର୍ଦ୍ଧକ ବାଧତାମୂଳକ ପାଠ୍ୟକ୍ରମ

Ability Enhancement Compulsory Course (AECC)

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ

(2019-20)

MIL (Communications) – Odia

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ **(2nd Semester)** କଳା, ବିଜ୍ଞାନ ଓ ବାଣିଜ୍ୟ ସାଧାରଣ **(Pass)** / ସମ୍ମାନ **(Hons)** ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

ମୋଟ୍ କ୍ରେଡିଟ୍ସ-୪, ମୋଟ ଶ୍ରେଣୀ ପାଠଦାନ ନିର୍ଘଣ୍ଟ -୪୦, ଗୋଟିଏ ଶ୍ରେଣୀ ପାଠଦାନର (ପିରିୟଡ୍) ସମୟ ଅବଧି -୪୫ ମିନିଟ୍, ପାଠ୍ୟକ୍ରମ – ୨, ପୂର୍ଣ୍ଣସଂଖ୍ୟା – ୧୦୦

(Credits – 4) Total Classes - 40, One Period - 45 Minutes, Course - II, Full Marks - 100

ପାଠ୍ୟକ୍ରମର ଭୂମିକା :

ଏହି ପାଠ୍ୟଖସଡ଼ାଟି ପସନ୍ଦ ଓ ଆସ୍ଥାଭତ୍ତିକ (CBCS / ସିବିସିଏସ୍) ପାଠ୍ୟ ପ୍ରଣାଳୀ ଅନୁସାରେ ପ୍ରସ୍ତୁତ ହୋଇଛି । ବିଭିନ୍ନ ସ୍ତରରେ ଆବଶ୍ୟକ ଅନୁସାରେ ସମସାମୟିକ ପରିସ୍ଥିତିକୁ ନେଇ ଭାବବିନିମୟ ଓ ପାରସ୍ପରିକ ଯୋଗାଯୋଗ ସ୍ଥାପନ କିପରି ଓଡ଼ିଆ ଭାଷାରେ ସହଜରେ, ସରଳରେ ହୋଇପାରିବ – ଏ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟର ପ୍ରାୟୋଗିକ ଜ୍ଞାନର ବିକାଶ ନିମିତ୍ତ +୩ ସ୍ତରୀୟ ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ଏହି ପାଠ୍ୟକ୍ରମର ଖସଡ଼ାଟି ସାହାଯ୍ୟ କରିବ । ସେଥିପାଇଁ ପ୍ରଚଳିତ ଭାଷାର ବୈୟାକରଣିକ, ବ୍ୟାବହାରିକ ଓ ପ୍ରାୟୋଗିକ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଏଥିରେ ସଂଯୋଗ ପ୍ରକ୍ରିୟାର ଅନୁବିଧି, ଯୋଗାଯୋଗର ତଥ୍ୟ ଓ ତତ୍ତ୍ୱ ପ୍ରତି ଗୁରୁତ୍ୱ ଦିଆଯାଇଛି । ସରକାରୀ କାର୍ଯ୍ୟାଳୟରେ ଓଡ଼ିଆ ଭାଷାର ବ୍ୟବହାରରେ ଏହା ଦକ୍ଷତା ବୃଦ୍ଧି କରିବ । ଓଡ଼ିଆ ଭାଷାର ପ୍ରୟୋଗରେ ସେମାନେ ଶୁଦ୍ଧ ଓ ପରିଚ୍ଛନ୍ନ ଭାବରେ ଯେକୌଣସି ପ୍ରକାର ଜ୍ଞାନର ସୂଚନା ତଥ୍ୟ ଓ ସିଦ୍ଧାନ୍ତକୁ ମୌଖିକ ଓ ଲିଖିତ ସ୍ତରରେ ସହଜରେ ପ୍ରକାଶ କରିପାରିବେ ଏବଂ ସେମାନଙ୍କ ମାତୃଭାଷା ପ୍ରୟୋଗର ବିକାଶ ଘଟିପାରିବ ।

ମୂଲ୍ୟ ବିଭାଜନ ପଦ୍ଧତି : (ସବୁଥିରୁ ବିକଳ୍ପ ପଡ଼ିବ)

କ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍) ରୁ ବିକଳ୍ପସହ ଦୁଇଟି ଲେଖାଏଁ ମୋଟ ୮ଟି ୧୫ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘପ୍ରଶ୍ନ ପଡିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ ।(୧୫ x ୪ = ୬୦)

ଖ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକରୁ ୧୨ଟି ଅତିସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (୧୦ x ୨ = ୨୦)

ଗ) ମହାବିଦ୍ୟାଳୟସ୍ତରୀୟ ଅନ୍ତଃ ପରୀକ୍ଷା (୨୦)

ମୋଟ ମୂଲ୍ୟାଙ୍କ - ୧୦୦

ସବିଶେଷ ପାଠ୍ୟ

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ **(AECC)**

ପାଠ୍ୟ-୧ / **Course – 1: ଯୋଗାଯୋଗ ଅନୁବିଧି, ରୀତି ଓ ମାଧ୍ୟମ**

୧ମ ଏକକ : ଯୋଗାଯୋଗର ପରିଭାଷା, ଅନୁବିଧି, ପରିସର ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ସାକ୍ଷାତକାର, ଭାଷଣ କଳା

୩ୟ ଏକକ : ସମ୍ବାଦର ପରିଭାଷା, ପରିସର ଓ ସମ୍ବାଦ ପ୍ରସ୍ତୁତି

୪ର୍ଥ ଏକକ : ଓଡ଼ିଆ ଭାଷାର ବର୍ଣ୍ଣମାଳା, ବର୍ଣ୍ଣାଶୁଦ୍ଧିର ନିରାକରଣ । (ବନାନ ତ୍ରୁଟି - ସାଦୃଶ୍ୟଜନିତ ଅଶୁଦ୍ଧି, ଲିଙ୍ଗଗତ ଅଶୁଦ୍ଧି, ସନ୍ଧିଗତ ଅଶୁଦ୍ଧି, ସମାସଗତ ଅଶୁଦ୍ଧି, ବଚନ ଓ ବିଭକ୍ତିଗତ ଅଶୁଦ୍ଧି, ବାକ୍ୟ ବିଧିଜନିତ ଅଶୁଦ୍ଧି, ସମାର୍ଥବୋଧକ ଶବ୍ଦାଶୁଦ୍ଧି, ପ୍ରତ୍ୟୟ ଜନିତ ଅଶୁଦ୍ଧି, ଶବ୍ଦ ସଂଯୋଗାତ୍ମକ ଓ ସ୍ୱରସଙ୍ଗତି ଜନିତ ଅଶୁଦ୍ଧି)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ (ପାଠ୍ୟ-୧ / **Course – 1**)

୧. ଯୋଗାଯୋଗ ମୂଳକ ମାତୃଭାଷା (ଓଡ଼ିଆ) ସାମଲ ବିରଞ୍ଚି ନାରାୟଣ, ସତ୍ୟନାରାୟଣ ବୁକ ଷ୍ଟୋର, କଟକ ।

୨. ସଂଯୋଗ ଅନୁବିଧି, ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ

୩. ଭାଷଣ କଳା ଓ ଅନ୍ୟାନ୍ୟ ପ୍ରସଙ୍ଗ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର,କଟକ

୪. ପ୍ରାୟୋଗିକ ଓଡ଼ିଆ ଭାଷା – ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୧. ସମ୍ବାଦ ଓ ସାମ୍ବାଦିକତା – ଚନ୍ଦ୍ରଶେଖର ମହାପାତ୍ର, ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୧. ନିର୍ଭୁଲ ଲେଖାର ମୂଳସୂତ୍ର, ନୀଳାନ୍ଦିଭୂଷଣ ହରିଚନ୍ଦନ, ପି.ସି.ଆର ପବ୍ଲିକେସନ, ଭୁବନେଶ୍ୱର

୨. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିଉ ଷ୍ଟୁଡେଣ୍ଟସ୍ ଷ୍ଟୋର, କଟକ

COMPULSORY LANGUAGE / LITERATURE COURSE MIL (ODIA)- ARTS

ବାଧତାମୂଳକ ଭାଷା ଓ ସାହିତ୍ୟ - ଆଧୁନିକ ଭାରତୀୟ ଭାଷା (ଓଡ଼ିଆ)

+୩, ପ୍ରଥମ ବର୍ଷ କଳା ସାଧାରଣ **(PASS)** ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

ପତ୍ର ସଂଖ୍ୟା - ପ୍ରଥମ

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ **(1ST SEMESTER)**

ପ୍ରତ୍ୟେକ ପତ୍ରର ମୂଲ୍ୟ - ୧୦୦ ନମ୍ବର

(୨୦ ନମ୍ବର ଅନ୍ତଃ ପରୀକ୍ଷା + ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା)

ମୂଲ୍ୟ ବିଭାଜନ

(କ) ପ୍ରଥମ ଏକକ (ଗଦ୍ୟ ସାହିତ୍ୟ)ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ ।
ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଖ) ଦ୍ୱିତୀୟ ଏକକ (ପଦ୍ୟ ସାହିତ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ ।
ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଗ) ତୃତୀୟ ଏକକ (ଅତିରିକ୍ତ ପାଠ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ ।
ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଘ) ଚତୁର୍ଥ ଏକକରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ ।
(ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଙ) ପ୍ରତ୍ୟେକ ଏକକରୁ ତିନୋଟି କରି ୧୨ଟି ପ୍ରଶ୍ନ ଆସିବ, ସେଥିରୁ ବିଦ୍ୟାର୍ଥୀ ୧୦ ଗୋଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (ମୋଟ୍ ୨ **X** ୧୦ = ୨୦)

ସବିଶେଷ ଅଧ୍ୟୟନ

ଅନୁମୋଦିତ ପାଠ୍ୟ

ପ୍ରଥମ ଏକକ- ଗଦ୍ୟ ସାହିତ୍ୟ

୧- ଜାତୀୟ ଜୀବନ - ମଧୁସୂଦନ ଦାସ

୨- ସୌନ୍ଦର୍ଯ୍ୟ ଓ ପ୍ରେମ – ଶଶିଭୂଷଣ ରାୟ

୩- ସାହିତ୍ୟ ଓ ଗଣମାଧ୍ୟମ – ଶରତ କୁମାର ମହାନ୍ତି

ଦ୍ୱିତୀୟ ଏକକ - ପଦ୍ୟ ସାହିତ୍ୟ

୧- କେଶବ କୋଇଲି - ମାର୍କଣ୍ଡ ଦାସ

୨- ମନବୋଧ ଚଉତିଶା - ଭକ୍ତଚରଣ ଦାସ

୩- କାକ ବାରତା - ନନ୍ଦକିଶୋର ବଳ

୪- ଝିଅ ପାଇଁ ଗୋଟିଏ କବିତା - ରାଜେନ୍ଦ୍ର କିଶୋର ପଣ୍ଡା

ତୃତୀୟ ଏକକ - ଅତିରିକ୍ତ ପାଠ୍ୟ (ଗଳ୍ପ ସାହିତ୍ୟ)

୧- ଅଶୁଭ ପୁତ୍ରର କାହାଣୀ - ଅଚ୍ୟୁତାନନ୍ଦ ପତି

୨- ସୁଲତାନ୍ - ରାଜକିଶୋର ପଟ୍ଟନାୟକ

୩- ପାଟଦେଈ – ବୀଣାପାଣି ମହାନ୍ତି

ଚତୁର୍ଥ ଏକକ - ବ୍ୟାକରଣ

ପାଠ : ପଦ ପ୍ରକରଣ - (ବିଶେଷ୍ୟ, ବିଶେଷଣ, ସର୍ବନାମ, ଅବ୍ୟୟ ଓ କ୍ରିୟା)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧) ସର୍ବସାର ବ୍ୟାକରଣ - ପଣ୍ଡିତ ନାରାୟଣ ମହାପାତ୍ର ଏବଂ ଶ୍ରୀଧର ଦାଶ - ନିଉ ଷ୍ଟୁଡେଣ୍ଟସ୍ ଷ୍ଟୋର୍, କଟକ

୨) ପ୍ରଚଳିତ ଓଡ଼ିଆ ଭାଷାର ବ୍ୟାକରଣ - ବିଜୟ ପ୍ରସାଦ ମହାପାତ୍ର - ବିଦ୍ୟାପୁରୀ, କଟକ

୩) ଆଧୁନିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ - ଧନେଶ୍ୱର ମହାପାତ୍ର - କିତାବ ମହଲ, କଟକ

୪) ଶେଷ ଦଶକର ରଚନା – ଶରତ କୁମାର ମହାନ୍ତି

COMPULSORY LANGUAGE / LITERATURE COURSE

MIL (ODIA)- ARTS

ବାଧତାମୂଳକ ଭାଷା ଓ ସାହିତ୍ୟ – ଆଧୁନିକ ଭାରତୀୟ ଭାଷା (ଓଡ଼ିଆ)

+୩, ପ୍ରଥମ ବର୍ଷ କଳା ସାଧାରଣ (PASS)ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

2019-20

ପତ୍ର ସଂଖ୍ୟା – ଦ୍ୱିତୀୟ

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (3RD SEMESTER)

(୨୦ ନମ୍ବର ଅନ୍ତଃ ପରୀକ୍ଷା + ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା = ୧୦୦ ନମ୍ବର)

ମୂଲ୍ୟ ବିଭାଜନ

(କ) ପ୍ରଥମ ଏକକ (ଗଦ୍ୟ ସାହିତ୍ୟ)ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ ।
ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଖ) ଦ୍ୱିତୀୟ ଏକକ (ପଦ୍ୟ ସାହିତ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ ।
ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଗ) ତୃତୀୟ ଏକକ (ଅତିରିକ୍ତ ପାଠ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘଧର୍ମୀ ପ୍ରଶ୍ନ ଆସିବ ।
ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଘ) ଚତୁର୍ଥ ଏକକରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ ।
(ମୋଟ୍ ମୂଲ୍ୟ - ୧୫)

(ଙ) ପ୍ରତ୍ୟେକ ଏକକରୁ ତିନୋଟି କରି ୧୨ଟି ପ୍ରଶ୍ନ ଆସିବ, ସେଥିରୁ ବିଦ୍ୟାର୍ଥୀ ୧୦ ଗୋଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (ମୋଟ୍ ୨ x ୧୦ = ୨୦)

ସବିଶେଷ ଅଧ୍ୟୟନ

ଅନୁମୋଦିତ ପାଠ୍ୟ

ପ୍ରଥମ ଏକକ- ଗଦ୍ୟ ସାହିତ୍ୟ

୧- ଅଛୁ ଓ ହେବୁ - ନୀଳକଣ୍ଠ ଦାସ

୨- ସ୍ତ୍ରୀ ଶିକ୍ଷା - ରେବା ରାୟ

୩- ଈଚ୍ଛନ୍ତି ଦାମ୍ବିକେ - ବୈଷ୍ଣବ ଚରଣ ସାମଲ

ଦ୍ୱିତୀୟ ଏକକ - ପଦ୍ୟ ସାହିତ୍ୟ

୧- ସବୁଥିରୁ ବଞ୍ଚିତ କରି - କାନ୍ତକବି ଲକ୍ଷ୍ମୀକାନ୍ତ ମହାପାତ୍ର

୨- ଅକ୍ରୁର ଉବାଚ - ଗୁରୁ ପ୍ରସାଦ ମହାନ୍ତି

୩- ଓଡିଶା - ସୀତାକାନ୍ତ ମହାପାତ୍ର

୪- ହେ ମୋ ଦେଶ – ବ୍ରଜନାଥ ରଥ

ତୃତୀୟ ଏକକ - ଅତିରିକ୍ତ ପାଠ୍ୟ (ଜୀବନୀ)

୧-ପିତୃପ୍ରସଙ୍ଗ (ସ୍ୱଭାବ କବି ଗଙ୍ଗାଧର ମେହେରଙ୍କ ଜୀବନୀ –କେବଳ ଜୀବନୀ ଅଂଶ)– ଭଗବାନ ମେହେର

ଚତୁର୍ଥ ଏକକ – ବ୍ୟାକରଣ- ବାକ୍ୟର ସଂଜ୍ଞା, ସ୍ୱରୂପ, ଲକ୍ଷଣ ଓ ରୂପାନ୍ତର, ଲୋକୋକ୍ତିର ଅର୍ଥ ଓ ପ୍ରୟୋଗ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧) ସର୍ବସାର ବ୍ୟାକରଣ - ପଣ୍ଡିତ ନାରାୟଣ ମହାପାତ୍ର ଏବଂ ଶ୍ରୀଧର ଦାଶ - ନିଉ ଷ୍ଟୁଡେଣ୍ଟସ୍ ଷ୍ଟୋର୍, କଟକ

୨) ପ୍ରାୟୋଗିକ ଓଡିଆ ଭାଷା, ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

ପାଠ୍ୟକ୍ରମ ସଂପର୍କରେ ଶିକ୍ଷକଙ୍କ ପ୍ରଶିକ୍ଷଣ ଯୋଜନା (୨୧ ଦିନ)

୨-ବୌଦ୍ଧ, ଶୈବ, ବୈଷ୍ଣବ, ଜଗନ୍ନାଥ ତତ୍ତ୍ୱ

୩-ଗବେଷଣା ପ୍ରବିଧି

୪-ସାହିତ୍ୟତତ୍ତ୍ୱ (ପ୍ରାଚ୍ୟ-ପାଶ୍ଚାତ୍ୟ)

୫-ଭାଷାବିଜ୍ଞାନ ଓ ଭାଷାତତ୍ତ୍ୱ

୬-ଲୋକସାହିତ୍ୟ ଓ ସଂସ୍କୃତି

୭-କଥା ସାହିତ୍ୟ (ଗଳ୍ପ ଉପନ୍ୟାସ)

୮-ଅନୁବାଦ ଓ ସଂପାଦନା

୯-କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN POLITICAL SCIENCE (Bachelor of Arts Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course structure of UG Political Science Honours

Semester	Course	Course Name	Credits	Total marks
I	AECC-I	AEC-I	04	100
	C-I	Understanding Political Theory	06	100
	C-II	Constitutional Government and Democracy in India	06	100
	GE-I	Feminism: Theory and Practice	06	100
			22	
II	AECC-II	AEC-II	4	100
	C-III	Political Theory-Concepts and Debates	06	100
	C-IV	Political Process in India	06	100
	GE-II	Governance: Issues and Challenges	06	100
			22	
III	C-V	Introduction to Comparative Government and Politics	06	100
	C-VI	Introduction to Public Administration	06	100
	C-VII	Perspectives on International Relations	06	100
	GE-III	Gandhi and the Contemporary World	06	100

	SEC-I	SEC-I(to be selected by the University/College from the Repertoire of SEC courses)	04	100
			28	
IV	C-VIII	Political Processes and Institutions in Comparative Perspective	06	100
	C-IX	Public Policy and Administration in India	06	100
	C-X	Global Politics	06	100
	GE-IV	United Nations and Global Conflicts	06	100
	SEC-II	SEC-II (to be selected by the University/College from the Repertoire of SEC courses)	04	100
			28	

Semester	Course	Course Name	Credits	Total marks
V	C-XI	Western Political Philosophy	06	100
	C-XII	Indian Political Thought(Ancient & Medieval)	06	100
	DSE-I	Introduction to Human Rights	06	100
	DSE-II	Development Process and Social Movements in Contemporary India	06	100
			24	
VI	C-XIII	Contemporary Political Philosophy	06	100

	C-XIV	Modern Indian Political Thought	06	100
	DSE-III	India's Foreign Policy in a Changing world	06	100
	DSE-IV	Women, Power and Politics	06	100
	OR			
	DSE-IV	Dissertation	06	100*
			24	

Discipline Specific Elective Papers: (Credit: 06 each) (4 papers to be selected by students of Political Science Honours): DSE 1-IV

1. Human Rights in a Comparative Perspective
2. Development Process and Social Movements in Contemporary India (PROJECT)
3. India's Foreign Policy in a Globalizing world
4. Women, Power and Politics
5. Project *Dissertation (can be opted as alternative of DSE-IV only and of 6 credits. **Dissertation content: 50, Seminar: 30, Viva: 20) as per regulation**

POLITICAL SCIENCE

HONOURS PAPERS:

Core course – Designated as CI to C XIV i.e. 14 papers
Discipline Specific Elective (DSE) – 4 papers
Generic Elective (GE) for non Public Administration students– 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm: 20 marks, End term : 80 marks, Total – 100 marks

Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

Core Paper I (C- I)

UNDERSTANDING POLITICAL THEORY

Introduction: This course is divided into two sections. Section 'A' introduces the students to the idea of political theory, its history and approaches and an assessment of its critical and contemporary trends. Section 'B' is designed to reconcile political theory and practices through reflections on the ideas and practices related to democracy.

UNIT-1: Introducing Political Theory

(i) What is Politics: Theorizing the 'Political'
(ii) Traditions of Political Theory: Liberal, Marxist, Anarchist and Conservative
(iii)Approaches to Political Theory: Normative, Historical, Behavioural and Post-behavioural

UNIT-II: Critical and Contemporary Perspectives in Political Theory

(i) Theories of Feminism: Feminist and Postmodern
(ii) Modernism and Post -modernism

UNIT-III: Political theory and Practice

(i) Democracy: Liberal and Marxist.
(ii) Procedural Democracy and its critique

UNIT-IV: The Grammar of Democracy

(i) Deliberative Democracy
(ii) Participation and Representation

Text Books

- Bhargava, R. and Ashok Acharya (2008) '*Political Theory: An Introduction.* New Delhi: Pearson Longman.
- Vinod, M.J and Deshpande, Meena (2013) 'Contemporary Political Theory', PHI, New Delhi
- Verma, S. P. (1996) 'Modern Political Theory', Vikash Publishing, 3rd Reprint, New Delhi.
- Ramaswamy, Sushila (2010), 'Political Theory: Ideas and Concepts', PHI Learning, New Delhi
- Bellamy, R. (1993), (ed.) 'Theories and Concepts of Politics'. New York: Manchester University Press.

- Marsh, D. and Stoker, G. (eds.) 'Theory and Methods in Political Science'. London: Macmillan.
- Heywood, Andrew (2016) (Reprint) 'Political Theory: An Introduction', Palgrave, UK.

Further Reading

- Kukathas, Ch. and Gaus, G. F. (2004) (eds.) 'Handbook of Political Theory'. New Delhi, Sage.
- Vincent, A. (2004) 'The Nature of Political Theory'. New York: Oxford University Press.
- Mckinnon, C. (ed.) (2008) 'Issues in Political Theory', New York: Oxford University Press.
- Arblaster, A. (1994) 'Democracy', (2nd Edition), Buckingham: Open University Press.
- Parekh, B. (2000), 'Rethinking Multiculturalism: Cultural Diversity and Political Theory', Macmillan Press, London.

Core Paper II(C-II)

CONSTITUTIONAL GOVERNMENT AND DEMOCRACY IN INDIA

Introduction: This course acquaints students with the Constitutional design of state structures and institutions, and their actual working over time. The Indian Constitution accommodates conflicting impulses (of liberty and justice, territorial decentralization and a strong union, for instance) within itself. The course traces the embodiment of some of these conflicts in constitutional provisions, and shows how these have played out in political practice. It further encourages a study of state institutions in their mutual interaction, and in interaction with the larger extra-constitutional environment.

UNIT-I: The Constituent Assembly and the Constitution

i) Formation and working of the Constituent Assembly
ii) The Philosophy of the constitution: The Preamble and its Features.
iii) Fundamental Rights, Directive Principles of State Policy, Fundamental Duties

UNIT-II: Organs of Government

i) The Legislature and the Executive
ii) The Judiciary: Supreme Court and High Courts

UNIT-III: Federalism

i) Federalism: Centre-State relations
ii) Recent trends in federalism

UNIT-IV: Decentralization

i) Panchayati Raj Institutions: Composition, Powers and functions of Gram Panchayat, Panchayat Samiti and Zilla Parishad.
ii) Municipalities: Composition Powers and function of Municipal Corporation, Municipal Council and Notified Area Council

Text Books

- G. Austin, (2010) 'The Indian Constitution: Cornerstone of a Nation', New Delhi, Oxford

University Press, 15th print.
- R. Bhargava (ed.) 'Politics and Ethics of the Indian Constitution', New Delhi, Oxford University Press.
- D. Basu, (2012) 'Introduction to the Constitution of India', New Delhi, Lexis Nexis.
- S. Chaube, (2009) 'The Making and Working of the Indian Constitution', New Delhi, National Book Trust.
- G. Austin, (2000) 'Working a Democratic Constitution', New Delhi, Oxford University Press.
- B. Shankar and V. Rodrigues, (2011), 'The Indian Parliament: A Democracy at Work', New Delhi: Oxford University Press.
- P. Mehta and N. Jayal (2010) (eds.) 'The Oxford Companion to Politics in India', New Delhi, Oxford University Press.

Reference Books

- Mehra and G. Kueck (eds.) 'The Indian Parliament: A Comparative Perspective', New Delhi, Konark.
- B. Kirpal et.al (eds.) 'Supreme but not Infallible: Essays in Honour of the Supreme Court of India', New Delhi, Oxford University Press.
- L. Rudolph and S. Rudolph, (2008) 'Explaining Indian Institutions: A Fifty Year Perspective, 1956-2006', Volume 2, New Delhi, Oxford University Press.
- M. Singh, and R. Saxena (2011) (eds.), 'Indian Politics: Constitutional Foundations and Institutional Functioning', Delhi: PHI Learning Private Ltd.
- K. Roy, C. Saunders and J. Kincaid (2006) (eds.) 'A Global Dialogue on Federalism', Volume 3Montreal, Queen's University Press

Core Paper III (C - III)

POLITICAL THEORY-CONCEPTS AND DEBATES

Introduction: This course is divided into two sections. Section A helps the student familiarize with the basic normative concepts of political theory. Each concept is related to a crucial political issue that requires analysis with the aid of our conceptual understanding. This exercise is designed to encourage critical and reflective analysis and interpretation of social practices through the relevant conceptual tool kit. Section B introduces the students to the important debates in the subject. These debates prompt us to consider that there is no settled way of understanding concepts and that in the light of new insights and challenges, besides newer ways of perceiving and interpreting the world around us, we inaugurate new modes of Political debates.

UNIT-I: Importance of Freedom

(i) Negative Freedom and Positive Freedom, Freedom of belief, expression and dissent
(ii) Equality: Meaning and Types, Egalitarianism: Social Exclusion & Affirmative action

UNIT-II: Indispensability of Justice

(i) Justice: Meaning and Types
(ii) Procedural, Distributive and Global Justice.

UNIT-III: The Universality of Rights

(i) Rights: Natural, Moral and Legal
(ii) Three Generations of Rights

UNIT-IV: Major debates

(i) Political obligation: Grounds
(ii) Cultural Relativism and Multiculturalism.

Text Book

- Verma, S. P. (1996) 'Modern Political Theory', Vikash Publishing, 3rd Reprint, New Delhi.
- Vinod, M.J and Deshpande, Meena (2013) Contemporary Political Theory, PHI, New Delhi
- Ramaswamy, Sushila (2010), 'Political Theory: Ideas and Concepts', PHI Learning, New Delhi
- Bellamy, R. (1993), (ed.) *Theories and Concepts of Politics*. New York: Manchester University Press.
- Marsh, D. and Stoker, G. (eds.) 'Theory and Methods in Political Science'. London, Macmillan.
- Heywood, Andrew (2016) (Reprint), 'Political Theory: An Introduction', Palgrave, UK.

Reference Books

- Bellamy, Richard and Mason, Andrew (1993) (eds.) 'Political Concepts' Manchester, Manchester University Press.
- Knowles, Dudley. (2001) 'Political Philosophy', London, Routledge.
- Mckinnon, Catriona (2008) (ed.) 'Issues in Political Theory', New York: Oxford University Press.
- Swift, Adam. (2001) 'Political Philosophy: A Beginners Guide for Student's and Politicians', Cambridge, Polity Press.
- La Follett, Hugh (2003) (ed.) 'The Oxford Handbook of Practical Ethic'. New York, Oxford University Press.
- Knowles, Dudley. (2001) 'Political Philosophy', London, Routledge.

Core Paper IV (C-IV)

POLITICAL PROCESS IN INDIA

Introduction: Actual politics in India diverges quite significantly from constitutional legal rules. An understanding of the political process thus calls for a different mode of analysis - that offered by political sociology. This course maps the working of 'modern' institutions, premised on the existence of an individuated society, in a context marked by communitarian solidarities, and their mutual transformation thereby. It also familiarizes students with the working of the Indian state, paying attention to the contradictory dynamics of modern state power.

Political Parties, the Party system and Determinants of Voting Behaviour

UNIT-I: Indian party system

(i) Party System in India: Features and Trends
(ii) Voting Behaviour and Its determinants: Caste, Class, Gender and Religion.
(iii) Election Commission: Constitution and Functions, Electoral Reforms

UNIT-II: Regionalism, Religion and Politics

(i) Regionalism: Causes and its trends,
(ii) Secularism and Communalism: Debates

UNIT-III: Caste and Politics

i) Caste and Politics: Politicisation of Caste
ii) Affirmative Action: Policies, Women, Caste and Marginalized Class

UNIT-IV: The Changing Nature of the India State

(i) Developmental and Welfare Dimensions
(ii) Coercive Dimension

Text books

- Kaviraj, Sudipta(2009) 'Politics in India', Oxford University Press, New Delhi
- Kohli, Atul (2004) (ed.) 'The Success of India's Democracy', New Delhi, Cambridge University Press.
- Kothari,R (1970) 'Caste in Indian Politics', Delhi, Orient Longman.
- M. John, (ed) (2008) 'Women in India: A Reader, Penguin , India
- P. Brass, (1999) 'The Politics of India since Independence, New Delhi, Cambridge University Press and Foundation Books.
- P. Mehta and N. Jayal (2010) (eds.) 'The Oxford Companion to Politics in India', New Delhi, Oxford University Press.
- Z. Hasan (2002) (ed.) 'Parties and Party Politics in India', New Delhi: Oxford University Press.
- Z. Hasan, E. Sridharan and R. Sudarshan (2002) (eds.) 'India's Living Constitution: Ideas, Practices, Controversies', New Delhi, Permanent Black.

Reference Books

- N. Menon and A. Nigam, (2007) 'Power and Contestation: India since 1989', London, Fernwood Publishing, Halifax and Zed Books.
- R. Vora and S. Palshikar (eds.) 'Indian Democracy: Meanings and Practices', New Delhi, Sage.
- Shah, G (ed.) 'Social Movements and the State', New Delhi, Sage Publications.
- P. deSouza and E. Sridharan (eds.) 'India's Political Parties', New Delhi, Sage Publications.
- A S. Ganguly, L. Diamond and M. Plattner (eds.) 'The State of India's Democracy', Baltimore,

John Hopkins University Press.

Core Paper V (C - V)

INTRODUCTION TO COMPARATIVE GOVERNMENT AND POLITICS

Introduction: This is a foundational course in comparative politics. The purpose is to familiarize students with the basic concepts and approaches to the study of comparative politics. More specifically the course will focus on examining politics in a historical framework while engaging with various themes of comparative analysis in developed and developing countries.

UNIT-1: Understanding Comparative Politics

(i) Meaning, Nature, scope and Evolution
(ii) Approaches to the study of Comparative Politics

UNIT-II: Historical context of modern government

(i) Capitalism: meaning and development
(ii) Globalization: Features & impact

UNIT-III: Historical context of Modern Government- II

(i) Socialism: Meaning, Types and its growth
(ii) Rise and Decline of Communism as a Ruling Ideology
(iv) Colonialism and decolonization: meaning, context, forms of colonialism

UNIT-IV: Themes of Comparative Politics

(i) A comparative study of Governments of USA & China
(ii) US: President, Congress, Supreme Court
(iii) China: People's Congress, National Assembly, Role of Communist Party of China

Text books:

- Bhagwan, Vishnoo et al (2012) 'World Constitutions', Sterling Publishers , New Delhi
- Chilcote, Ronald (1994) 'Theories of Comparative Politics: The Search for a Paradigm Reconsidered', Westview Press, Boulder.
- G. Ritzer, (2002) 'Globalization*:* A Basic Text'. London, Wiley-Blackwell.
- Huntington, Samuel, (1968) 'Political Order in Changing Societies', Yale University Press, New Haven.
- Kapur, A.C and K.K. Mishra (2010) 'Select Constitutions', S. Chand, New Delhi
- Suresh. R(2010), 'Economy and Society : Evolution of Capitalism', Sage , New Delhi

Reference Books

- P. Burnell, et. al, 'Politics in the Developing World'. New Delhi: Oxford University Press,
- J. McCormick, (2007) 'Comparative Politics in Transition', UK, Wadsworth.

- L. Barrington et. al (2010) 'Comparative Politics - Structures and Choices', Boston, Wadsworth,
- M. Kesselman, J. Krieger and William (2010), 'Introduction to Comparative Politics: Political Challenges and Changing Agendas', UK, Wadsworth.
- J. Kopstein and M. Lichbach. (eds.) 'Comparative Politics: Interest, Identities and Institutions in a Changing Global Order'. Cambridge: Cambridge University Press.

Core Paper VI (C-VI)

INTRODUCTION TO PUBLIC ADMINISTRATION

Introduction: The course provides an introduction to the discipline of public administration. This paper encompasses public administration in its historical context with an emphasis on the various classical and contemporary administrative theories. The course also explores some of the recent trends, including feminism and ecological conservation and how the call for greater democratization is restructuring public administration. The course will also attempt to provide the students a comprehensive understanding on contemporary administrative developments.

UNIT-1 : Public Administration as a Discipline

(i) Meaning, Scope and Significance of the Discipline,Public and Private Administration
(ii) Evolution of Public Administration

UNIT-II: Theoretical Perspectives

Classical Theories

(i) Scientific management (F. W. Taylor), Ideal-type bureaucracy (Max Weber)
(ii) Administrative Management (Gullick, Urwick and Fayol)

UNIT-III: Neo-Classical and Contemporary Theories

(i) Human Relations theory (Elton Mayo), Rational decision-making (Herbert Simon)
(ii) Ecological approach (Fred Riggs), Innovation and Entrepreneurship (Peter Drucker)

UNIT-IV: Public Policy and Major Approaches in Public Administration

(i) Public Policy-Concept and approaches, Formulation, implementation and evaluation
(ii) New Public Administration, New Public Management, New Public Service Approach
(iii) Good Governance, Feminist Perspectives in Governance

Text Books

- B. Chakrabarty and M. Bhattacharya (eds), 'Administrative Change and Innovation: A Reader', New Delhi, Oxford University Press.
- Basu, Rumki, (2014) 'Public Administration: Concepts and Theories', Sterling Publishers, New Delhi

- D. Ravindra Prasad, Y. Pardhasaradhi, V. S. Prasad and P. Satyrnarayana, (2010) (eds.) 'Administrative Thinkers', Sterling Publishers.
- J. Shafritz, and A. Hyde, (2004) (eds.) 'Classics of Public Administration', 5th Edition. Belmont, Wadsworth.
- M. Bhattacharya, (2008) 'New Horizons of Public Administration', 5th Revised Edition. New Delhi, Jawahar Publishers.
- M. Bhattacharya, (2011) 'New Horizons of Public Administration', New Delhi: Jawahar Publishers.
- M. Bhattacharya, (2012) 'Restructuring Public Administration: A New Look', New Delhi, Jawahar Publishers,
- N. Henry, (2013) 'Public Administration and Public Affairs', 12th edition. New Jersey, Pearson,
- Shafritz, J. and Hyde, A. , (1997) (eds.) 'Classics of Public Administration', 4th Edition. Forth Worth, Hartcourt Brace, TX.

Reference Books

- B. Chakrabarty and M. Bhattacharya (2003) (eds.), 'Public Administration: A Reader', New Delhi, Oxford University Press.
- B. Chakrabarty, (2007) 'Reinventing Public Administration: The India Experience'. New Delhi, Orient Longman,
- B. Miner, (2006) 'Organisational Behaviour: Historical Origins and the Future'. New York,
- F. Riggs, (1964) 'Administration in Developing Countries: The Theory of Prismatic Society'. Boston, Houghton Miffin.
- F. Riggs, (1961) 'The Ecology of Public Administration', Part 3, New Delhi, Asia Publishing House.
- M. Bhattacharya, (2006) 'Social Theory, Development Administration and Development Ethics', New Delhi, Jawahar Publishers.
- Nivedita Menon (1999), (ed.) 'Gender and Politics', New Delhi, Oxford University Press.
- Peter F. Ducker, (2006) 'The Practice of Management', Harper Collins.
- S. Maheshwari,(2009) 'Administrative Thinkers', New Delhi: Macmillan

Core Paper VII (C-VII)

PERSPECTIVES ON INTERNATIONAL RELATIONS

Introduction: This paper seeks to equip students with the basic intellectual tools for understanding International Relations. It introduces students to some of the most important theoretical approaches for studying international relations. The course begins by historically contextualizing the evolution of the international state system before discussing the agency-structure problem through the levels-of-analysis approach. After having set the parameters of the debate, students are introduced to different theories in International Relations. It provides a fairly comprehensive overview of the major political developments and events starting from the twentieth century. Students are expected to learn about the key milestones in world history and equip them with the tools to understand and analyze the same from different perspectives. A key objective of the course is to make students aware of the implicit

Euro-centricism of International Relations by highlighting certain specific perspectives from the Global South.

UNIT-I: Studying International Relations

(i) International Relations: Meaning, Scope and Evolution**,** Emergence of International State System
(ii) National Interest-Key Determinants of International Relations

(iii) Power-Cornerstone of International Relations

UNIT-II: Theoretical Perspectives

(i) Classical Realism & Neo-Realism, Liberalism & Neo-liberalism
(ii) Marxist Approaches, Feminist Perspectives, Euro- centricism & Perspective from the Global South

UNIT-III: An Overview of Twentieth Century IR History-I

(i) World War I: Causes & Consequences, significance of Bolshevik Revolution
(ii) Rise of Fascism / Nazism, World war II-Causes &Consequences

UNIT-IV: An Overview of Twentieth Century IR -II

(i) Cold War Evolution& Different Phases (4 Lectures) Disintegration of USSR
(ii) Emergence of the Third World, End of the Cold War

Text Books

- Basu, Rumki (2012) (ed.) 'International Politics: Concepts, Theories and Issues', New Delhi.
- Baylis & S. Smith (2002) (eds.), 'The Globalization of World Politics', Oxford University Press, UK, 4th edition, 2007 W.Bello, Deglobalization, Zed Books, London.
- M. Nicholson, (2002) 'International Relations: A Concise Introduction', New York, Palgrave.
- P. Viotti and M. Kauppi, (2007) 'International Relations and World Politics: Security, Economy, Identity', Pearson Education.
- R. Jackson and G. Sorensen, (2007) 'Introduction to International Relations: Theories and Approaches', 3rd Edition, Oxford, Oxford University Press.
- S. Joshua. Goldstein and J. Pevehouse, (2007) 'International Relations', New York, Pearson Longman.

Reference Books

1. Calvocoressi, P. (2001) 'World Politics: 1945—2000'. Essex, Pearson.
1. Dey, Dipankar (2007)(ed.), 'Sustainable Development: Perspectives and Initiatives', ICFAI University Press, Hyderabad,
2. K. Booth and S. Smith, (eds), 'International Relations Theory Today', Pennsylvania, The Pennsylvania State University Press.
3. M. Smith and R. Little (2000) (eds.), 'Perspectives on World Politics', New York, Routledge

Core Paper VIII(C-VIII)

POLITICAL PROCESSES AND INSTITUTIONS IN COMPARATIVE PERSPECTIVE

Introduction: In this course students will be trained in the application of comparative methods to the study of politics. The course is comparative in both what we study and how we study. In the process the course aims to introduce undergraduate students to some of the range of issues, literature, and methods that cover comparative political.

UNIT-I: Approaches to Studying Comparative Politics

(i) Political Culture –Meaning, Types &relevance.
(ii) New Institutionalism –Meaning, Background, Significance

UNIT-II: Election& Party System

(i) Definition and procedures: Types of election system (First Past the Post, Proportional Representation, Mixed Representation)
(ii) Party System -Evolution, Theories and types

UNIT-III: Nation-state

(i) Nation-state; Meaning and Evolution in West Europe
(ii) Nation and State; Debates in Post-colonial contexts

UNIT-IV: Democratization in Post- colonial societies

(i) Democratization in Post-authoritarian countries and in Post-communist countries
(ii) Federalism: Meaning and Features, Federation& Confederation: Debates around territorial division of power.

Text Books

- A. Heywood, (2002) 'Politics', New York, Palgrave.
- J. Bara and M. Pennington, (eds.) *Comparative politics.* New Delhi: Sage Publications.
- J. Bara and Pennington. (2009) (eds.) 'Comparative Politics: Explaining Democratic System', Sage Publications, New Delhi.
- J. Ishiyama, and M. Breuning, (2011) (eds) '21st Century Political Science: A Reference Book', Los Angeles, Sage Publications.
- M. Lichback and A. Zuckerman, (eds.) 'Comparative Political: Rationality, Culture, and Structure'. Cambridge, Cambridge University Press.

Reference Books

- R. Watts, (2008) 'Comparing Federal Systems'. Montreal and Kingston, McGill Queen's

University Press.
- Saxena, R (2011) (eds.) 'Varieties of Federal Governance: Major Contemporary Models', New Delhi, Cambridge University Press.
- T. Landman, (2003) 'Issues and Methods of Comparative Methods: An Introduction'. London, Routledge.

Core Paper IX (C-IX)

PUBLIC POLICY AND ADMINISTRATION IN INDIA

Introduction: The paper seeks to provide an introduction to the interface between public policy and administration in India. The essence of public policy lies in its effectiveness in translating the governing philosophy into programs and policies and making it a part of the community living. It deals with issues of decentralization, financial management, citizens and administration and social welfare from a non-western perspective.

UNIT-I: Public Policy

i) Definition, characteristics and models
ii) Public Policy Process in India

UNIT-II: Decentralization

(i) Meaning, significance, types and approaches to decentralization.
(ii) Local Self Governance: Rural and Urban

UNIT-III: Budget and Social Welfare Administration

(i) Concept and Significance of Budget, Budget cycle in India, Types of Budgeting
(ii) Concept and Approaches of Social Welfare.
(iii) Social Welfare Policies:
(a) **Education:** Right to Education,
(b) **Health:** National Health Mission,
(c) **Food:** Right to Food Security,
(d) **Employment:** MNREGA

UNIT-I V: Citizen and Administration Interface

(i) Public Service Delivery System;
(ii) Redressal of Public Grievances: RTI, Lokpal, Citizens' Charter and e-Governance

Text Books

- Basu Rumki (2015) 'Public Administration in India Mandates, Performance and Future Perspectives', New Delhi, Sterling Publishers

- Bidyut Chakrabarty, (2007) 'Reinventing Public Administration: The Indian Experience', Orient Longman,
- Henry, N. (1999) 'Public Administration and Public Affairs', New Jersey, Prentice Hall
- Jean Drèze and Amartya Sen, (1995) 'India, Economic Development and Social Opportunity', Oxford, Oxford University Press.
- R.B. Denhardt and J.V. Denhardt, (2009) 'Public Administration', New Delhi, Brooks/Cole
- Satyajit Singh and Pradeep K. Sharma (2007) (eds.) 'Decentralization: Institutions and Politics in Rural India', Oxford University Press, New Delhi.
- Singh, S. and Sharma, P. (2007) (eds.) 'Decentralization: Institutions and Politics in Rural India'. New Delhi, Oxford University Press.
- Vasu Deva, (2005) 'E-Governance In India: A Reality', Commonwealth Publishers.
- Vijaya Kumar, (2012) 'Right to Education Act 2009: Its Implementation as to Social Development in India', Delhi: Akansha Publishers.

Reference Books

- 'World Development Report', (1992) World Bank, Oxford University Press,.
- Anderson, (1975) 'Public Policy Making', New York, Thomas Nelson and sons Ltd.
- Gabriel Almond and Sidney Verba, (1965) 'The Civic Culture', Boston, Little Brown.
- J.Dreze and Amartya Sen, (1997) 'Indian Development: Selected Regional Perspectives', Oxford, Clareland Press
- Jayal, N.G (1999) 'Democracy and The State: Welfare, Secular and Development in Contemporary India', Oxford, Oxford University Press.
- Jugal Kishore, (2005) National Health Programs of India: National Policies and Legislations, Century Publications.
- Lee and Mills, (1983) 'The Economic of Health In Developing Countries', Oxford, Oxford University Press.
- M. Howlett, M. Ramesh, and A. Perl, (2009), 'Studying Public Policy: Policy Cycles and Policy subsystems', 3rd edition, Oxford University Press, New Delhi
- Marma Mukhopadhyay and Madhu Parhar (2007) (ed.) 'Education in India: Dynamics of Development' New Delhi, Shipra Publications.
- Noorjahan Bava, (2001) 'Development Policies and Administration in India', Delhi, Uppal Publishers.
- R. Putnam, (1993) 'Making Democracy Work', Princeton University Press.
- T. Dye, (2002) 'Understanding Public Policy', New Delhi, Pearson
- United Nation Development Programme, (1997)'Reconceptualising Governance', New York
- Y. Dror, (1989) 'Public Policy Making Reexamined'. Oxford, Transaction Publication.

Core Paper X (C-X)

GLOBAL POLITICS

Introduction: This course introduces students to the key debates on the meaning and nature of globalization by addressing its political, economic, social, cultural and technological dimensions. In keeping with the most important debates within the globalization discourse, it imparts an understanding of the working of the world economy, its anchors and resistances offered by global social movements while analyzing the changing nature of relationship between the state and trans-national actors and networks. The course also offers insights into key contemporary global issues such as the proliferation of nuclear weapons, ecological issues, international terrorism, and human security before concluding with a debate on the phenomenon of global governance.

UNIT-I: Globalization: Conceptions

(i) Understanding Globalization and its Alternative Perspectives, Non-Proliferation Regimes
(ii) Global Economy: Its significance & anchors of Global Political Economy: IMF, World Bank, WTO, TNCs

UNIT-II: Globalization: Perspectives

(i) Political Debates on Sovereignty and Territoriality
(ii) Cultural and Technological Dimensions
(iii) Global Resistances (Global Social Movements and NGOs)
(iv) Ecological Issues: International Environmental Agreements, Climate Change

UNIT-III: Contemporary Global Issues-I

(i) Proliferation of Nuclear Weapons
(ii) International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments

UNIT-IV: Contemporary Global Issues-II

(i) Migration & Human Security
(ii) Global Shifts: Power and Governance

Text Books

- G. Ritzer, (2010) 'Globalization: A Basic Text', Sussex: Wiley-Blackwell.
- M. Strager, (2009) 'Globalization: A Very Short Introduction', London, Oxford University Press.
- Heywood, (2011) 'Global Politics', New York, Palgrave-McMillan.
- J. Baylis, S. Smith and P. Owens (2011) (eds.) 'Globalization of World Politics: An Introduction to International Relations', New York, Oxford University Press.
- W. Ellwood, (2005) 'The No-nonsense Guide to Globalization', Jaipur, Rawat Publications.
- D. Held and A. McGrew (2000) (eds.) 'The Global Trans-Formations Reader', Cambridge, Polity Press.

Reference Books

- A. Narlikar, (2005) 'The World Trade Organization: A Very Short Introduction', New York, Oxford University Press.
- Goldstein, (2006) 'International Relations', New Delhi, Pearson.
- P. Hirst, G. Thompson and S. Bromley, (2009) 'Globalization in Question', Cambridge, Polity Press.
- D. Held et al, (1999) 'Global Transformations: Politics, Economics and Culture', California, Stanford University Press.
- F. Lechner and J. Boli (ed.), (2004) 'The Globalization Reader', London, Blackwell.(WTO).
- G. Ritzer, (2010) 'Globalization: A Basic Text', Sussex, Wiley-Blackwell.
- T. Cohn, (2009) 'Global Political Economy', New Delhi, Pearson.
- D. Held and A. McGrew (eds.), (2002) 'Global Transformations Reader: Politics, Economics and Culture', Cambridge, Polity Press.
- A. Vanaik, (ed.), (2004) 'Globalization and South Asia: Multidimensional Perspectives', New Delhi, Manohar Publications.

Core Paper XI (C-XI)

WESTERN POLITICAL PHILOSOPHY

Introduction: This course goes back to Greek antiquity and familiarizes students with the manner in which the political questions were first posed. Machiavelli comes as an interlude inaugurating modern politics followed by Hobbes and Locke, Rousseau, Marx. This is a basic foundation course for students.

UNIT-I : Text and Interpretation: Antiquity

(i) Plato
(ii) Aristotle

UNIT-II

(i) Machiavelli
(ii) Hobbes

UNIT-III

(i) Locke
(ii) Rousseau

UNIT-IV

(i) J. S. Mill
(ii) Karl Marx

Text Books

- C. Kukathas and G. Gaus, (eds.) 'Handbook of Political Theory', London, Sage Publications Ltd.
- D. Boucher and P. Kelly (2009), (eds) 'Political Thinkers: From Socrates to the Present', Oxford, Oxford University Press.
- J. Coleman, (2000) 'A History of Political Thought: From Ancient Greece to Early Christianity, Oxford, Blackwell Publishers.
- Mukherjee, Subrato and Susheela Ramaswamy(2011) 'History of political Thought: Plato to Marx', PHI Publishers , New Delhi
- Okin, S. (1992), 'Women in Western Political Thought', Princeton, Princeton University Press.
- R. Kraut (1996) (ed.) 'The Cambridge Companion to Plato', Cambridge, Cambridge University Press.

Reference Books

1. A. Skoble and T. Machan, (2007) 'Political Philosophy: Essential Selections', New Delhi, Pearson Education.
2. J. Barnes (1995) (ed.), 'The Cambridge Companion to Aristotle'. Cambridge, Cambridge University Press.

Core Paper XII (C-XII)

INDIAN POLITICAL THOUGHT (ANCIENT AND MEDIEVAL)

Introduction: This course introduces the specific elements of Indian Political Thought spanning over two millennia. The basic focus of study is on individual thinkers whose ideas are however framed by specific themes. The course as a whole is meant to provide a sense of the broad streams of Indian thought while encouraging a specific knowledge of individual thinkers and texts. Selected extracts from some original texts are also given to discuss in class. The list of Reference books is meant for teachers as well as the more interested students.

UNIT-I: Traditions of Pre-colonial Indian Political Thought

i) Brahmanic and Shramanic
ii) Islamic and Syncretic.

UNIT-II : Ved Vyasa (Shantiparva) and Manu
(i) Ved Vyasa : Rajadharma
(ii) Manu : Social Laws

UNIT-III: Kautilya, Barani and Aggannasutta

(i) Kautilya: Theory of State, Foreign Policy, Role of King
(ii) Aggannasutta- Theory of Kingship
(iii) Barani: Ideal Polity

UNIT-IV :Kabir and Abul Faza
(i) AbulFazal-Monarchy
(ii) Kabir: Syncretism

Text Books

- A. Appodoroy, (2002) 'Political Thought in India, Delhi, Khama Publication.
- A. B. M, (1976), 'The Foundation of Muslim Rule in India', Allahabad, Central Book Depot.
- Brown, (2003) 'The Verses of Vemana', Asian Educational Services, Delhi.
- Habib, Irfan.(1995) 'Essays in Indian History', New Delhi, Tulika Publications.
- Roy, Himanshu and Singh, M. (2017), 'Indian Political Thought: Themes and Thinker', Second Edition, New Delhi, Pearson.
- S. Saberwal, (2008) 'Spirals of Contention', New Delhi, Routledge,
- Sharma, R. S (1991) 'Aspects of Political Ideas Institutions in Ancient India, Delhi, Motilal Banarsidas.
- T. Pantham, and K. Deutsch (1986) (eds.), Political Thought in Modern India, New Delhi, Sage Publications.
- Thapar, Romila, (1997) 'Ashok and the Decline of the Mauryas, ' New York, Oxford University Press.
- V. Mehta, (1992) 'Foundations of Indian Political Thought, New Delhi, Manohar Publications.
- V.P. Varma, (1974) 'Studies in Hindu Political Thought and Its Metaphysical Foundations', New Delhi, Motilal Banarsidass.

Reference Books

- A. Fazl, (1873) 'The Ain-i Akbari ' (translated by H. Blochmann), Calcutta: G. H. Rouse.

- J. Spellman, (1964) 'Political Theory of Ancient India: A Study of Kingship from the Earliest time to Ceirca AD 300, Oxford, Clarendon Press.
- L. Hess and S. Singh, (2002) 'The Bijak of Kabir', New Delhi, Oxford University Press.
- R. Kangle (ed. and trns.), 'Arthasastra of Kautilya', New Delhi, Motilal Publishers.
- S. Collins, (2001) 'Agganna Sutta: The Discussion on What is Primary (An Annotated Translation from Pali), Delhi, Sahitya Akademi.

Core Paper XIII (C-XIII)

CONTEMPORARY POLITICAL PHILOSOPHY

Introduction: Philosophy and politics are closely intertwined. Students will be exposed to the manner in which the questions of politics have been posed in terms that have implications for larger questions of thought and existence. Contemporary political philosophy and debates are introduced to the students here.

UNIT-I

i) Lenin

UNIT-II

i) Mao Zedong (Mao Tse Tung)

UNIT-III

(i) Antonio Gramsci

UNIT-IV

(i) John Rawls

Text Books

- B. Nelson, (2008) 'Western Political Thought'. New York, Pearson Longman.
- D. Boucher, and P. Kelly, (2003) (eds.) 'Political Thinkers: From Socrates to the Present'. New York, Oxford University Press.
- Gramsci, Antonio(1996), 'Selections from the Prison Notebooks', Orient Longman, Hyderabad
- Hacker, A. (1961), 'Political Theory: Philosophy, Ideology, Science', Macmillan, New York.
- Mukherjee, Subrato and Susheela Ramaswamy(2011) 'History of political Thought: Plato to Marx', PHI Publishers , New Delhi
- Rawls, John (2011), 'A Theory of Justice', Universal Law Publishing Co., New Delhi.

- Sabine, George, H. (1973). 'A History of Political Theory', Oxford and I.B.H. Publishing, New Delhi.
- Wayper. C.L (1989), 'Political Thought', B.I. Publications, Bombay.

Reference Books

- D. Germino (1972). Modern Western Political Thought: Machiavelli to Marx, Chicago University Press, Chicago.
- F.W. Coker (1971). Recent Political Thought, The World Press Pvt. Ltd., Calcutta.
- J.H. Hallowell (1960). Main Currents in Modern Political Thought, Holt, New York.

Core Paper XIV (C-XIV)

MODERN INDIAN POLITICAL THOUGHT

Introduction: Based on the study of individual thinkers, the course introduces a wide span of thinkers and themes that defines the modernity of Indian political thought. The objective is to study general themes that have been produced by thinkers from varied social and temporal contexts. Selected extracts from original texts are also given to discuss in the class. The list of Reference books is meant for teachers as well as the more interested students.

UNIT-I: Introduction

(i) Rammohan Roy: Rights, Reform Movement, Liberalism
(ii) Pandita Ramabai: Gender, critique of orthodoxy
(iii)Vivekananda: Ideal Society, Humanism, Nationalism

UNIT-II: Gandhi & Ambedkar

(i) Gandhi: Swaraj, Swadeshi(8 lectures)
(ii) Ambedkar: Social Justice

UNIT-III : Tagore&Savarkar

(i) Tagore Critiqueof Nationalism (8 lectures)
(ii) Savarkar: Hindutwa-A critical Assessment

UNIT-IV: Nehru,Lohia and J.P. Narayan

(i) Nehru: Secularism, Socialism
(ii) Lohia: Socialism,
(iii) J.P.Narayan: Total Revolution

Text books:

- A. Sen, (2003) 'Swami Vivekananda', Delhi, Oxford University Press.

- D. Dalton, (1982) 'Indian Idea of Freedom: Political Thought of Swami Vivekananda, Aurobindo Ghose, Rabindranath Tagore and Mahatma Gandhi', Academic Press, Gurgaon.
- G. Omvedt, (2008) 'Ramabai: Women in the Kingdom of God', in *Seeking Begumpura*: *The Social Vision of Anti Caste Intellectuals,* New Delhi, Navayana.
- M. Kosambi (2000) (ed.), 'Pandita Ramabai Through her Own Words: Selected Works', New Delhi, Oxford University Press.
- Raghuramaraju, (2007) 'Debates in Indian Philosophy: Classical, Colonial, and Contemporary', Delhi, Oxford University Press.
- S. Sarkar, (1985) 'A Critique on Colonial India', Calcutta, Papyrus.
- Sh. Kapila (2010) (ed.), 'An intellectual History for India', New Delhi: Cambridge University Press.
- T. Pantham and K. Deutsch (1986), (eds.) 'Political Thought in Modern India', New Delhi, Sage.
- V. Mehta and T. Pantham (eds.), (2006) 'A Thematic Introduction to Political Ideas in Modern India: Thematic Explorations, History of Science, Philosophy and Culture in Indian civilization' Vol. 10, Part: 7, New Delhi, Sage Publication.

Reference Books

- P. Chatterjee, (1986) 'Nationalist Thought and the Colonial World: A Derivative Discourse? London, Zed Books.
- S. Hay (1991) (ed.), 'Sources of Indian Tradition', Vol. 2.Second Edition, New Delhi, Penguin.
- S. Thorat and Aryama (2007) (eds.), 'Ambedkar in Retrospect - Essays on Economics, Politics and Society', Jaipur, IIDS and Rawat Publications.

Discipline Specific Elective Paper-I

INTRODUCTION TO HUMAN RIGHTS

Introduction: This course attempts to build an understanding of human rights among students through a study of specific issues in a comparative perspective. It is important for students to see how debates on human rights have taken distinct forms historically and in the contemporary world. The course seeks to anchor all issues in the Indian context, and pulls out another country to form a broader comparative frame.

Human Rights: Theory and Institutionalization
UNIT-I:

i) Understanding Human Right
ii) Three Generations of Rights

UNIT-II

i) Universal Declaration of Human Rights

UNIT-III

i) Rights in National Constitutions: South Africa and India

UNIT-IV

i) International Refugee Law, International Humanitarian Law

Text Books

- Alston Philip (1995), 'The United Nations and Human Rights-A Critical Appraisal', Oxford, Clarendon.
- Baxi, Upendra (1995) (ed.), 'The Right to be Human', Delhi, Lancer,
- Beetham, David (1987) (ed.), 'Politics and Human Rights', Oxford, Blackwell.
- Desai, A R. (1986)(ed), 'Violations of Democratic Rights in India', Bombay, Popular Prakashan.
- Evans, Tony (2001), 'The Politics of Human Rights: A Global Perspective', London, Pluto Press.
- Hargopal. G.(1999) 'Political Economy of Human Rights', Hyderabad, Himalaya.
- J. Hoffman and P. Graham, (2006) 'Introduction to Political Theory', Delhi, Pearson.

Reference Books

- Kothari, Smitu and Sethi, Harsh (1991)(eds.), 'Rethinking Human Rights', Delhi, Lokayan.
- Saksena, K.P. (1999) (ed.), 'Human Rights: Fifty Years of India's Independence', Delhi, Gyan.
- Subramanian, S.(1997), 'Human Rights: International Challenges', Delhi, Manas Publications.
- Vistaar Iyer, V.R. Krishna (1999), 'The Dialectics and Dynamics of Human Rights in India', Delhi, Eastern Law House.

Discipline Specific Elective Paper II

DEVELOPMENT PROCESS AND SOCIAL MOVEMENTS IN CONTEMPORARY INDIA (Project)

Introduction: Under the influence of globalization, development processes in India have undergone transformation to produce spaces of advantage and disadvantage and new geographies of power. The high social reproduction costs and dispossession of vulnerable social groups involved in such a development strategy condition new theories of contestation and struggles. A variety of protest movements emerged to interrogate and challenge this development paradigm that evidently also weakens the democratic space so very vital to the formulation of critical consensus. This course proposes to introduce students to the conditions, contexts and forms of political contestation over development paradigms and their bearing on the retrieval of democratic voice of citizens.

UNIT-I: Development Process since Independence

(i)Welfare State, Development and the role of Planning commission
(ii)Development in the era of Liberalization and Reforms

UNIT-II: Development Strategy and its Impact on the Social Structure

(i) Industrial Development and its impact on organized and unorganized labour
(ii) Agricultural Development and Agrarian Crisis, Land Reforms and Green Revolution,

UNIT-III: Social Movements

i) Social Movements: Meaning and Approaches, New Social Movements
ii) Women's Movement, Environmental Movements

UNIT-IV: Social Movements

i) Dalit Movement, Tribal Movement,
ii) Left wing Extremism: Issues and Challenges

Text Books

- A. Desai, (1986) (ed.), 'Agrarian Struggles in India After Independence', Delhi, Oxford University Press
- A. F. Frankel, (2005) 'India's Political Economy (1947-2004): The Gradual Revolution', Delhi, Oxford University Press.
- B. Nayar, (2007) (ed.), 'Globalization and Politics in India', Delhi, Oxford University Press.
- G. Omvedt, (1983) 'Reinventing Revolution, New Social Movements and the Socialist Tradition in India', New York, Sharpe.
- G. Rath, (2006) (ed.), 'Tribal development in India: The Contemporary Debate', New Delhi, Sage Publications.
- G. Shah, (2004) 'Social Movements in India: A Review of Literature', New Delhi, Sage Publications.
- G. Shah, (ed.), (2002) 'Social Movements and the State'. New Delhi, Sage Publications.
- R. Mukherji (2010) (ed.) 'India's Economic Transition: The Politics of Reforms', Delhi, Oxford University Press.
- S. Roy and K. Debal, (2004) 'Peasant Movements in Post-Colonial India: Dynamics of Mobilization and Identity', Delhi, Sage.

Reference Books

- J. Harris, (2009) 'Power Matters: Essays on Institutions, Politics, and Society in India', Delhi, Oxford University press.
- J. Harriss, (2006) (ed*)* 'Power Matters: Essays on Institutions, Politics, and Society in

India,' Delhi. Oxford University Press.
- K. Suresh, (ed.), (1982) 'Tribal Movements in India', Vol I and II, New Delhi, Manohar (emphasis on the introductory chapter).
- L. Fernandes, (2007) 'India's New Middle Class: Democratic Politics in an Era of Economic Reform', Delhi, Oxford University Press.
- M. Jayal, and P. Mehta, (2010) (eds.), 'The Oxford Companion to Politics in India', Delhi, Oxford University Press.
- M. Mohanty, P. Mukherji and O. Tornquist, (1998)(eds.) 'People's Rights: Social Movements and the State in the Third World', New Delhi, Sage.
- N. Jayal (2012)(ed.) 'Democracy in India', New Delhi, Oxford India Paperbacks, Sixth impression.

Discipline Specific Elective Paper III

INDIA'S FOREIGN POLICY IN A CHANGING WORLD

Introduction: This course's objective is to teach students the domestic sources and the structural constraints on the genesis, evolution and practice of India's foreign policy. The endeavour is to highlight integral linkages between the 'domestic' and the 'international' aspects of India's foreign policy by stressing on the shifts in its domestic identity and the corresponding changes at the international level. Students will be instructed on India's shifting identity as a postcolonial state to the contemporary dynamics of India attempting to carve its identity as an 'aspiring power'. India's evolving relations with the superpowers during the Cold War and after, bargaining strategy and positioning in international politics facilitate an understanding of the changing positions and development of India's role as a global player since independence.

UNIT-I : India's Foreign Policy in a changing world

i) India's Foreign Policy: Major bases and determinants
ii) India's Foreign Policy: Postcolonial Perspective

UNIT-II : India's Relation with USA& Russia

i) India's Relations with the USA
ii) India's Relation with USSR/Russia,

UNIT-III : India-China Relations, India and South Asia

(i) India-China Relations
(ii) India and South Asia: SAARC, Look East Policy, Act East Policy

UNIT-IV : India and Contemporary World

(i) India as an emerging Global Power, Myth and Reality
(ii) India in the Contemporary World

Text Books :

- Appadorai, A. and M.S. Rajan(1988), 'India's Foreign Policy and Relations', New Delhi, South Asian Publishers Pvt. Ltd.
- Bahadur, Kalim (ed.)(1986), 'South Asia in transition: Conflicts and Tensions', New Delhi, Patriots.
- Bandyopadhyaya, J.(2006), 'The making of India's Foreign Policy', New Delhi, Allied Publishers Pvt. Ltd.
- Banerjee, A.K. (ed.)(1998), 'Security issues in South Asia: Domestic and External Sources of Threats to Security', Calcutta, Minerva.
- Bidwai, Praful and Achin Vanaik (eds.)(1999), 'South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament', New Delhi, Oxford University Press.
- D. Scott (2011)(ed.), 'Handbook of India's International Relations', London, Routeledge.
- Dutt, V.P.(2007), 'India's Foreign Policy Since Independence', New Delhi, National Book Trust.
- Tellis and S. Mirski (2013) (eds.), 'Crux of Asia: China, India, and the Emerging Global Order', Carnegie Endowment for International Peace, Washington.

Reference Books

- A. Ganguly, S. and Rahul Mukherji(2011), India since 1980, New Delhi: Cambridge University Press.
- Ghosh, Partha S.(1989), Cooperation and conflict in South Asia, New Delhi: Manohar.
- Gould, H.A. and Sumit Ganguly (eds.)(1993), The Hope and the Reality: U.S.-Indian Relations from Roosevelt to Reagan, New Delhi: Oxford & IBH.
- Gujral, I.K.(1998), A foreign policy for India, Delhi: External publicity division, MEA, Government of India.
- Mansingh, Surjeet(1984), India's search for power: Indira Gandhi's foreign policy, 1966-1982 New Delhi: Sage.
- Muni, S.D.(2010), India's Foreign Policy the democracy dimension, New Delhi: Foundation Books.
- Nayar, B.R. and T.V. Paul(2004), India in the world order searching for major power status, New Delhi: Cambridge University Press.
- S. Cohen, (2002) *India: Emerging Power*, Brookings Institution Press.
- S. Mehrotra, (1990) 'Indo-Soviet Economic Relations: Geopolitical and Ideological Factors', in *India and the Soviet Union: Trade and Technology Transfer*, Cambridge University Press: Cambridge.
- Sengupta, Bhabani(1998), Fulcrum of Asia relations among China, India, Pakistan and the USSR, New Delhi: Konark Publishers.
- W. Anderson, (2011) 'Domestic Roots of Indian Foreign Policy', in W. Anderson, *Trysts with Democracy: Political Practice in South Asia*, Anthem Press: University Publishing Online.

Discipline Specific Elective Paper IV

WOMEN, POWER AND POLITICS

Introduction: This course opens up the question of women's agency, taking it beyond 'women's empowerment' and focusing on women as radical social agents. It attempts to question the complicity of social structures and relations in gender inequality. This is extended to cover new forms of precarious work and labour under the new economy. Special attention will be paid to feminism as an approach and outlook.

UNIT-I: Feminism

(i) Meaning and Development
(ii)Liberal, Socialist and Radical Feminism

UNIT-II: **Issues**

i) Patriarchy
ii) Sex and Gender
iii) Gender, Power and Politics

UNIT-III: Issues

(i) Women Movement in India
(ii) Women Empowerment: Policies and Practices
(iii) Violence against Women

UNIT-IV: **Women and Development**

i) WID (Women in Development), WAD (Women and Development), GAD (Gender and Development
ii) Women and Work (Visible and Invisible)

Text Books

.

- B. Hooks, (2010) 'Feminism: A Movement to End Sexism', in C. Mc Cann and S. Kim (eds),
- M. John.(2008) (ed) *Women's Studies in India,* New Delhi: Penguin.
- M. Kosambi, (2007) *Crossing the Threshold,* New Delhi, Permanent Black.
- Menon, (2008) 'Power', in R. Bhargava and A. Acharya (eds), *Political Theory: An Introduction,* Delhi: Pearson.
- *Naarivaadi Rajneeti: Sangharsh evam Muddey,* University of Delhi: Hindi Medium Implementation Board.
- T. Shinde, (1993) 'Stree Purusha Tulna', in K. Lalitha and Susie Tharu (eds), *Women Writing in India,* New Delhi, Oxford University Press.

  The Feminist Reader: Local and Global Perspectives, New York: Routledge.
- U. Chakravarti, (2001) 'Pitrasatta Par ek Note', in S. Arya, N. Menon & J. Lokneeta (eds.)
- V Geetha, (2002) *Gender,* Kolkata, Stree Publications.

Reference Books

- N. Gandhi and N. Shah, (1992) *Issues at Stake – Theory and Practice in the Women's Movement,* New Delhi: Kali for Women.
- N. Menon, (2004) 'Sexual Violence: Escaping the Body', in *Recovering Subversion,* New Delhi: Permanent Black.

- P. Swaminathan, (2012) 'Introduction', in *Women and Work,* Hyderabad: Orient Blackswan.
- R. Kapur, (2012) 'Hecklers to Power? The Waning of Liberal Rights and Challenges to Feminism in India', in A. Loomba *South Asian Feminisms,* Durham and London: Duke University Press.
- U. Chakravarti, (2003) *Gendering Caste through a Feminist Len,* Kolkata, Stree pubications.
- V. Bryson, (1992) *Feminist Political Theory,* London*:* Palgrave-MacMillan.

DSE Paper – IV

DISSERTATION / RESEARCH PROJECT

(College can give this choice only for students with above 60% aggregate marks)

Project Paper- Development Process and Social Movements in Contemporary India (DSE-II)

Introduction:

The research experience of students is greatly enriched by early exposure to conducting research. There are numerous benefits of undergraduate students who get involved in research. They are better off in understanding published works, determine an area of interest, can discover their passion for research and may start their career as a researcher. Further students will be able to develop ability for scientific inquiry and critical thinking, ability in the knowledge base and communication. This course is included to promote above mentioned abilities among the students.

Learning Objectives:

- To help students to learn how to develop scientific research designs in the study of public administration.
- To guide students to understand the previous research in their field of interest and review them to arrive at a research problem
- To encourage the students to learn ways to describe and evaluate public policy implementation.
- To help students understand the logic of hypothesis testing in both quantitative and qualitative research.
- To make students to learn the methods of writing a research report.

Expected outcomes: Students will be able to

- Independently prepare a research design to carry out a research project
- Review the related research papers to find out a research problem and relevant hypotheses
- Understand the dynamics of citizen – administrative interface and administrative behaviours.
- Learn the use of statistical techniques for interpretation of data.
- Learn the APA style of reporting a research project.

Unit I A student is required to carry out a project on an issue of interest to him / her under the guidance and supervision of a teacher. In order to do so s/he must have the knowledge in research methodology and of steps in planning and conducting a research. The supervisors

may help the students to go on field study / study tour relevant to their work. Thirty hours of class may be arranged in the routine to help students understand research methodology, and planning, conduction and reporting on the research. An external examiner with the supervisor as the internal examiner will evaluate the research project on the basis of scientific methodology in writing the report, and presentation skill and performance in the viva.

- **Format**
  - **Abstract –** 150 words including problem, method and results.
  - **Introduction** – Theoretical considerations leading to the logic and rationale for the present research
  - **Review**- Explaining current knowledge including substantive findings and theoretical and methodological contributions to the topic, objectives and hypotheses of the present research
  - **Method** – Design, Sample, Methods of data collection, Procedure
  - **Results**- Quantitative analysis of group data-- (Raw data should not be attached in Appendix) Graphical representation of data wherever required.¬ Qualitative analysis wherever done should indicate the method of¬ qualitative analysis.
  - **Discussion**
  - **References (APA Style) & Appendices**
- Project should be in Soft binding. It should be typed in Times New Roman 14 letter size with 1.5 spacing on one sides of the paper. Total text should not exceed 50 pages (References & Appendices extra).
- Two copies of the project should be submitted to the College.
- ***Project - American Psychological Association (APA) – Publication Manual 2006 to be followed for project writing***

Mark distribution for dissertation / Research project

Identification of problem	Review of Literature	Methodology	Analysis	Findings	Viva-voce	Total
10	10	10	25	20	25	100

Broad areas identified for Project: Social Movements: Environment, Women, Dalit, Peasant, Social Development, Political Development in Odisha, Political Socialization, Political Participation, Political Modernization and Communication, Decentralized democracy: Rural and Urban Local Self Governance, Functionary of Gram Sabha, Empowerment of Women and other marginals in PRIs, Development, Displacement, Rehabilitation, Resettlement in Odisha, Role of NGOs in Development, Regional Development and Regional Imbalances, Implementation of ORTPS- 2012, RTE-2009, Food Security Act, 2013, FRA, 2007.

Generic Elective Paper I

FEMINISM: THEORY AND PRACTICE

Introduction: The aim of the course is to introduce students to contemporary debates on feminism

and the history of feminist struggles. The course begins with a discussion on construction of gender and an understanding of complexity of patriarchy and goes on to analyze theoretical debates within feminism. It offers a gendered analysis of Indian society, economy and polity with a view to understanding the structures of gender inequalities. And the last section aims to understand the issues with which contemporary Indian women's movements are engaged with.

UNIT-I: Understanding Feminism

(i) Feminist theorizing of the sex/gender distinction; Public Man and Private Woman

(ii) Understanding Patriarchy and Feminism

UNIT-II: Theories of Feminism

(i) Liberal and Socialist,
(ii) Radical feminism and Eco-feminism

UNIT-III: Feminist issues and women's participation: The Indian Experience

(i) Women's participation in anti-colonial and national liberation movements with special focus on India
(ii) Traditional Historiography and Feminist critiques; Social Reforms Movement and position of women in India, History of Women's struggle in Post- Independent India

UNIT-IV: Family in contemporary India and Understanding Woman's Work and Labour

(i) Family in contemporary India - patrilineal and matrilineal practices. Gender Relations in the Family, Patterns of Consumption: Intra Household Divisions, entitlements and bargaining, Property Rights

(ii) Understanding Woman's Work and Labour – Sexual Division of Labour, Productive and Reproductive labour, Visible - invisible work – Unpaid (reproductive and care), Underpaid and Paid work,- Methods of computing women's work , Female headed households

Text Books

- Bina Agarwal, (2013) 'Gender And Green Governance', Oxford University Press, Oxford,
- Forbes, Geraldine (1998) 'Women in Modern India'. Cambridge, Cambridge University Press
- Geetha, V. (2002) 'Gender'. Calcutta, Stree Publications.
- Geetha, V. (2007) 'Patriarchy'. Calcutta, Stree Publications.
- Jagger, Alison. (1983) 'Feminist Politics and Human Nature'. U.K, Harvester Press.
- John, Mary (
- John, Mary(2008) 'Women studies in India: A Reader', Peguin, New Delhi
- Lerner, Gerda. (1986) 'Creation of Patriarchy'. New York. Oxford University Press.

Reference Books

- Banarjee, Sikata. (2007) 'Ghadially, Rehana. (ed.) 'Urban Women in Contemporary India: A Reader'. New Delhi, Sage.

- Chakravarti, Uma. (1988) 'Beyond the Altekarian Paradigm: Towards a New Understanding of Gender Relations in Early Indian History', Social Scientist, Volume 16, No. 8.
- Desai, Neera & Thakkar, Usha. (2001) 'Women in Indian Society'. New Delhi: National Book Trust.
- Gandhi, Nandita & Shah, Nandita. (1991) 'Contemporary Women's Movement in India'. Delhi, Zubaan.
- Gupta, A and Sinha Smita, (2005) 'Empowerment of women: Language and Other Facets', Mangal Deep, New Delhi.
- Jayawardene, Kumari. (1986) 'Feminism and Nationalism in the Third World'. London, Zed Books and Conclusion.
- Nayak, Smita (2016) (eds.) ' Combating Violence Against Women: A Reality in the Making', Kalpaz, Gyan Books Pvt, Ltd, New Delhi
- Nayak, Smita (2016) (eds.) 'Gender Dynamics: The Emerging Frontiers', Research India Publications, New Delhi.
- Nayak, Smita, (2016), 'Whither Women: A Shift from Endowment to Empowerment', Edupedia, New Delhi.
- Rege, Sharmila. (2003) (ed.) 'The Sociology of Gender: The Challenge of Feminist Sociological Knowledge'. New Delhi, Sage.
- Rowbotham, Shiela. (1993) 'Women in Movements', New York and London, Routledge.
- Sangari, Kumkum & Chakravarty, Uma.(1999) (eds.) 'From Myths to Markets: Essays on Gender'. Delhi, Manohar.
- Sarkar, Tanika & Butalia, Urvashi. (1995) (eds.) 'Women and the Hindu Right'. Delhi, Kali for Women.

Generic Elective Paper II

GOVERNANCE: ISSUES AND CHALLENGES

Objectives: This paper deals with concepts and different dimensions of governance highlighting the major debates in the contemporary times. There is a need to understand the importance of the concept of governance in the context of a globalizing world, environment, administration, development. The essence of governance is explored through the various good governance initiatives introduced in India.

UNIT-I: Government and governance: concepts

(i) Governance: Meaning, Nature and Types
(ii) Role of State in the Era of Globalisation: State, Market and Civil Society

UNIT-II : Good Governance

i) Good Governance

ii) Sustainable Development and Governance

UNIT-III: Local Governance

(i) Democratic Decentralization: Institutions of Local Governance (PRIs),
(ii) People' Participation in Local Governance & Deepening Democracy

UNIT-IV : Good Governance Initiatives In India

i) Public Service Guarantee Acts & Electronic Governance
ii) Citizens Charter & Right to Information, Corporate Social Responsibility
iii)

Text Books

- A Baviskar, ((1995) The Belly of the River: Tribal Conflict Over Development in the Narmada Valley', Delhi, Oxford University Press.
- A. Parel (2000) (ed) 'Gandhi, Freedom and Self-Rule', New Delhi, Lexington Books.
- B. Parekh, (1997) 'Gandhi: A Brief Insight', Delhi, Sterling Publishing Company.
- B. Parekh, (1999) 'Colonialism, Tradition and Reform: An Analysis of Gandhi's Political Discourse', New Delhi, Sage Publication.
- D. Hardiman, (2003) 'Gandhi in his Time and Ours'. Delhi, Oxford University Press.

Reference Books

- R Iyer, (ed) (1993) 'The Essential Writings of Mahatma Gandhi', New Delhi, Oxford University Press.
- R. Ramashray, (1984) 'Self and Society: A Study in Gandhian Thought', New Delhi, Sage Publication.

Generic Elective Paper III

GANDHI AND THE CONTEMPORARY WORLD

Introduction: Locating Gandhi in a global frame, the course seeks to elaborate Gandhian thought and examine its practical implications. It will introduce students to key instances of Gandhi's continuing influence right up to the contemporary period and enable them to critically evaluate his legacy.

UNIT-I-

i) Theories: Satyagraha, Ahimsa

UNIT-II-

i) Swaraj, Swadeshi

UNIT-III-

i) Relevance Gandhi: Gandhi & Environment, Gandhi & Women, Gandhi & Social Harmony

UNIT-IV-

- Gandhi & Global Peace: Gandhian Philosophy in Contemporary World

Text Books

- B. C. Smith (2007), 'Good Governance and Development', Palgrave.
- B. Chakrabarty and M. Bhattacharya, (1998) (eds.) 'The Governance Discourse'. New Delhi, Oxford University Press.
- B. Nayar (1995) (ed.), 'Globalization and Politics in India', Delhi, Oxford University Press.
- Neera Chandhoke, (1995) 'State and Civil Society Explorations In Political Theory', Sage Publishers.
- Panda, Smita Mishra (2008), 'Engendering Governance Institutions: State, Market and Civil Society', Sage Publications.
- Surendra Munshi and Biju Paul Abraham (2004) (eds.), 'Good Governance, Democratic Societies and Globalisation', Sage.
- United Nation Development Programme, (1997) 'Reconceptualising Governance', New York.
- World Bank Report, (1992) 'Governance and Development'.

Reference Books

- Burns H Weston and David Bollier (2013), 'Green Governance: Ecological Survival, Human Rights, and the Law of the Commons', Cambridge University Press.
- Emilio F. Moran, (2010) 'Environmental Social Science: Human - Environment interactions and Sustainability', Wiley-Blackwell.
- Pardeep. Sachdeva, (2011) 'Local Government in India', Pearson Publishers, New Delhi.
- Pranab Bardhan and Dilip Mookherjee (2006), 'Decentralization And Local Governance In Developing Countries: A Comparative Perspective', MIT Press.
- T.R. Raghunandan (2013), 'Decentralization and Local Governments: The Indian Experience, Readings on The Economy, Polity and Society', Orient Blackswan.
- D. Crowther (2008), 'Corporate Social Responsibility', Deep and Deep Publishers, New Delhi.

Generic Elective Paper IV

UNITED NATIONS AND GLOBAL CONFLICTS

Introduction: This course provides a comprehensive introduction to the most important multilateral political organization in international relations. It provides a detailed account of the organizational structure and the political processes of the UN, and how it has evolved since 1945, especially in terms of dealing with the major global conflicts. The course imparts a critical understanding of the UN's performance until now and the imperatives as well as processes of reforming the organization in the context of the contemporary global system.

UNIT-I : The United Nations

i) An Historical Overview of the United Nations.
ii) Principles and Objectives

UNIT-II

i) Structures and Functions**:** General Assembly, Security Council, Economic and Social Council,.

ii) The International Court of Justice, The Specialized Agencies (International Labour Organisation (IOL), United Nations Educational, Scientific and Cultural Organisation (UNESCO), World Health Organisation (WHO), UN Programmes Funds: United Nations Children's Fund (UNICEF), United Nations Development Programme (UNDP), United Nations High Commissioner for Refugees (UNHCR)
iii) Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to Protect
iv) Millennium Development Goals.

UNIT-III Major Global Conflicts since the Second World war

i) Korean war
ii) Vietnam War
iii) Afghanistan War
iv) Balkans Serbia and Bosnia

UNIT-IV

Assessment of the United Nations as an International Organisation: Imperatives of Reforms and the Process of Reforms

Text Books

- Basu, Rumki (2014) 'United Nations: Structure and Functions of an international organization', New Delhi, Sterling Publishers
- Baylis, J. and Smith, S. (2008) (eds.) 'The Globalization of World Politics: An Introduction to International Relations'. 4th edn. Oxford, Oxford University Press.
- Gareis, S.B. and Varwick, J. (2005) 'The United Nations: an introduction'. Basingstoke, Palgrave.
- Goldstein, J. and Pevehouse, J.C. (2006) 'International Relations'. 6th edn. New Delhi, Pearson.
- Saxena, J.N. (1986) et.al. 'United Nations for a Better Worl', New Delhi, Lancers.
- White, B. et al. (eds.) (2005) 'Issues in World Politics', 3rd edn. New York, Macmillan.
- Whittaker, D.J. (1997) 'United Nations in the Contemporary World', London, Routledge.

Reference Books

- Armstrong, D., Lloyd, L. and Redmond, J. (2004) 'International Organisations in World Politics'. 3rd edn. New York, Palgrave, Macmillan.
- Calvocoressi, P. (2001) 'World Politics: 1945-2000', 3rd edn. Harlow, Pearson Education.
- Moore, J.A. Jr. and Pubantz, J. (2008) 'The new United Nations', Delhi, Pearson Education.
- United Nations Department of Public Information. (2008) 'The United Nations Today'. New York, UN.

Course structure of UG Political Science Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Introduction To Political Theory	06	100
II	DSC-II	Indian Government And Politics	06	100

III	DSC-III	Comparative Government And Politics	06	100
IV	DSC-IV	Introduction To International Relations	06	100
V	DSE-I	Administration And Public Policy: Concepts And Theories	06	100
VI	DSE-II	Democracy And Governance	06	100
			30	**600**

POLITICAL SCIENCE Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

Discipline Specific Core Paper I

INTRODUCTION TO POLITICAL THEORY

Course Objective: This course aims to introduce certain key aspects of conceptual analysis in political theory and the skills required to engage in debates surrounding the application of the

concepts.

Unit-I Political Theory: Definition and Approaches: Normative, Historical, Behavioural and Post Behavioural, Relevance (14 lectures)

Unit-II Concepts: Democracy, Liberty, Equality, Justice

Unit-III Rights, Gender, Citizenship, Civil Society and State

Unit-IV Debates in Political Theory:
(i) Grounds of Political Obligation
(ii) Protective discrimination and Equality

Text Books

- Bhargava, R. and Ashok Acharya (2008) '*Political Theory: An Introduction.* New Delhi: Pearson Longman.
- Vinod, M.J and Deshpande, Meena (2013) 'Contemporary Political Theory', PHI, New Delhi
- Verma, S. P. (1996) 'Modern Political Theory', Vikash Publishing, 3rd Reprint, New Delhi.
- Ramaswamy, Sushila (2010), 'Political Theory: Ideas and Concepts', PHI Learning, New Delhi
- Bellamy, R. (1993), (ed.) 'Theories and Concepts of Politics'. New York: Manchester University Press.
- Marsh, D. and Stoker, G. (eds.) 'Theory and Methods in Political Science'. London: Macmillan.
- Heywood, Andrew (2016) (Reprint) 'Political Theory: An Introduction', Palgrave, UK.

Reference Books

- Kukathas, Ch. and Gaus, G. F. (2004) (eds.) 'Handbook of Political Theory'. New Delhi, Sage.
- Vincent, A. (2004) 'The Nature of Political Theory'. New York: Oxford University Press.
- Mckinnon, C. (ed.) (2008) 'Issues in Political Theory', New York: Oxford University Press.
- Arblaster, A. (1994) 'Democracy', (2nd Edition), Buckingham: Open University Press.
- Parekh, B. (2000), 'Rethinking Multiculturalism: Cultural Diversity and Political Theory', Macmillan Press, London.

Discipline Specific Core Paper II

INDIAN GOVERNMENT AND POLITICS

Unit-I Historical Development of Indian Constitution and formation and working of the Constituent Assembly

Unit-II Indian Constitution: Basic features, Preamble, Fundamental Rights and Directive Principles

Unit-III Institutional Functioning: President, Prime Minister, Parliament and Judiciary

Unit-IV (i) Parties and Party systems in India
(ii) Recent trends in Federalism in India

Text Books

1. Abbas, H., Kumar, R. & Alam, M. A. (2011) *Indian Government and Politics.* New Delhi: Pearson, 2011.
2. Austin, G. (1999) *Indian Constitution: Corner Stone of a Nation.* New Delhi: Oxford University Press.
3. Austin, G. (2004) *Working of a Democratic Constitution of India.* New Delhi: Oxford University Press.
4. Chakravarty, B. & Pandey, K. P. (2006) *Indian Government and Politics.* New Delhi: Sage.
5. Chandhoke, N. & Priyadarshi, P. (eds.) (2009) *Contemporary India: Economy, Society, Politics.* New Delhi: Pearson.
6. Jayal, N. G. & Maheta, P. B. (eds.) (2010) *Oxford Companion to Indian Politics.* New Delhi: Oxford University Press.

Reference Books:

7. Chandra, B., Mukherjee, A. & Mukherjee, M. (2010) *India After Independence.* New Delhi: Penguin.
8. Menon, N. and Nigam, A. (2007) *Power and Contestation: India Since 1989.* London: Zed Book.
9. Singh, M.P. & Saxena, R. (2008) *Indian Politics: Contemporary Issues and Concerns.* New Delhi: PHI Learning.
   Vanaik, A. & Bhargava, R. (eds.) (2010) *Understanding Contemporary India: Critical Perspectives.* New Delhi: Orient Blackswan.

Discipline Specific Core Paper III

COMPARATIVE GOVERNMENT AND POLITICS

Unit-I The nature, scope and methods of comparative political analysis

Unit-II Comparing Regimes: Authoritarian and Democratic

Unit-III Classifications of political systems:

(i) Parliamentary and Presidential: UK and USA
(ii) Federal and Unitary: Canada and China

Unit-IV

Party Systems: one-party, two-party and multi-party systems: China, UK, and India

Text Books

- Ann L. G. (ed.) (2002) Handbook *of Federal Countries.* Montreal & Kingston: McGill Queen's University Press.

- Bara, J & Pennington, M. (eds.). (2009) *Comparative Politics.* New Delhi: Sage.
- D. Caramani. (ed.) (2008) *Comparative Politics.* Oxford: Oxford University Press.
- Dhillon, Michael. (2009) *Contemporary China: An Introduction.* London, New York: Routledge, 2009.
- Hague, R and Harrop, M. (2004) *Comparative Government and Politics: An Introduction.* London: Palgrave McMillan, pp. 268□290.
- Newton, K. and Deth, Jan W. V. (2010) *Foundations of Comparative Politics: Democracies of the Modern World.* Cambridge: Cambridge University Press.
- O'Neil, P. (2009) *Essentials of Comparative Politics.* (Third Edition). New York: WW. Norton & Company, Inc.
- Palekar, S.A. (2009) *Comparative Government and Politics.* New Delhi: PHI Learning Pvt. Ltd. (Eighth Edition). London: Palgrave McMillan.
- Rekha Saxena. (ed.) (2002) *Mapping Canadian Federalism for India.* New Delhi: Konark Publisher, Pvt., pp. 115□129.

Reference Books:

- Bara, J. (2009) 'Methods for Comparative Analysis', in Bara, J. & Pennington, M. (eds.) *Comparative Politics.* New Delhi: Sage, pp. 40□65.
- Blondel, J. (1996) 'Then and Now: Comparative Politics', *Political Studies. Vol. 47, Issue 1,* pp. 152□160
- Chandhoke, N. (1996) 'Limits of Comparative Political Analysis', *Economic and Political Weekly.* vol. 31, No. 4, (January 27), pp. PE 2□PE8.
- Ishiyama, J.T. and Breuning, M. (eds.) (2011) *21st Century Political Science: A Reference Book.* Los Angeles: Sage, pp. 150□158.
- Mair, P. (2008) 'Democracy', in Carmani, D. (ed.) *Comparative Politics.* Oxford: Oxford University Press, pp. 108□132.
- Watts, D. (2003) *Understanding US/UK Government and Politics.* Manchester: Manchester University Press, pp. 1□25; 66□105; 106□138.

Discipline Specific Core Paper IV

INTRODUCTION TO INTERNATIONAL RELATIONS

Course Objective: This Course is designed to give students a sense of some important theoretical approaches to understand international relations; a history from 1945 onwards to the present; and an outline of the evolution of Indian foreign policy since independence and its possible future trajectory.

Unit-I Approaches to International Relations

(a) Classical Realism
(b) Liberalism and Neo-Liberalism
(c) Feminist Perspective

Unit-II Cold War and Post-Cold:

(i) Origin and Phases
(ii)Post Cold- War Era and Emerging Centres of Power (European Union, China, Russia and Japan)

Unit-III India's Foreign Policy: Basic Determinants (Historical, Geo-Political, Economic, Domestic and Strategic)

Unit-IV (i) India's Policy of Non-alignment
(ii) India: An Emerging Power

Text Books

- Appadorai and Rajan, M. S. (eds.) (1985) *India's Foreign Policy and Relations.* New Delhi: South Asian Publishers.
- Art, R. J. and Jervis, R. (eds.) (1999) *International Political Enduring: Concepts and Contemporary Issues.*5th Edition. New York: Longman, pp. 7□14; 29□49; 119□126.
- Basu, Rumki (ed)(2012) *International Politics: Concepts theories and Issues*, New Delhi, Sage Publications India Pvt Ltd.
- Baylis, J. and Smith, S. (eds.) (2011) *The Globalization of World Politics: An Introduction to International Relations.* Fifth Edition. Oxford: Oxford University Press.
- Ganguly, S. (ed.) (2009) *India's Foreign Policy: Retrospect and Prospect.* New Delhi: Oxford University Press.
- Goldstein, J. and Pevehouse, J.C. (2009) *International Relations.* New Delhi: Pearson.
- Indian Foreign Service Institute. (1997, 1998) *India's Foreign Policy: An Agenda for the 21st Century* Vols. 1 & 2, New Delhi: Konark Publishers.
- Vanaik, A. (1995) *India in a Changing World: Problems, Limits and Successes of Its Foreign Policy.* New Delhi: Orient Longman.

Reference Books

- Jackson, R. and Sorenson, G. (2008) *Introduction to International Relations: Theories and Approaches*. New York: Oxford University Press.
- Mewmillians, W.C. and Piotrowski, H. (2001) *The World Since 1945: A History of International Relations*.Fifth edition. London: Lynne Rienner Publishers.
- Smith, M., Little, R. and Shackleton, M. (eds.) (1981) *Perspectives on World Politics.* London: Croom Helm.
- Tickner, J. A. (2001) *Gendering World Politics: Issues and Approaches in the Post-Cold War Era.* Columbia University Press.
- Wenger, A. and Zimmermann, D. (eds.) (2003) *International Relations: From the Cold World War to the Globalized World.* London: Lynne Rienner.
- William, P., Goldstein, D. M. and Shafritz, J. M. (eds.) (1999) *Classic Readings of International Relations*. Belmont: Wadsworth Publishing Co.

Discipline Specific Elective Paper I

ADMINISTRATION AND PUBLIC POLICY: CONCEPTS AND THEORIES

Topics:

Unit-I Public administration: Meaning, scope and significance of the subject, Public and Private Administration, Major Approaches, (16 lectures)

Unit-II Administrative Theories: The Classical Theory, Scientific Management, the Human - Relation theory, and Rational Decision-Making. (16 lectures)

Unit-III Understanding public policy: (i) concept and theories, relevance.

Unit-IV Policy formulation, implementation and evaluation. (14 lectures)
Development Administration, New Public Management.

Readings:

Text Books

Topic 1. Public administration as a discipline

- Awasthi, A. and Maheshwari, S. (2003) *Public Administration.* Agra: Laxmi Narain Agarwal, pp. 3□12.
- Basu, Rumki, (2014) Public Administration, Concepts and Theories, Delhi Sterling Publishers
- Henry, N. (2003) Public Administration and Public Affairs. New Delhi: Prentice Hall, pp. 1□52.

Topic 2. Administrative theories

- Bhattacharya, M. and Chakrabarty, B. (2005) (eds.) Public *Administration: A Reader*. Delhi: Oxford University Press.
- *Frontiers in Organization & Management.* New York: Praeger.
- Henry, N. (2003) Public Administration and Public Affairs. New Delhi: Prentice Hall, pp. 53□74.
- Benson, J. K. (ed.) (1977) *Organizational Analysis: Critique and Innovation*. Beverly Hills: Sage.
- Bhattacharya, M. and Chakrabarty, B. (eds.) (2005) Public *Administration: A Reader*. Delhi: Oxford University Press, pp. 88□100.

Topic 3. Development administration

- Bhattacharya, M. (2001) *New Horizons in Public Administration*. New Delhi: Jawahar.

Topic 4. Understanding public policy

- Dror, Y. (1983) *Public Policy Making Re-examined.* Oxford: Transaction Publication.
- Dye, T.R. (1975) *Understanding Public Policy.* New Jersey: Prentice Hall.

Reference Books:

- Bernard, C. (1938) *The Functions of Executive.* Cambridge: Harvard University Press.
- Gant, G.F. (1979) *Development Administration: Concepts, Goals, Methods*. Madison: University of Wisconsin Press.
- Mooney, J. (1954) *The Principles of Organization*. New York: Harper & Row.
- Siffin, W. (eds.), *Approaches to Development Politics* . New York: McGraw□Hill.
- Simon, H. (1967) *Administrative Behavior: A Study of Decision Making Process in Administrative Organization.* New York: Macmillan.
- Wiedner, E. (ed.) (1970) *Development Administration in Asia.* Durham: Duke University Press.

Discipline Specific Elective Paper II

DEMOCRACY AND GOVERNANCE

Course Objective: This Paper tries to explain the institutional aspects of democracy and how institutions function within a constitutional framework. It further delves into how democracy as a model of governance can be complimented by institution building.

Unit-I

Structure and Process of Governance: Parliament, Party Politics and Electoral behaviour, Federalism, The Supreme Court and Judicial Activism, Units of Local Governance (Grassroots Democracy)

Unit-II

Ideas, Interests and Institutions in Public Policy:

a. Contextual Orientation of Policy Design

b. Institutions of Policy Making

Unit-III

Regulatory Institutions –

(i) SEBI, TRAI, Competition Commission Of India

(ii)Lobbying Institutions: Chambers of Commerce and Industries, Trade Unions, Farmers Associations, etc.

Unit-IV

Dynamics of Civil Society: New Social Movements and Various interests, Role of NGO's, Understanding the political significance of Media and Popular Culture.

Text Books

- Agarwal B, Environmental Management, Equity and Eco-feminism: Debating India's Experience, Journal of Pesant Studies, Vol. 25, No. 4, pp. 55□95.
- Atul Kohli (ed.), (2001)The Success of India's Democracy, Cambridge University Press,
- Corbridge, Stuart and John Harris, (2000) Reinventing India: Liberalisation, Hindu Nationalism and Popular Democracy OUP.
- Basu Rumki et, al(ed) (2010)Democracy and good governance: Reinventing the Public service Delivery System in India, New Delhi, Bloomsbury India, 2015
- Baxi, Upendra and Bhikhu Parekh, (ed.) (1994)Crisis and Change in Contemporary India, New Delhi, Sage.
- Bidyut Chakrabarty, (2003) Public Administration: A Reader, Oxford University Press, New Delhi.
- Kothari, Rajini,(1970) Politics in India, Delhi, Orient Longma,.
- Mackie. Gerry, (2003) Democracy Defended, New York, Cambridge University Press,.
- Mahajan, Gurpreet (ed.) (2000) Democracy, Difference and Social Justice, New Delhi, Oxford University Press.
- Menon, Nivedita, (ed.) (2001) Gender and Politics in India, New Delhi, Oxford University Press.
- Mohanty, Manoranjan (1998) Peoples Rights: Social Movements and the State in the Third World, Sage, New Delhi,.
- Brass. Paul, (1990) Politics in India since Independence, Hyderabad, Orient Longman.

Reference Books

- Fuller, C.J. (ed.) (1997)Caste Today, Oxford University Press

- Jenkins. Rob, (2004) Regional Reflections: Comparative Politics Across India's States, New Delhi, OUP,.
- Joseph E. Stiglitz,(2003) Globalisation and its Discontents, WW Norton Press.
- Pankaj Sharma, (2004) E-*Governance: The New Age Governance*, APH Publishers
- S. Laurel Weldon, (2011) When Protest Makes Policy: How Social Movements Represent Disadvantaged Groups, Michigan Publishers.
- Shah. Ghanshyam, [ed.], (2002) Social Movements and The State, Sage Publication,
- Smitu Kothari, (1993) Social Movements and the Redefinition of Democracy, Boulder, Westview.
- Su H. Lee,(2010) Debating New Social Movements: Culture, Identity, and Social Fragmentation , Rawat Publishers, New Delhi
- Sury, M.M, (2003) India: A Decade of Economic Reforms: 1991 –2001, New Delhi, New Century Publication.
- Thomas R. Dye, (1984) Understating Public Policy, Prentice Hall NJ.
- Vasu Deva, *E-Governance In India : A Reality*, Commonwealth Publishers,2005
- Y. Dror, Public Policy Making Re-examined, Leonard Hill Books, Bedfordshire, 1974.

SKILL ENHANCEMENT COURSES (SEC)

Optional for SECC II paper

Total Marks- 100

Skill Enhancement Courses (SECC Option-I)

LEGISLATIVE PRACTICES AND PROCEDURES

Introduction : To acquaint the student broadly with the legislative process in India at various levels, introduce them to the requirements of peoples' representatives and provide elementary skills to be part of a legislative support team and expose them to real life legislative work. These will be, to understand complex policy issues, draft new legislation, track and analyze ongoing bills, make speeches and floor statements, write articles and press releases, attend legislative meetings, conduct meetings with various stakeholders, monitor media and public developments, manage constituent relations and handle inter-office communications. It will also deepen their understanding and appreciation of the political process and indicate the possibilities of making it work for democracy.

Unit-I

Powers and Functions of People's Representatives at different tiers of Governance

i) Members of Parliament, State Legislative Assemblies
ii) Representatives of Rural & Urban local self-government from Zilla Parishad, Municipal Corporation to Panchayat/ Ward

Unit-II :Supporting the Legislative Process and the Legislative Committees

i) Legislative Procedure: How a Bill becomes law, Role of the Standing Committee in reviewing a Bill
ii) Types of Committees; Role of Committees in reviewing Government Finances, policy, programmes and legislation

Unit-III : Reading the Budget Document

i) Overview of the Budget Process, Role of Parliament in Parliament in reviewing the Union Budget
ii) Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries

Unit –IV : Support in Media monitoring and Communication

i) Types of Media and their significance for Legislators
ii) Basics of Communication in Print and Electronic Media

Text Books

1. D. Kapur and P. Mehta, (2006) 'The Indian Parliament as an Institution of Accountability', *Democracy, Governance and Human Rights,* Programme Paper Number 23, United Nations Research Institute for Social Development.
2. Government of India, (Ministry of Parliamentary Affairs) (2009), *Subordinate Legislation*,
3. Government of India, (Ministry of Parliamentary Affairs), (2009) *Legislation, Parliamentary Procedure.*
4. P. Mehta, 'India's Unlikely Democracy: The Rise of Judicial Sovereignty', *Journal of Democracy,* Vol. 18(2), pp.70-83.
5. Sanyal, (2011) *Strengthening Parliamentary Committees* PRS, Centre for Policy Research, New Delhi.

Reference Books

6. A. Celestine, (2011) *How to Read the Union Budget* PRS, Centre for Policy Research, New Delhi,
7. B. Jalan, (2007) *India's Politics,* New Delhi: Penguin.
8. G. Rose, (2005) **'**How to Be a Media Darling: There's No getting Away From It', *State Legislatures*, Vol. 31(3).
9. N. Jayal and P. Mehta (eds), (2010)*The Oxford Companion to Politics in India,* Oxford University Press: New Delhi,
10. R. Guha, (2007), *India After Gandhi*, Macmillan: New Delhi.

Skill Enhancement Courses (SECC Option-II)

PEACE AND CONFLICT RESOLUTION

Introduction: The objective of an undergraduate application course for common students in Peace and Conflict Studies will cover in-depth knowledge of conflict analysis, conflict resolution, conflict prevention, as well as the historical and cultural context of organized violence, Peace and Conflict Resolution addresses the sources of war, social oppression and valence and the challenges of promoting peace and justice internationally and domestically. It also introduces more equitable, cooperative and non-violent methods that can be used to transform unjust, violent or oppressive world situations. This course provides students with an overview of the Peace and Conflict Studies discipline, including key concepts and related theories. The course is designed to familarise students with the historical background of various peace movements, to analyse principles used to resolve conflict and to provide a view of how peace and conflict resolution are being pursued today. The course will also cover extensive understanding of current research and development within the field of peace and conflict studies and perspective of the environment, gender, migration and ethnicity.

Unit-I International Peace and Conflict Resolution: Sources of War

i) Sources of War: International and Domestic Issues and Trends
ii) What is Conflict: Introduction to International Conflict Resolution

Unit-II International Conflict Resolution Theories:

i) Models developed by Johan Galtung, Joseph Montville,
ii) Models developed by Morton Deutsch, William Zartman, Levy Jack.

Unit-III Conflict Resolution

i) Background of various Peace Movement and Concepts,
ii) Principles used to resolve conflict**.**

Unit-IV Cross-border Relationship

i) Migration, International rules and regulations, normative concept and political decisions.
ii) Current perspective of peace and conflict resolution.

Text Books

1. Bidwai, Praful and Achin Vanaik (eds.)(1999), South Asia on a short fuse: Nuclear politics and the future of global disarmament, New Delhi: OUP.
2. Carr, Edward H.,(1994) "Realism and Idealism," Richard Betts (ed), Conflict After the Cold War, Boston: Simon & Schuster.
3. Deutsch, Morton,(1973) The Resolution of Conflict: Constructive and Destructive Processes, New Haven, Yale University Press.
4. Ghosh, Partha S.(1989), Cooperation and conflict in South Asia, New Delhi: Manohar.

Reference Books

5. Kriesberg, Louis (1998), Constructive Conflicts: From Escalation to Resolution, Rowman & Littlefield, Maryland. Banerjee, A.K. (ed.)(1998), Security issues in South Asia: Domestic and external sources of threats to security, Calcutta: Minerva.
6. Levy, Jack, (1995)"Contending Theories of International Conflict: A Levels-of-Analysis Approach" in Crocker et al, Managing Global Chaos, USIP.
7. Starkey, Boyer, and Wilkenfield, (1999) Negotiating a Complex World. Rowman & Littlefield, Maryland.
8. Waltz, Kenneth N., (1994)"Structural Causes and Economic Effects," Richard Betts (ed), Conflict After the Cold War, Boston: Simon & Schuster.

Training Component of the UG Syllabus in Political Science

The present Syllabus in Political Science requires special training for the teachers of undergraduate teaching. The training modules will update their knowledge and help them to deliver quality inputs to the students.

Themes on which inputs for teachers are to be developed:

I. Understanding Political Theory
- Theorizing the Political
- Theories of Feminism
- Modernism and Post Modernism

II. Constitutional Government and Democracy in India
- Recent trends in Federalism

III. Political Theory-Concepts and Debates
- Egalitarianism: Special Exclusion and Affirmative Action
- Procedural, Distributive and Global Justice
- Cultural Relativism and Multiculturalism

IV. Political Process in India
- Recent trends in Indian Party System
- Role of Caste, Class, Gender and Religion in Voting Behaviour
- Electoral Reforms-Recent Debates
- Secularism and Communalism Debates
- Politicisation of Caste

V. Introduction to Comparative Governments and Politics

- Going beyond Euro-centrism
- Capitalism: Meaning and development
- Globalization: features and impact
- Rise and decline of Communism as a ruling Ideology
- Decolonization meaning and context

VI. Introduction to Public Administration

- Public Policy
- New public Administration
- New Public Management
- New Public Service Approach
- Good governance
- Feminist perspective

VII. Perspective on International Relations

- Development of International Relations; Emergence of International State System
- Nationalization and Power
- National Interest-Key Development of International Relations
- Power, Conservations of International Relations
- Classical Realism and Neo-realism, Liberalism and Neo- liberalism, Marxist Approach, Feminist Perspective , Euro-centricism and Perspective from Global South
- World War-I causes and consequences, Significance of Bolshevik Revolution
- Rise of Fascism and Nazism, World War-II cause and consequences
- Cold war evolution and different phrases, Disintegration of USSR
- Emergence of Third World War and End of Cold War

VII. Political Processes and Institutions in Comparative Perspective

- New Institutionalism: meaning, background, significance
- Nation-State-meaning and Evolution in West Europe
- Nation and State Debates in Post colonial context
- Democratization in Post-Authoritarian Countries
- Democratization in Post-Communist Countries
- Federalism: meaning, evolution and features

IX. Public Policy and Administration in India

- Public Policy Process in India
- Concept and Significance of Budget, Budget cycle in India
- Various Approaches and Types of Budgeting
- Public Service Delivery System
- Redressal of Public Grievances: RTI, Lokpal, Citizens' Charter and e-Governance

X. Global Politics

- Proliferation of Nuclear Weapons
- International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments
- Political Debates on Sovereignty and Territoriality
- Cultural and Technological Dimension
- Global Resistances (Global Social Movements and NGOs)
- Ecological Issues: Historical Overview of International Environmental Agreements, Climate

Change
- Global Economy: Its Significance and Anchors of Global Political Economy: IMF, World Bank, WTO, TNCs
- Understanding Globalization and its Alternative Perspectives
- Migration & Human Security
- Global Shifts: Power and Governance

XI. Western Political Philosophy
- Hegel
- Marx

XII. Indian Political Philosophy
- Brahmanic and Shramanic
- Islamic and Syncretic
- Abul Fazal-Monarchy
- Kabir: Syncretism

XIII. Contemporary Political philosophy
- Antonio Gramsci
- John Rawls

XIV. Modern Indian Political Thought
- Pandita Ramabai: Gender, Critique of Orthodoxy
- Tagore Critique of Nationalism
- Savarkar: Hindutwa-A Critical Assessment
- Lohia: Socialism,
- J.P.Narayan: Total Revolution

Training Component of the UG Syllabus in Political Science (Pass)

The present Syllabus in Political Science requires special training for the teachers of undergraduate teaching. The training modules will update their knowledge and help them to deliver quality inputs to the students.

Themes on which inputs for teachers are to be developed:

I- Introduction to Political Theory
- Definition and Approaches: Normative, Historical, Behavioural and Post Behavioural, Relevance
- Debates in Political Theory: Protective discrimination and Equality.

II- COMPARATIVE GOVERNMENT AND POLITICS
- Comparing Regimes: Authoritarian and Democratic

IV- INTRODUCTION TO INTERNATIONAL RELATIONS
- Approaches to International Relations**:** Classical Realism, Liberalism and Neo-Liberalism Feminist Perspective
- Cold War and Post-Cold: Phases, Post Cold- War Era and Emerging Centres of Power European Union, China, Russia and Japan

Generic Elective -2 (Interdisciplinary): (additional option)

1) READING GANDHI

Course objective: Locating Gandhi in a global frame, the course seeks to elaborate Gandhian thought and examine its practical implications. It will introduce students to key instances of Gandhi's continuing influence right up to the contemporary period and enable them to critically evaluate his legacy.

Unit-I- Theories: Satyagraha, Ahimsa

Unit-II- Swaraj, Swadeshi

Unit-III- Relevance of Gandhi: Gandhi & Environment, Gandhi & Women, Gandhi and Social Harmony

Unit-IV- Gandhi and Global Peace: Gandhian Philosophy in Contemporary World

Text Books

- A. Parel (ed) (2000) Gandhi*, Freedom and Self-Rule*, New Delhi: Lexington Books.
- A. Parel (ed.) (1997) *Gandhi, Hind Swaraj and Other Writings* Cambridge: Cambridge University Press.
- B. Parekh, (1999) *Colonialism, Tradition and Reform: An Analysis of Gandhi's Political Discourse*, New Delhi: Sage Publication.
- Brown. J, and A Parel (eds) (2011) *Cambridge Companion to Gandhi*, Cambridge University Press.
- D. Dalton, (2000) A. Parel (ed) *Gandhi, Freedom and Self-Rule*, New Delhi: Lexington Books.
- H. Coward (ed) (2003) *Indian Critiques of Gandhi,* New York: State University of New York Press.
- R. Iyer, (2001) *The Moral and Political Thought of Mahatma Gandhi*, New Delhi: Oxford University Press. pp. 344-358.
- R. Mukharjee, (ed) (1995), *The Penguin Gandhi Reader*, New Delhi: Penguin.

Reference Books

- B Parekh, (1997) *Gandhi: A Brief Insight,* Delhi: Sterling Publishing Company.
- Brown, J. (2008) *Gandhi and Civil Disobedience: The Mahatma in Indian Politics*, Cambridge: Cambridge University Press.
- Chatterjee. P, (1986) *Nationalist Thought and the Colonial World: A derivative discourse?* Delhi: Zed Books.
- D. Dalton, (1996) *Mahatma Gandhi: Selected Political Writings*, USA: Hackett Publishing.
- D. Hardiman, (1981) *Peasant Nationalists of Gujarat: Kheda District, 1917-1934*, Delhi: Oxford University Press.
- D. Hardiman, (2003) *Gandhi in his Time and Ours*. Delhi: Oxford University Press.
- Dirks, (2001), '*Castes of Mind: Colonialism and the making of Modern India*, Princeton: Princeton University Press.
- Gandhi, (1941) 'Chapter 1, 2, 9, 15, and 16', in *Constructive Programme: Its Meaning and Place*, Ahmedabad: Navjivan Trust.

- R Iyer, (ed) (1993) *The Essential Writings of Mahatma Gandhi*, New Delhi: Oxford University Press.
- R. Ramashray, (1984) *Self and Society: A Study in Gandhian Thought*, New Delhi: Sage Publication.
- S. Sarkar, (1982) *Modern India 1885-1947*, New Delhi: Macmillan.
- Taneja, (2005) Gandhi Women and the National Movement 1920-1947, New Delhi: Haranand Publishers.
- Terchek, (1998) *Gandhi: Struggling for Autonomy*, USA: Rowman and Littlefield Publishers.
- Weber, (2006) 'Gandhi is dead, Long live Gandhi- The Post Gandhi Gandhian Movement in India', in *Gandhi, Gandhism and the Gandhians*, New Delhi: Roli.

Generic Elective- 3, Additional option

2) HUMAN RIGHTS GENDER AND ENVIRONMENT

Course Objective: This course aims at enabling the students to understand the issues concerning the rights of citizens in general and the marginalized groups in particular, and assess the institutional and policy measures which have been taken in response to the demands of various movements. Conceptual dimensions, international trends and the Indian experience form the contents of the course.

Expected Learning Outcome: The study of the course will equip the students with theoretical and conceptual understanding of socio – economic and political problems of marginalized groups in society such as women, dalits, minorities and adivasis and repercussions of contemporary developments on globalization on them.

Unit-I Understanding Social Inequality

i. Caste, Gender, Ethnicity and Class as distinct categories and their interconnection.
ii. Globalisation and its impact on workers, peasants, dalits, adivasis and women.

Unit-II Human Rights

i. Human Rights: Various Meanings
ii. UN Declarations and Covenants
iii. Human Rights and Citizenship Rights
iv. Human Rights and the Indian Constitution
v. Human Rights, Laws and Institutions in India; the role of the National Human Rights Commission.
vi. Human Rights of Marginalized Groups: Dalits, Adivasis, Women, Minorities and Unorganized Workers.
vii. Consumer Rights: The Consumer Protection Act and Grievance Redressal mechanisms.
viii. Human Rights Movement in India.

Unit-III Gender

i. Analysing Structures of Patriarchy
ii. Gender, Culture and History
iii. Economic Development and Women

iv. The issue of Women's Political Participation and Representation in India
v. Laws, Institutions and Women's Rights in India
vi. Women's Movements in India

Unit-IV Environment

i. Environmental and Sustainable Development
ii. UN Environment Programme: Rio, Johannesburg and after.
iii. Issues of Industrial Pollution, Global Warming and threats to Bio – diversity
iv. Environment Policy in India
v. Environmental Movement in India

Text Books

- Agarwal, Anil and Sunita Narain (1991), *Global Warming and Unequal World: A Case of Environmental Colonialism*, Centre for Science and Environment, Delhi.
- Baxi, Upendra (2002), *The Future of Human Rights*, Oxford University Press, Delhi.
- Beteille, Andre (2003), *Antinomies of Society: Essays on Ideology and Institutions*, Oxford University Press, Delhi.
- Geetha, V. (2002) *Gender*, Stree Publications, Kolkata.
- Ghanshyam Shah, (1991) *Social Movements in India*, Sage Publications, Delhi.
- Gonsalves, Colin (2011) Kaliyug: The decline of human rights law in the period of globalization Human Rights Law Network, New Delhi.
- Guha, Ramachandra and Madhav Gadgil, (1993) *Environmental History of India*, University of California Press, Berkeley.
- Haragopal, G. (1997) *The Political Economy of Human Rights*, Himachal Publishing House, Mumbai.
- Menon, Nivedita (ed) (2000) *Gender and Politics in India*, Oxford University Press, Delhi.
- Patel, Sujata et al (eds) (2003) *Gender and Caste: Issues in Contemporary Indian Feminism*, Kali for Women, Delhi.
- Sen, Amartya, (1999) Development as Freedom New Delhi, OUP.
- Shah, Nandita and Nandita Gandhi (1992) *Issues at Stake: Theory and Practice in the Contemporary Women's Movement in India*, Kali for Women, Delhi.

Generic Elective (Interdisciplinary): 4 (additional Option)

1. Feminism: Theory and Practice

- Feminist theorizing of the sex/gender distinction; Public Man and Private Woman
- Radical feminism and Eco-feminism
- Women's participation in anti-colonial and national liberation movements with special focus on India
- Traditional Historiography and Feminist critiques; Social Reforms Movement and position of women in India, History of Women's struggle in Post- Independent India
- Family in contemporary India - patrilineal and matrilineal practices. Gender Relations in the Family, Patterns of Consumption: Intra Household Divisions, entitlements and bargaining, Property Rights

- Understanding Woman's Work and Labour – Sexual Division of Labour, Productive and Reproductive labour, Visible - invisible work – Unpaid (reproductive and care), Underpaid and Paid work,- Methods of computing women's work , Female headed households

II. Gandhi and The Contemporary World

- Relevance of Gandhi: Gandhi and Environment, Gandhi and Women, Gandhi and Social Harmony
- Gandhi and Global Peace: Gandhian Philosophy in Contemporary World

III. Governance: Issues and Challenges

- Role of State in the Era of Globalization: State, Market and Civil Society
- Good Governance
- Sustainable Development and Governance
- People' Participation in Local Governance and Deepening Democracy
- Public Service Guarantee Acts and Electronic Governance
- Citizens Charter and Right to Information, Corporate Social Responsibility

DISCIPLINE SPECIFIC ELECTIVE -4 (DSE Additional))

I. Human Rights in a Comparative Perspective

- Rights in National Constitutions: South Africa
- International Refugee Law, International Humanitarian Law

II. Development Process and Social Movements in Contemporary India

- Welfare State, Development and the role of Planning Commission
- Development in the era of Liberalization and Reforms
- Industrial Development and its impact on organized and unorganized labour
- Agricultural Development and Agrarian Crisis, Land Reforms and Green Revolution,
- Social Movements: Meaning and Approaches, New Social Movements
- Women's Movement, Environmental Movements
- Dalit Movement, Tribal Movement,
- Leftwing Extremism: Issues and Challenges

III. India's Foreign Policy in a Changing World

- India's Foreign Policy: Postcolonial Perspective
- India and South Asia: SAARC, Look East Policy, Act East Policy
- India as an emerging Global Power, Myth and Reality
- India in the Contemporary World

IV. Women, Power and Politics

- Gender, Power and Politics
- WID (Women in Development), WAD (Women and Development), GAD (Gender and Development
- Women and Work (Visible and Invisible)

STATE MODEL SYLLABUS FOR UNDER GRADUATE
COURSE IN ECONOMICS
(Bachelor of Arts Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course structure of UG Economics Honours

Semester	Course	Course Name	Credits	Total marks
I	AEC-I	AEC-I	04	100
	C-I	Introductory Microeconomics	06	100
	C-II	Mathematical Methods for Economics I	06	100
	GE-I	Indian Economy	06	100
			22	
II	AEC-II	AEC-II	04	100
	C-III	Introductory Macroeconomics	06	100
	C-IV	Mathematical Methods for Economics II	06	100
	GE-II	Indian Economy II	06	100
			22	
III	C-V	Microeconomics I	06	100
	C-VI	Macroeconomics I	06	100
	C-VII	Statistical Methods for Economics	06	100
	GE-III	Introductory Microeconomics	06	100
	SEC-I	SEC-I	04	100
			28	

IV	C-VIII	Microeconomics II	06	100
	C-IX	Macroeconomics II	06	100
	C-X	Research Methodology	06	100
	GE-IV	Introductory Macroeconomics	06	100
	SEC-II	SEC-II	04	100
			28	

Semester	Course	Course Name	Credits	Total marks
V	C-XI	Indian Economy I	06	100
	C-XII	Development Economics I	06	100
	DSE-I	1. Economic History of India (1857-1947) 2. Introductory Econometrics 3. Odisha Economy 4. Public Economics 5. Money and Banking	06	100
	DSE-II		06	100
			24	
VI	C-XIII	Indian Economy II	06	100
	C-XIV	Development Economics II	06	100
	DSE-III	1. Environmental Economics 2. International Economics 3. Agricultural Economics 4. History of Economic Thought	06	100
	DSE-IV		06	100

		5. Project		
	OR			
	DSE-IV	Dissertation	06	100*
			24	

Discipline Specific Elective Papers: (Credit: 06 each) (4 papers to be selected by students of Economics Honours): DSE 1-IV

DSE Group I

1. Economic History of India (1857-1947)
2. Introductory Econometrics
3. Odisha Economy
4. Public Economics
5. Money and Banking

DSE Group II

1. Environmental Economics
2. International Economics
3. Agricultural Economics
4. History of Economic Thought
5. Project *Dissertation (can be opted as alternative of DSE-IV only and of 6 credits. **Dissertation content: 50, Seminar: 30, Viva: 20)**

ECONOMICS

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers (out of the 6 papers suggested)
Generic Elective for Non Economics students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

Core Paper I

INTRODUCTORY MICROECONOMICS

Introduction:
This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

Unit I: Exploring the Subject Matter of Economics, Markets and Welfare

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The economist as Scientist – The scientific method: Observation, Theory and more observation; Role of Assumptions; Economic Models; Why economists disagree; Graphs in Economics

The Market Forces; Markets and Competition; The Demand and Supply curves – Market vs Individual curves, Shifts in Demand and Supply Curves; Market Equilibrium and changes there in; Price Elasticity of Demand – determinants and computation; Income and Cross Elasticity of Demand; The Price Elasticity of Supply – determinants and computation; Consumer and Producer Surplus.

Unit II: Theory of Consumer Choice

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of Indifference Curves; Two extreme examples of indifference curves; Optimization – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and Substitution Effect; Derivation of Demand Curve; Three applications – Demand for Giffen goods, Wages and Labour Supply, Interest rate and Household saving.

Unit III: The Firm and Market Structures

Cost concepts; Production and Costs; The various measures of cost – Fixed and Variable cost, Average and Marginal cost; Cost curves and their shapes; Costs in the short run and in the long run; Economies and diseconomies of scale. Firms in Competitive Markets – What is a competitive market; Profit maximization and the competitive firm's supply curve; The marginal cost curve and the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run

Unit IV: The Input Markets

The Demand for Labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the Labour Market; Other factors of production: Land and Capital; Linkages among factors of production.

Text Book:

- Principles of Economics, Gregory N Mankiw, 6e Cengage Learning India Private Limited, New Delhi

Reference Book:

- Karl E. Case and Ray C. Fair (2007): *Principles of Economics*, 8th Edition, Pearson Education Inc.
  Pindyck, Robert and Daniel Rubinfeld (2018): Microeconomics, 9th Edition, Pearson Education Inc

Core Paper II

MATHEMATICAL METHODS FOR ECONOMICS I

Introduction:

This is the first of a compulsory two-course sequence. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Unit I: **Preliminaries and Functions of one Real Variable**

Sets and set operations; Cartesian product; relations; functions and their properties; Number systems

Types of Functions- constant, polynomial, rational, exponential, logarithmic; Graphs and graphs of functions; Limit and Continuity of functions; Limit theorems

Unit II: Derivative of a Function

Rate of change and derivative; Derivative and slope of a curve; Continuity and differentiability of a function; Rules of differentiation for a function of one variable; Application- Relationship between total, average and marginal functions

Unit III: Functions of two or more Independent Variables

Partial differentiation techniques; Geometric interpretation of partial derivatives; Partial derivatives in Economics; Elasticity of a function – demand and cost elasticity, cross and partial elasticity

Unit IV: **Matrices and Determinants**

Matrices: concept, types, matrix algebra, transpose, inverse, rank; Determinants: concept, properties, solving problems using properties of determinants, solution to a system of equations - Crammer's rule and matrix inversion method.

Text Book:

- A. C. Chiang and K. Wainwright (2005): *Fundamental Methods of Mathematical Economics*, McGraw Hill International Edition.

Reference Book:

- K. Sydsaeter and P. J. Hammond (2002): *Mathematics for Economic Analysis*. Pearson Educational Asia

Core Paper III

INTRODUCTORY MACROECONOMICS

Introduction:

This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Unit I: Basic Concepts in Macroeconomics

Macro vs. Micro Economics; Limitations of Macroeconomics; Stock and Flow variables, Equilibrium and Disequilibrium, Partial and General Equilibrium Statics – Comparative Statics and Dynamics; National Income Concepts – GDP, GNP, NDP and NNP at market price, factor cost, real and nominal; Disposable personal Income;

Unit II: Measurement of Macroeconomic Variables

Output, Income and Expenditure Approaches; Difficulties of Estimating National Income; National Income Identities in a simple 2-sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-sector economies; National Income and Economic Welfare; Green Accounting.

Unit III: Money and Changes in its Value

Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices
Inflation – Meaning, Causes, and Anti-Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Inflationary Gap, Deflation- Meaning, Causes, and Anti-Deflationary Measurers, Depression and Stagflation; Inflation vs. Deflation

Unit IV: Determination of National Income
The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption- Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier

Text Book:

- N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi

Reference Book:

- Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.

Core Paper IV

MATHEMATICAL METHODS FOR ECONOMICS II

Introduction:
This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this Syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Unit I: **Linear models:**

Input- Output Model: Basic concepts and structure of Leontief's open and static Input-Output model; Solution for equilibrium output in a three industry model; The closed model

Unit II: Second and Higher Order Derivatives and Integration:

Technique of higher order differentiation; Interpretation of second derivative; Second order derivative and curvature of a function; Concavity and convexity of functions; Points of inflection, Derivative of Implicit Function; Higher Order Partial Derivative

Indefinite Integrals; Rules of Integration; Techniques of Integration: Substitution Rule, Integration by parts, and Partial Fractions; Definite Integral – Area Interpretation

Unit III: Single and Multivariable Optimization:

Optimum values and extreme values; Relative maximum and minimum; Necessary versus sufficient conditions - First and Second derivative tests (using Hessian Determinants); Economic applications thereof, First and second order condition for extrema of multivariable functions; Convex functions and convex sets

Unit IV: Optimization with Equality Constraints:
Effects of a constraint; Finding stationary value – Lagrange-Multiplier method (Two variable single constraint case only): First and second order condition; The Bordered Hessian determinant

Text Book:

- A. C. Chiang and K. Wainwright (2005): *Fundamental Methods of Mathematical Economics*, McGraw Hill International Edition.

Reference Book:

- K. Sydsaeter and P. J. Hammond (2002): *Mathematics for Economic Analysis*. Pearson Educational Asia

Core Paper V

MICROECONOMICS I

Introduction:
The course is designed to provide a sound training in microeconomic theory to formally analyze the behavior of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts; this course looks at the behavior of the consumer and the producer and also covers the behavior of a competitive firm.

Unit I: Consumer Theory I

Preferences and Utility, Axioms of Rational Choice, Utility, Trades and Substitutions, Indifference curves; Mathematics of Indifference curves, Utility functions for specific preferences, the many good case; Utility Maximization and choice: the 2-good case (graphical analysis), the n-good case, Indirect utility function, the Lump sum principle, Expenditure minimization, properties of expenditure function

Unit II: Consumer Theory II

The Income and Substitution Effects: Demand function, changes in income, changes in a goods price- Direct and Indirect Approaches (Slutsky), the Individual's Demand Curve, Compensated (Hicksian) demand curves and functions, demand elasticity, Consumer Surplus, Demand relationships among goods, the 2-good case, substitutes and complements, Net (Hicksian) substitutes, and Complements, Substitutability with many goods

Unit III: Production Theory and Costs

Production Functions: Marginal productivity, Production with One Variable Input (labour) and with Two-Variable Inputs, Isoquant Maps and the Rate of Technical Substitution, Returns to Scale, Elasticity of Substitution, Some Simple Production Functions: Linear, Fixed Proportions, Cobb-Douglas; Technical Progress
Definition of Cost and its properties, Cost minimizing input choices (Optimization principles, Expansion Path), Cost Functions and Shift in Cost Curves, Long-Run versus Short-Run Cost Curves

Unit IV: Profit Maximization

The Nature and Behavior of Firms, Marginal Revenue – Relationship between Average and marginal revenue, Short-Run Supply by a Price-Taking Firm, Profit Functions and its Properties, Profit maximization – General conditions, Input demands

Text Book:

- C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India

Reference Books:

- H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems

Core Paper VI

MACROECONOMICS I

Introduction:
This course introduces the students to formal modeling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.

Unit I: Consumption and Investment

Consumption – Income Relationship, Propensities to Consume and the Fundamental Psychological Law of Consumption; Implications of Keynesian Consumption Function; Factors Influencing Consumption Function; Measures to Raise Consumption Function; Absolute, Relative, Permanent and Life – Cycle Hypotheses
Autonomous and Induced Investment, Residential and Inventory Investment, Determinants of Business Fixed Investment, Decision to Invest and MEC, Accelerator and MEI, Theories of Investment.

Unit II: Demand for and Supply of Money

Demand for Money – Classical, Neoclassical and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications, Supply of Money, The Theory of Money Supply Determination and Money Multiplier, Measures of Money Supply in India

Unit III: Aggregate Demand and Aggregate Supply

Derivation of Aggregate Demand and Aggregate Supply Curves in the IS-LM Framework; Nature and Shape of IS and LM curves; Interaction of IS and LM curves and Determination of Employment, Output, Prices and Investment; Changes in IS and LM curves and their Implications for Equilibrium

Unit IV: Inflation, Unemployment and Expectations, and Trade Cycles

Inflation – Unemployment Trade off and the Phillips Curve – Short run and Long run Analysis; Adaptive and Rational Expectations; The Policy Ineffectiveness Debate; Meaning and Characteristics of Trade Cycles; Hawtrey's Monetary Theory, Hayek's Over-investment Theory and Keynes' views on Trade Cycles

Text Book:

- N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi

Reference Book:

- Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.

Core Paper VII

STATISTICAL METHODS FOR ECONOMICS

Introduction:

This is a course on statistical methods for economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It is followed by a study and measure of relationship between variables, which are the core of economic analysis. This is followed by a basic discussion on index numbers and time series. The paper finally develops the notion of probability, followed by probability distributions of discrete and continuous random variables and introduces the most frequently used theoretical distribution, the Normal distribution.

Unit I: **Data Collection and Measures of Central Tendency and Dispersion**

Basic concepts: population and sample, parameter and statistic; Data Collection: primary and secondary data, methods of collection of primary data; Presentation of Data: frequency distribution; cumulative frequency; graphic and diagrammatic representation of data; Measures of Central Tendency: mean, median, mode, geometric mean, harmonic mean, their relative merits and demerits; Measures of Dispersion: absolute and relative - range, mean deviation, standard deviation, coefficient of variation, quartile deviation, their merits and demerits; Measures of skewness and kurtosis.

Unit II: Correlation and Regression Analysis

Correlation: scatter diagram, sample correlation coefficient - Karl Pearson's correlation coefficient and its properties, probable error of correlation coefficient, Spearman's rank correlation coefficient. Two variable linear regression analysis - estimation of regression lines (Least square method) and regression coefficients - their interpretation and properties, standard error of estimate

Unit III: Time Series and Index Number

Time Series: definition and components, measurement of trend- free hand method, methods of semi-average, moving average and method of least squares (equations of first and second degree only), measurement of seasonal component; Index Numbers: Concept, price relative, quantity relative and value relative; Laspeyer's and Fisher's index, family budget method, problems in construction and limitations of index numbers, test for ideal index number.

Unit IV: Probability Theory and Sampling

Probability: Basic concepts, addition and multiplication rules, conditional probability; Meaning of Sampling, Types of Sampling: Probability Sampling verses Non-Probability Sampling; Simple

Random Sampling and its selection, Systematic Sampling, Multi-stage Sampling, Quota Sampling; Error: Sampling and Non-sampling

Text books:

- S. C. Gupta (2017): *Fundamentals of Statistics*, Himalaya Publishing House, Delhi

Reference Book:

- Murray R. Speigel (2017): *Theory & Problems of Statistics*, Schaum's publishing Series.

Core Paper VIII

MICROECONOMICS II

Introduction:

This course is a sequel to Microeconomics I. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning. It covers Market, general equilibrium and welfare, imperfect markets and topics under information economics.

Unit I: Firm Supply and Equilibrium

Market Environments; Pure competition; Supply decision of a competitive firm and Exceptions; Inverse Supply Function; Profits and Producer's Surplus; Long Run Supply Curve of a Firm; Long Run Average Costs; Short Run and Long Run Industry Supply; Industry Equilibrium in Short and Long Run; Meaning of Zero Profits; Economic Rent

Unit II: General Equilibrium, Efficiency and Welfare

The Edge worth Box; Trade; Pareto Efficient Allocations; Existence of equilibrium and efficiency; The Welfare Theorems and their implications; The Firm; Production and the Welfare Theorems ; Production possibilities, comparative advantage and Pareto efficiency

Unit III: Market Imperfections: Monopoly and Oligopoly

Barriers to Entry, Profit Maximization and Output Choice, Monopoly and resource Allocation, Monopoly, Product Quality and Durability, Price Discrimination, Second Degree Price Discrimination through Price Schedules, Regulation of Monopoly, Dynamic Views of Monopoly
Oligopoly – Choosing a strategy; Quantity and price leadership; Simultaneous Quantity Setting; Example of Cournot Equilibrium; Simultaneous Price Setting; Collusion

Unit IV: Game Theory

The Payoff Matrix of a Game; Nash Equilibrium; Mixed Strategies ;The Prisoner's Dilemma; Repeated Games; Enforcing a cartel; Sequential Games; A Game of entry deterrence.

Text Book:

- H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems.

Reference Book:

- C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.
- Pindyck, Robert and Daniel Rubinfeld (2018): Microeconomics, 9th Edition, Pearson Education Inc

Core Paper IX

MACROECONOMICS II

Introduction:

This course is a sequel to Macroeconomics I. In this course, the students are introduced to the long run dynamic issues like growth and technical progress. It also provides the micro-foundations to the various aggregative concepts used in the previous course.

Unit I: Modeling Economic Growth

Accumulation of Capital in the basic Solow Model; supply and demand for goods, growth in the capital stock and the steady state, Golden rule level of capital: Comparing steady states, transition to the golden rule steady state with too much and too little capital, Population Growth, Technological Progress- Solow version, Beyond Solow Model and Endogenous Growth

Unit II: Open Economy and Macroeconomic Policy

Balance of payments- concept; meaning of equilibrium and disequilibrium in balance of payments; Determination of foreign exchange rate- the balance of payments theory; Fixed versus flexible exchange rates; Short-run open economy model- the basic Mundell-Fleming model;
Macroeconomic Policies – Fiscal policy, Crowding –out and Crowding – in; Monetary policy and instruments, the Transmission Mechanism; Effectiveness of macroeconomic policies in open and closed economies

Unit III: Classical and Keynesian Macroeconomics Thoughts

Keynes verses classics: Classical macroeconomics, Employment and output determination, Say's law, the quantity theory of money, Keynes's General theory: Keynes's main propositions; analysis of the labour market, Keynes's critique of Say's law and Quantity theory of money, the orthodox Keynesian school, underemployment equilibrium in the Keynesian model, the Phillips curve and orthodox Keynesian school

Unit IV: Monetarist and New Classical Macroeconomic Thoughts

The orthodox monetarist school, the Quantity Theory of Money approach, the expectations augmented Phillips curve analysis, the orthodox monetarist school and stabilization policy
New Classical Economics: The influence of Robert e Lucas Jr, the structure of new classical models: the Rational Expectations hypothesis; and policy implications

Text Book:

- N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi

Reference Book:

- Brian Snowdon and Howard R Vane (2005): Modern Macroeconomics: Its Origins, Development and Current State, Edward Elgar

Core Paper X

Research Methodology

Introduction:
The course is to develop a research orientation among the students and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them to the basic concepts used in research and to scientific social research methods and their approach. It includes discussions on sampling techniques, research designs and techniques of analysis.

Unit I: Basics of Research

Introduction to Research: Meaning, Objectives, Motivation, Types, Approaches, Significance, Research Process, Criteria of Good Research; Qualities of a Good Researcher, Research as a Career

Unit II: Research Problem

Defining the Research Problem: What is a Research Problem? Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem; Research Design: Meaning, Need, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs

Unit III: Issues in Research

Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Techniques of Measurement Tools, Scaling and Important Scaling Technique
Research Ethics: codes and ethics, permissions to research, responsibilities, confidentiality, feedback, participatory research; Research Proposal and literature review: research proposal, review of literature, levels of analysis, using the library and internet, abstracting, word processing, plagiarism, Concept of IPR

Unit IV: Actions in Research

English in report writing: words, sentences, paragraph, writing style; The Report: improving quality, sections, drawing conclusions, evaluation checklists, persistence; Common Citation Styles

Text Book:

- Kothari, C. R. (2004): Research Methodology: Methods and Techniques, New Age International Private Limited Publishers, New Delhi.

Reference Books:

- Guthrie, G. (2010): Basic Research Methods, Sage Publications India Private Limited, New Delhi.

Core Paper XI

INDIAN ECONOMY I

Introduction:
Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list will have to be updated annually.

Unit I: Basic Characteristics of Indian Economy as a Developing Economy

Indian Economy in the Pre-British Period; The Structure and Organization of Villages and Towns; Industries and Handicrafts in Pre-British India; Colonialism; Economic Consequences of British Rule; Decline of Handicrafts and Progressive Ruralization; The Land System and Commercialization of Agriculture; Industrial Transition; Colonial Exploitation and Impacts – Underdevelopment; Colonization and Modernization; State Policies and Economic Underdevelopment; The Current State of Indian Economy

Unit II: Population and Human Development

Population Growth and Economic Development – size, growth and future of population; Causes of rapid population growth; Population and economic development; Population policy; Demographic issues – Sex and Age Composition of population; Demographic Dividend; Urbanization and Migration; Human Resource Development – Indicators and importance of Human Resource Development; Education policy; Health and nutrition.

Unit III: National Income in India – The Growth Story and Current Challenges

Trends in national and per capita income; Changes in sectoral composition of national income; Regional disparities in Growth and Income; Savings and Investment and Economic Growth – The

Linkage; Poverty – Estimation and Trends, Poverty Alleviation Programs – MGNREGA, NRLM, SJSRY; Inequality – Measures and trends in India; Unemployment – Nature, Estimates, Trends, Causes and Employment Policy

Unit IV: Economic Planning in India

Rationale, Features, Objectives, Strategies, Achievements and Assessment of Planning in India; Eleventh Five Year Plan – Objectives, Targets and Achievements; Twelfth Five Year Plan – Vision and Strategy; From Planning to NITI – Transforming India's Development Agenda.

Text Book:

- Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya Publishing House, Mumbai

Reference Books:

- Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.
- Indian Economy Datt and Sundharam, GauravDatt and AshwaniMahajan, S Chand Publications, 7th Revised Edition
- Indian Economy Since Independence, ed by Uma Kapila, Academic Foundation, Revised Nineteenth Edition 2008-09
- Government of India (Current Year): Economic Survey, Ministry of Finance, New Delhi

Core Paper XII

DEVELOPMENT ECONOMICS I

Introduction:

This is the first part of a two-part course on economic development. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The axiomatic basis for inequality measurement is used to develop measures of inequality and connections between growth and inequality are explored. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.

Unit I: Study of Economic Development

Development Economics as a subject; economic growth and economic development; Characteristics of underdeveloped countries – vicious cycle of poverty and cumulative causation; obstacles to economic development; measures of economic development – national and per capita income, basic needs approach, capabilities approach, three core values of development, PQLI, HDI, HPI, MDPI, GDI; capital formation and economic development

Unit II: Theories of Economic Growth and Development

Classical theory, Marxian theory; Schumpeterian theory; Rostow's stages of economic growth; Solow model and convergence with population growth and technical progress

Unit III: Poverty, Inequality, Agriculture, Industry and Development:

Measuring poverty: Head Count Ratio, Poverty Gap Ratio, Squared Poverty Ratio, FGT Ratio; Measuring Inequality – Lorenz curve and Kuznets' inverted U hypothesis; Growth, poverty and inequality; Policy options – some basic considerations
Agriculture, Industry and Economic Development: Role of agriculture; Transforming traditional agriculture; Barriers to agricultural development; Role of industrialization; Interdependence between agriculture and industries – A model of complementarities between agriculture and industry; terms of trade between agriculture and industry; functioning of markets in agrarian societies; interlinked agrarian markets

Unit IV: Institutions and Economic Development:

Role of institutions in economic development; Characteristics of good institutions and quality of institutions; The pre-requisites of a sound institutional structure; Different measures of institutions – aggregate governance index, property rights and risk of expropriation; The role of democracy in economic development; Role of markets and market failure; Institutional and cultural requirements for operation of effective private markets; Market facilitating conditions; Limitations of markets in LDCs; Corruption and economic development – tackling the problem of corruption

Text book:

- Todaro, Michael P and Stephen C Smith (2006): *Economic Development*, 8th Edition, Pearson

Reference Books:

- Debraj Ray (2009): *Development Economics,* Oxford University Press.
- Thirlwall, A P (2011): *Economics of Development*, 9th Edition, Palgrave Macmillan

Core Paper XIII

INDIAN ECONOMY II

Introduction:
This course examines sector-specific polices and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence. Given the rapid changes taking place in the country, the reading list will have to be updated annually.

Unit I: Agricultural Development in India

Indian Agriculture: nature, importance, trends in agricultural production and productivity, factors determining production, land reforms, new agricultural strategies and green revolution, rural credit; Agricultural marketing and warehousing.

Unit II: Industrial Development in India

Trends in industrial output and productivities; Industrial Policies of 1948, 1956, 1977 and 1991; Industrial Licensing Policies – MRTP Act, FERA and FEMA; Growth and problems of SSIs, Industrial sickness; Industrial finance; Industrial labour.

Unit III: Tertiary Sector, HRD and the External Sector

Tertiary Sector: growth and contribution of service sector to GDP of India, share of services in employment; Human development – concept, evolution, measurement; HRD: indication, importance, education in India, Indian educational policy; Health and Nutrition.
Foreign Trade: role, composition and direction of India's foreign trade, trends of export and import in India, export promotion verses import substitution; Balance of Payments of India; India's Trade Policies; Foreign Capital – FDI, Aid and MNCs.

Unit IV: Indian Economy and Environment

Environmental Policies in India: The Environment (Protection) Act 1986, The Environment (Protection) Rules 1986, The National Forest Policy 1988, Policy statement for Abatement of Pollution 1992, National Conservation Strategy and Policy Statement on Environment and Development 1992, The National Environment Appellate Authority Act 1997, National Environmental Policy 2006; Global deal with Climate Change: Introduction, Intergovernmental Panel for Climate Change (IPCC), Impact of Climate Change on India, Global Response on Climate Change, Possible Role of India.

Text Book:

- Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya Publishing House, Mumbai

Reference Books:

- Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.
- Indian Economy Datt and Sundharam, GauravDatt and AshwaniMahajan, S Chand Publications, 7th Revised Edition
- Indian Economy Since Independence, ed by Uma Kapila, Academic Foundation, Revised Nineteenth Edition 2008-09
- Government of India (Current Year): Economic Survey, Ministry of Finance, New Delhi

Core Paper XIV

DEVELOPMENT ECONOMICS II

Introduction:
This is the second unit of the economic development sequence. It begins with basic demographic concepts and their evolution during the process of development. The structure of markets and contracts is linked to the particular problems of enforcement experienced in poor countries. The governance of communities and organizations is studied and this is then linked to questions of sustainable growth. The course ends with reflections on the role of globalization and increased international dependence on the process of development.

Unit I: Population and Development

Demographic concepts : birth and death rates, age structure, fertility and its determinants, the Malthusian population trap and the microeconomic household theory of fertility; costs and benefits of population growth and the model of low level equilibrium trap; rural-urban migration – the Harris Todaro migration model and policy implications

Unit II: Dualism and Economic Development

Dualism – geographic, social and technological; the theory of cumulative causation (Myrdal); the regional inequalities in the context of economic development; the inverted U relationship; international inequality and the centre periphery thesis; dependency, exploitation and unequal exchange; the dualistic development thesis and its implications

Unit III: Environment and Development

Basic issues of environment and development – Development and environment inter-linkage; Poverty, environmental degradation and externalities; common property resources, renewable and non-renewable resources; concept of sustainable development; basics of climate change

Unit IV: International Trade and Economic Development and Financing Economic Development

Trade and economic development; export led growth; terms of trade and economic growth – the Prebisch Singer Hypothesis; trade strategies for development – import substitution vs. export promotion; international commodity agreements; trade vs aid.
Saving, capital formation and economic development; financial sector and economic development; taxation, public borrowing and economic development; inflation, foreign finance, investment and foreign aid – controversies and opportunities

Text Book:

- Todaro, Michael P and Stephen C Smith (2006): *Economic Development*, 8th Edition, Pearson

Reference Book:

- Thirlwall, A P (2011): *Economics of Development*, 9th Edition, Palgrave Macmillan

DSE Group I
(A student has to choose any two from group I under DSE-1& DSE - 2)

Discipline Specific Elective Paper-1

ECONOMIC HISTORY OF INDIA 1857-1947

Introduction:
This course analyses key aspects of Indian economic development during the second half of British colonial rule. In doing so, it investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule. This course links directly to the course on India's economic development after independence in 1947.

Unit I: Introduction: Colonial India: Background and Introduction and Macro trends;

Overview of colonial economy**,** National Income; population; occupational structure

Unit II: Agriculture

Agrarian structure and land relations; agricultural markets and institutions – credit, commerce and technology; trends in performance and productivity; famines

Unit III: Railways and Industry

Railways; the de-industrialization debate; evolution of entrepreneurial and industrial structure; nature of industrialization in the interwar period; constraints to industrial breakthrough; labor relations

Unit IV: Economy and State in the Imperial Context

The imperial priorities and the Indian economy; drain of wealth; international trade, capital flows and the colonial economy – changes and continuities; government and fiscal policy

Text Book:
- Tirthankar Roy, *The Economic History of India 1857-1947*, Oxford University Press, 3rd edition, 2011.

Discipline Specific Elective Paper-2

INTRODUCTORY ECONOMETRICS

Introduction:
This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for misspecification of regression models.

Unit I: Introduction

Definition, Nature and scope of econometrics; Theoretical Probability Distributions: Binomial, Poisson and Normal distributions: their properties
Theory of Estimation: Estimation of parameters; properties of estimators – small sample and asymptotic properties; point and interval estimation

Unit II: Hypothesis Testing

Testing of hypotheses: defining statistical hypotheses; Simple and composite hypotheses; Null and alternative hypothesis; Type I and Type II errors, Critical region; Neyman-Pearson lemma; Power of a test; Test statistics: z, chi square, t and F

Unit III: Linear Regression Analysis

Two variable linear regression model – Assumptions; Least square estimates, Variance and co-variance between Least square estimates; BLUE properties; Standard errors of estimates; Co-efficient of determination; Inference in a two variable linear regression model; ANOVA; Forecasting. Introduction to multiple regression models.

Unit IV: Violation of Classical Assumptions
Heteroscedasticity, Multicollinearity and Auto-correlation: Meaning, consequences, tests and remedies.

Text Book:
- Gujarati, D & Sangeetha (2007); "Basic Econometrics", McGraw Hill Book Co.

Discipline Specific Elective Paper-3

ODISHA ECONOMY

Introduction:
Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in Odisha in pre- and post-Independence period, with particular emphasis on

paradigm shifts and turning points. Given the rapid changes taking place in Odisha, the reading list will have to be updated annually.

Unit I: Odisha Economy before 1947

Orissa's Economy in the Nineteenth Century: Benevolence or Exploitation, Forces of Nature, Animal Power, The Company Steps in, Public Works and Public Health, Education, Disintegration of Village Economy, New Social Environment, Changing Position of Social Classes, The Moneylenders, The Borrowers, Money-flows from Village to Metropolis, Pauperization of Peasantry, The Wage Earners, Demographic Changes, Profiting from Rural Adversity; Diarchy in 1919 and Separation of Provincial Finances from Central Government in 1937; Emergence of Federal Finance (Ref.: Das 1976a and 1976b, GoO 2016)

Unit II: Macro Economy of Odisha

A macro glance of Odisha economy: aggregate income, broad sectoral decomposition, performance of districts, employment, child labour and bonded labour, employment programmes, consumption expenditure, cost of living; Odisha State public finances (Chapter 14 and 15 of Ref 1; & Chapter 2 and 9 of Ref 2)

Unit III: Agriculture, Industry, Infrastructure and Environment in Odisha

Agriculture: land ownership and land tenure, agricultural wages and rural unemployment, production and productivity of major crops, agricultural inputs, agricultural policy; Animal Husbandry; Fisheries (Chapter 1 to 3 of Ref 1; & Chapter 3 of Ref 2)
Industry: Investment, industrial policy, and the growth of large industries, mining and quarrying; Construction; tertiary sector: tourism, transport and power; Water Resources, Forest Resources (Chapter 4 to 8 of Ref 1; & Chapter 4 & 5 of Ref 2)

Unit IV: Social Sector in Odisha

Poverty: income poverty and inequality; health sector: outcomes, infrastructure, finance, public health, NRHM; education: Literacy, Primary education, secondary education, higher education, SSA; human development (Chapter 9 to 13 of Ref 1; & Chapter 7 & 8 of Ref 2)

Text Book:

- Nayak, P., Panda, S. C., Pattanaik, P. K. (2016): **The Economy of Odisha: A Profile**, Oxford University Press, New Delhi

Reference Book:

- GoO (Latest): Odisha Economic Survey, Planning and Convergence Department, Directorate of Economics and Statistics, Government of Odisha, Bhubaneswar
- GoO (2004): *Human Development Report 2004 Orissa*, Planning and Coordination Department, Government of Odisha, Bhubaneswar

- GoO (2018): 80 Years Odisha Budget: Commemorative Volume, Department of Finance, Bhubaneswar

Discipline Specific Elective Paper-4

MONEY, BANKING AND FINANCIAL MARKET

Introduction:

This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It highlights the organization, structure and role of financial markets and institutions. It also discusses interest rates, monetary management and instruments of monetary control. Financial and banking sector reforms and monetary policy with special reference to India are also covered.

Unit I: Money

Definition and functions of money; Types of money: legal tender money and bank money, near money; Value of money and index number; construction of index number; WPI, CPI, PPI, GDP deflator, Cost of living index

Demand for money- Classical and Keynesian approaches, Patinkin and the Real Balance Effect; Friedman's Quantity theory of money. Supply of Money- Measures of money supply: M_1,M_2, M_3 and M_4; High powered money and money multiplier.

Unit II: Commercial Banking

Meaning and types; Functions of commercial banks; the process of credit creation and its limitations**;** Balance sheet and portfolio management, Banking sector reforms in India; Lessons from Global Financial Crisis and Policy Response in India.

Unit III: Central Banking

Functions of a central bank; Quantitative and qualitative methods of credit control; Central Bank's Supervision and prudential measures for Financial stability; current monetary policy of India, liquidity adjustment facility (LAF) through Repo and reverse repo operation, MSF.

Unit IV: Financial Markets

Financial Market, Meaning, Types , Money market and Capital Market, Primary and Secondary Market, Stock Exchanges, SEBI; Role of Financial Markets for Economic Development.

Text Book

- L. M. Bhole and J. Mahukud*, Financial Institutions and Markets,* Tata McGraw Hill, 5th edition, 2011.

Discipline Specific Elective Paper-5

PUBLIC ECONOMICS

Introduction:
Public economics is the study of government policy from the points of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization. Inherently, this study involves a formal analysis of government taxation and expenditures. The subject encompasses a host of topics including public goods, market failures and externalities.

Unit I: Introduction to Public Finance and Public Budgets

Public Finance: meaning and scope, distinction between public and private finance; public good verses private good; Principle of maximum social advantage; Market failure and role of government; Public Budget: kinds of budget, economic and functional classification of the budget; Balanced and unbalanced budget; Balanced budget multiplier; Budget as an instrument of economic policy

Unit II: Public Expenditure

Meaning, classification, principles, cannons and effects, causes of growth of public expenditure, Wagner's law of increasing state activities, Peacock-Wiseman hypotheses

Unit III: Public Revenue

Sources of Public Revenue; Taxation - meaning, cannons and classification of taxes, impact and incidence of taxes, division of tax burden, the benefit and ability to pay approaches, taxable capacity, effects of taxation, characteristics of a good tax system, major trends in tax revenue of central and state governments in India

Unit IV: Public Debt

Sources, effects, debt burden – Classical/ Ricardian views, Keynesian and post-Keynesian views; shifting - intergenerational equity, methods of debt redemption, debt management, tax verses debt

Text Books:

- J. Hindriks and G. Myles (2006): *Intermediate Public Economics*, MIT Press.

Reference Book:

- R. A. Musgrave and P. B. Musgave(1989): *Public Finance in Theory and Practices.* McGraw Hill
- Bhatia H L (2018): *Public Finance.* Vikas Publishing House.

DSE Group II
(A student has to choose any two from group II under DSE-3 & DSE- 4)

Discipline Specific Elective Paper- 1

Environmental Economics

Introduction:
This course introduces the students to the basics of environmental economics to understand the fundamentals of environmental concerns and develop insights into valuation of environment.

Unit I: Economy and Environment

Nature and Scope of Environmental Economics- Environment and Economy interaction; Environment as a public good- Serious environmental problems of Developing Countries – Air pollution, water pollution and deforestation.
Global environmental problems, trade and environment, International Cooperation for Environmental Protections, Montreal and other protocols.

Unit II: The Economics of Pollution and Climate change

Pollution as externality, The market Approach to optimal pollution, Property rights and market bargain theorems, Coase theorem; Pigouvian Taxation, Subsidies and optimal pollution; Climate change – concept, causes, effects and management.

Unit III: Valuation of Environmental Damage

Methods and difficulties of environmental valuation, Economic value, Use value, Option value, Existence value; Direct and Indirect Valuation of Environmental Goods: The hedonic price approach, Contingent valuation, Travel cost approach.

Unit IV: Natural Resources and Sustainable Development

Natural resources- Renewable and exhaustible; Tragedy of commons, People's Participation in the management of common property resources; Sustainable Development Concepts, Sustainability rules, Indicators of sustainability, Solow/Hartwick, Natural capital stock, Safe Minimum Standard.

Text Book:

- Bhattacharya, R. N. (2002): Environmental Economics: An Indian Perspectives, OUP, New Delhi

Reference Book:

- Kolstad, C.D (1999); Environmental Economics Oxford University Press, New Delhi

Discipline Specific Elective Paper-2

INTERNATIONAL ECONOMICS

Introduction:
This course introduces the students to international trade and finance to understand the theories of international trade and develop insights into trade policy and balance of payments. The course also develops insight into international financial system and the trade policy of India.

UNIT I: Importance of Trade and Trade Theories

Importance of the study of International Economics; Inter-regional and international trade; Theories of Trade-absolute advantage (Adam Smith), comparative advantage (David Ricardo) and opportunity cost (Haberler); Heckscher-Ohlin theory of trade — its main features, assumptions and limitations (Leontief Paradox) Factor Price Equalization theorem.

UNIT II: Trade Policy and International Economic Institutions

Concepts of terms of trade and their importance; Doctrine of reciprocal demand – Offer curve technique; Gains from trade ;Trade as an Engine of Growth and Concept of immiserizing growth, Tariffs and quotas – their impact in partial equilibrium analysis; General Equilibrium analysis of tariff and the concept of optimum tariff, Functions of IMF (Conditional Clause), Role of IMF in international liquidity, Reforms for the emergence of international monetary system; World Bank and WTO; Their achievements and failures; Their Role from the point of view of India

UNIT III: Exchange Rate

Concept and Types of Exchange Rate (bilateral vs. trade-weighted exchange rate, cross exchange rate, spot, forward, futures), Demand for and Supply of foreign exchange, Exchange Rate Determination: Mint Parity Theory, Purchasing-Power Parity Theory, Fixed versus Flexible exchange rate

UNIT IV: Balance of Trade and Payments

Concepts and components of balance of trade and balance of payments; Disequilibrium in balance of payments; Various measures to correct deficit in BOPs (Expenditure switching and expenditure reducing policies, Direct control), Depreciation Vs. Devaluation; Elasticity approach to devaluation, Foreign trade multiplier- Concept and implications.

Text Book:

- Mannur H. G (Recent Edition) *International Economics*, Vikash Publishing

Reference Books:

- SalvatoreDominick, *InternationalEconomics*,WileIndia.
- SoderstenBo andReedJ, *InternationalEconomics*, McMillanPublisher

Discipline Specific Elective Paper-3

AGRICULTURAL ECONOMICS

Course description

This course introduces students to the significance of agriculture in the Indian economy and helps to understand the role agriculture in economic development. It is designed to develop insights into changing agricultural practices in India and assess the significance of agriculture in the era of liberalization.

UNIT I: Agriculture and Economic Growth

Role of Agriculture in Economic Development, sectoral changes and agriculture, agriculture in rural development, farm and non-farm employment issues, inter-linkages between agriculture and industry; empirical evidence of inter-dependence between agriculture and industry; Schultz's hypothesis on traditional agriculture – its criticisms; Mechanization of Indian Agriculture; Case for and against farm mechanization; Green revolution and trends of mechanization in India

UNIT II: Agricultural Price and Marketing

Agricultural price policy for a developing economy – objectives and effectiveness of agricultural price policy, elements of agricultural price policy, features of an ideal agricultural price policy, agricultural price policy in India and public distribution system

Agricultural marketing – need and criteria for assessing efficiency, agricultural marketing system in India, development of a national agricultural marketing platform

UNIT III: Risk and Uncertainty in Agriculture

Difference between risk and uncertainty, types of uncertainty in agriculture, measures for mitigating risk and uncertainty in agriculture, new agricultural insurance scheme of India

Rural credit in India, importance and estimates, agencies for rural credit, review of progress of institutional finance in rural India since independence

UNIT IV: Agriculture in India

Agriculture in Indian Planning, Globalization and Indian agriculture, Case for and against privatization of agriculture, WTO and India's trade in agricultural commodities

Text Book

- Sony, R. N. (2006), Leading Issues in Agricultural Economics, Vishal Publishing, Jalandhar.

Reference Book:

- Sadhu, A N and A Singh (2008), Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai.

Discipline Specific Elective Paper-4

HISTORY OF ECONOMIC THOUGHT

Introduction:

This course provides a perspective to our intellectual history, development of economic thought and helps relate this thought to the current thinking. It introduces the students to the philosophers and economists who developed economic reasoning and modeling of economic activities. It also helps create critical abilities and attitudes.

UNIT I: Introduction and Early Economic Thought

Mercantilism-main characteristics, Thomas Mur's views ; Physiocracy- main features, Tableau Economique, taxation; Early Classicism: Adam Smith- Theory of Value, Division of labour, capital accumulation, distribution, views on trade and economic progress; David Ricardo-theory of value, theory of rent, distribution, ideas on international trade and development.

UNIT II: Classicism Vs Marxism

Thomas Malthus- population theory, glut theory; Karl Marx-dynamic of social change, theory of value, surplus value, theory of profit, crisis of capitalism, Johns Stuart Mill- ideas on value, distribution, views as a synthesizer.

UNIT III: The Marginalists' Revolution

Economic ideas of Jevons, Walras and Menger, Bohm-Bowerk, Wicksell ; Marshall – Role of time element in price determination, ideas on consumer surplus, Marshal as a synthesizer

UNIT IV: Indian Economic Thought

Main themes of Kautilya's Arthasashtra; Modern Economic Ideas: Dada Bhai Naoroji, M.K. Gandhi, village swaraj, non-violence, machines and labour, cottage industries; Comparison of Indian Economic thought with western Economic thought.

Text Book

- Gide, Charles and Rist, Charles (1973): A History of Economic Doctrines, Oxford University Press.
- Dasgupta, A K (1986): Epochs of Economic Theory, Oxford University Press, New Delhi

Reference Book:

- O'Brien, D P (1975): Classical Economists, Oxford, Clarendon Press.
- Ekelund, Robert B. and Robert F. Hebert (1990): A History of Economic Theory and Method, third edition, New York: McGraw Hill
- Henry W. Spiegel (1991): The Growth of Economic Thought, 3rd ed. Durham: Duke University Press
- Tom Bottomore (1980): Dictionary of Marxist Thought, Basic Blackwell Publishers.
- Roll, Eric, History of Economic Thought, Faber and Faber Ltd.

- L N Rangarajan (1992): Kautilya: The Arthasastra, edited, rearranged, translated and introduced; Penguine books, New Delhi

DSE Paper –4
DISSERTATION / RESEARCH PROJECT
(College can give this choice only for students with above 60% aggregate marks)

Introduction : The project is intended to establish the connection between Economics as confined to the text books and class rooms and Economics at play in the ground. It is expected to give an empirical content to the subject. Economics is defined as the study of mankind in the ordinary business of life. It studies individual as well as group behavior.

Project work at the undergraduate level is an in-depth study on a topic chosen by the student. The objective of the project work for the students at undergraduate level is to expose students to the social and real world contexts in which the subjects taught in the classroom have applications. Therefore, the topic must be related to the field of study the student is enrolled. It is undertaken with the guidance of a faculty supervisor, and involves a prolonged period of investigation and writing. The supervisor is supposed to help the student and mentor him/her throughout, from selection of the topic to submission of the project report.
The project output will be a project report written on the topic, chosen by the student and approved by the guide, in about 10000 words.

The process of project preparation typically comprises of an investigation of a particular topic, based on the application of philosophical and theoretical knowledge available in the already existing scientific literature and other published sources of information. The student may use already available data (texts, documents, artworks or existing data sets) or she may go for collection of data from the field. The final report should ideally have the following sections.
(1) Abstract (in about 500 words) containing a summary of the entire report.
(2) Introduction of the topic, arguments for choosing such a topic and the key investigation propositions.
(3) A review of the existing knowledge on the topic
(4) Information on the data and data treatment tools used in the study
(5) An analysis of data and findings
(6) Conclusions
(7) References

A good research project requires sincere efforts and honest dedication from students. Moreover, it requires an engagement of the student with an issue under probe for a fairly long period of time compared to their preparations of subjects for the examination.

A successful completion of the project report has several positive learning outcomes for the student. It empowers the student with the life skill of patience and persistence. It also helps the student to locate her theoretical understandings in the context of socio-economic and political realities.

Generic Elective Paper I

INDIAN ECONOMY

Introduction: This paper introduces the students to the essentials of Indian economy with an intention of understanding the basic feature of the Indian economy and its planning process. It also aids in developing an insight into the agricultural and industrial development of India. The students will understand the problems and policies relating to the agricultural and industrial sectors of India and current challenges of Indian economy.

Unit I: Introduction to Indian Economy and Current Challenges

Colonialism & British Rule: Exploitation and under-development in India; Basic features of India Economy; Indian Economy as a developing economy; Demographic trends in India - Size and growth of population, Occupational structure, Sex composition, Age structure and demographic dividend; Causes of population growth and population policy; The problem of unemployment and recent policies for employment generation; The problem of inequality in income distribution and its causes, Policies to address inequality.

Unit II: Indian Agriculture

Role of Agriculture in Indian Economy; Cause of low productivity, Green Revolution and Land Reforms, Agricultural Finance-Sources and Problems; Agricultural Marketing in India

Unit III: Industrial Development in India

Role of Industrialization in Indian Economy; Small Scale & Cottage Industries: Meaning, Role, Problems and Remedies; Industrial Policies of 1948, 1956, 1977 and1991; Problems of Industrial Development in India; Industrial Sickness

Unit IV: Service Sector in India

Growth & Contribution to GDP; Composition and relative importance of service sector; Factors determining growth of the sector; ICT and IT – Spread and Policy; Sustainability of services led growth

Text Book:

- Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya Publishing House, Mumbai

Reference Book

- Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.

Generic Elective Paper II

INDIAN ECONOMY II

Introduction: : This paper is the part II of Indian economy deals with the external sector, financial markets in India, Indian Public Finances and Economic Reforms. This paper also throws some light on current challenges of Indian Economy.

Unit I: External Sector in India
Trends, Composition & Direction in exports from and imports of India; Problems of Balance of Payment: Causes of deficit in BOP & measures to correct it; Trade Policy- Export Promotion Vs Import Substitution; Foreign Trade Policy of India; WTO and India

Unit II: Financial Markets in India
Commercial Banking in India- Nationalization of Banks; Lead bank scheme and branch expansion; RBI - Functions, Monetary Policy; Development Banking- IFCI,IDBI, SIDBI and NABARD

Unit III: Indian Public Finance
Public Expenditure-Growth and Composition, Causes of Growth of Public Expenditure in India: Tax Revenue of Central and State Governments; Concept of VAT; Deficit Financing in India-Revenue, Budget, Fiscal and Primary Deficits; Purpose and Effects of Deficit Financing; India's Fiscal Policy-Objectives

Unit IV: Current Challenges Facing Indian Economy
Inflation – Causes, Consequences and Anti-inflationary Policy; Poverty – Poverty line and Estimates, Major Poverty Alleviation Programmes; Environmental Degradation – Growth and Environment; Population Growth and Environment; Environment Policy; Economic Reforms-Globalization, Macroeconomic Stabilization, Structural Reforms, and their impact on the Indian Economy; Foreign capital and MNCs-Role and consequences

Text Book:

- Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya Publishing House, Mumbai

Reference Book

- Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.
- Basu, Kaushik (2016): An Economist in the Real World: The Art of Policy Making in India, enguin

Generic Elective Paper III

INTRODUCTORY MICROECONOMICS

Introduction:
This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situation.

Unit I: Exploring the Subject Matter of Economics, Markets and Welfare

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The economist as Scientist – The scientific method: Observation, Theory and more observation; Role of assumptions; Economic Models; Why economists disagree; Graphs in Economics

The market forces; Markets and competition; The demand and supply curves – Market vs. individual curves, Shifts in demand and supply curves; Market equilibrium and changes there in; Price elasticity of demand – determinants and computation; Income and cross elasticity of demand; The price elasticity of supply – determinants and Computation; Consumer and Producer Surplus

Unit II: Theory of Consumer Choice

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of indifference curves; Two extreme examples of indifference curves; Optimization – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and substitution effect; Derivation of demand curve; Three applications – Demand for Giffen goods, Wages and Labour Supply, Interest rate and Household saving

Unit III: The Firm and Market Structures

Cost concepts; Production and costs; The various measures of cost – Fixed and variable cost, average and marginal cost; Cost curves and their shapes; Costs in the short run and in the long run; Economies and diseconomies of scale. Firms in competitive markets – What is a competitive market; Profit maximization and the competitive firm's supply curve; The marginal cost curve and the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run

Unit IV: The Input Markets

The demand for labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the labour market; Other factors of production: Land and capital; Linkages among factors of production.

Text Book:

- Principles of Economics, Gregory N Mankiw, 6e Cengage Learning India Private Limited, New Delhi

Reference Book:

- Karl E. Case and Ray C. Fair (2007): *Principles of Economics*, 8th Edition, Pearson Education Inc.

- Pindyck, Robert and Daniel Rubinfeld (2018): Microeconomics, 9th Edition, Pearson Education Inc

Generic Elective Paper IV

INTRODUCTORY MACROECONOMICS

Introduction:
This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Unit I: Basic Concepts in Macroeconomics
Macro vs. Micro Economics; Limitations of Macroeconomics ; Stock and Flow variables, Equilibrium and Disequilibrium, Partial and General Equilibrium Statics – Comparative Statics and Dynamics ; National Income Concepts – GDP, GNP, NDP and NNP at market price, factor cost, real and nominal; Disposable personal Income

Unit II: Measurement of Macroeconomic Variables
Output, Income and Expenditure Approaches ; Difficulties of Estimating National Income; National Income Identities in a simple 2- sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-sector; economies; National Income and Economic Welfare; Green Accounting

Unit III: Money and Changes in its Value
Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices. Inflation – Meaning, Causes, and Anti-Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Inflationary Gap, Deflation- Meaning, Causes, and Anti-Deflationary Measurers, Depression and Stagflation; Inflation vs. Deflation

Unit IV: Determination of National Income
The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption- Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier

Text Book:
- N. Gregory Mankiw (2010):*Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi

Reference Book:

- Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.

Course structure of UG Economics Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Principles of Microeconomics I	06	100
II	DSC-II	Principles of Microeconomics II	06	100
III	DSC-III	Principles of Macroeconomics I	06	100
IV	DSC-IV	Principles of Macroeconomics II	06	100
V	DSE-I	1. Economic Development and Policy in India 2. Economic History of India 1857-1947	06	100
VI	DSE-II	1. Odisha Economy 2. Money and Banking	06	100
			30	**600**

ECONOMICS Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

Discipline Specific Core Paper I

PRINCIPLES OF MICROECONOMICS- I

Introduction:
This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

Unit I: Exploring the subject matter of Economics, Markets and Welfare

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The economist as Scientist – The scientific method: Observation, Theory and more observation; Role of assumptions; Economic Models; Why economists disagree; Graphs in Economics

The market forces; Markets and competition; The demand and supply curves – Market vs individual curves, Shifts in demand and supply curves; Market equilibrium and changes there in; Price elasticity of demand – determinants and computation; Income and cross elasticity of demand; The price elasticity of supply – determinants and Computation; Consumer and Producer Surplus.

Unit II: Theory of Consumer Choice

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of indifference curves; Two extreme examples of indifference curves; Optimization – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and substitution effect; Derivation of demand curve; Three applications – Demand for Giffen goods, wages and labour supply, Interest rate and household saving.

Unit III: The Firm and Market Structures

Cost concepts; Production and costs; The various measures of cost – Fixed and variable cost, average and marginal cost; Cost curves and their shapes; Costs in the short run and in the long run; Economies and diseconomies of scale. Firms in competitive markets – What is a competitive market; Profit maximization and the competitive firm's supply curve; The marginal cost curve and

the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run

Unit IV: The Input Markets

The demand for labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the labour market; Other factors of production: Land and capital; Linkages among factors of production.

Text Book:

- Principles of Economics, Gregory N Mankiw, 6e Cengage Learning India Private Limited, New Delhi

Reference Book:

- Karl E. Case and Ray C. Fair (2007): *Principles of Economics*, 8th Edition, Pearson Education Inc.

Discipline Specific Core Paper II

PRINCIPLES OF MICROECONOMICS II

Introduction:

The course is designed to provide a sound training in microeconomic theory to formally analyze the behavior of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts; this course looks at the behavior of the consumer and the producer and also covers the behavior of a competitive firm.

Unit I: Consumer Theory I

Preferences and Utility, Axioms of Rational Choice, Utility, Trades and Substitutions, Indifference curves; Mathematics of Indifference curves, Utility functions for specific preferences, the many good case; Utility Maximization and choice: the 2-good case (graphical analysis), the n-good case, Indirect utility function, the Lump sum principle, Expenditure minimization, properties of expenditure function.

Unit II: Consumer Theory II

The income and substitution effects: Demand function, changes in income, changes in a goods price- Direct and Indirect Approaches (Slutsky), the Individual's Demand Curve, Compensated (Hicksian) demand curves and functions, demand elasticity, Consumer Surplus, Demand relationships among goods, the 2-good case, substitutes and complements, Net (Hicksian) substitutes, and Complements, Substitutability with many goods.

Unit III: Production Theory and Costs

Production Functions: Marginal productivity, Production with One Variable Input (labour) and with Two-Variable Inputs, Isoquant Maps and the Rate of Technical Substitution, Returns to Scale, Elasticity of Substitution, Some Simple Production Functions: Linear, Fixed Proportions, Cobb-Duglas; Technical Progress.
Definition of Cost and its properties, Cost minimizing input choices (Optimisation principles, expansion path), Cost Functions and Shift in Cost Curves, Long-Run versus Short-Run Cost Curves.

Unit IV: Profit Maximization

The Nature and Behavior of Firms, Marginal Revenue – Relationship between Average and marginal revenue, Short-Run Supply by a Price-Taking Firm, Profit Functions and its Properties, Profit maximization – General conditions, Input demands.

Text Book:

- C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India

Reference Books:

- H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems

Discipline Specific Core Paper III

PRINCIPLES OF MACROECONOMICS I

Introduction:
This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.

Unit I: Basic Concepts in Macroeconomics

Macro vs. Micro Economics; Limitations of Macroeconomics ; Stock and Flow variables, Equilibrium and Disequilibrium, Partial and General Equilibrium Statics – Comparative Statics and Dynamics ; National Income Concepts – GDP, GNP, NDP and NNP at market price, factor cost, real and nominal; Disposable personal Income;

Unit II: Measurement of Macroeconomic Variables

Output, Income and Expenditure Approaches ; Difficulties of Estimating National Income; National Income Identities in a simple 2- sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-sector; economies; National Income and Economic Welfare; Green Accounting.

Unit III: Money and Changes in its Value

Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices
Inflation – Meaning, Causes, and Anti-Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Inflationary Gap, Deflation- Meaning, Causes, and Anti-Deflationary Measurers, Depression and Stagflation; Inflation vs. Deflation

Unit IV: Determination of National Income

The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption- Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier

Text Book:

N. Gregory Mankiw (2010):*Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi

Reference Book:

Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.

Discipline Specific Core Paper IV

PRINCIPLES OF MACROECONOMICS II

Introduction:
This course introduces the students to formal modeling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.

Unit I: Consumption and Investment

Consumption – Income Relationship, Propensities to Consume and the Fundamental Psychological Law of Consumption; Implications of Keynesian Consumption Function; Factors Influencing

Consumption Function; Measures to Raise Consumption Function; Absolute, Relative, Permanent and Life – Cycle Hypotheses
Autonomous and Induced Investment, Residential and Inventory Investment, Determinants of Business Fixed Investment, Decision to Invest and MEC, Accelerator and MEI, Theories of Investment.

Unit II: Demand for and Supply of Money

Demand for Money – Classical, Neoclassical and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications, Supply of Money – Classical and Keynesian Approaches, The Theory of Money Supply Determination and Money Multiplier, Measures of Money Supply in India

Unit III: Aggregate Demand and Aggregate Supply
Derivation of Aggregate Demand and Aggregate Supply Curves in the IS-LM Framework; Nature and Shape of IS and LM curves; Interaction of IS and LM curves and Determination of Employment, Output, Prices and Investment; Changes in IS and LM curves and their Implications for Equilibrium

Unit IV: Inflation, Unemployment and Expectations, and Trade Cycles

Inflation – Unemployment Trade off and the Phillips Curve – Short run and Long run Analysis; Adaptive and Rational Expectations; The Policy Ineffectiveness Debate; Meaning and Characteristics of Trade Cycles; Hawtrey's Monetary Theory, Hayek's Over-investment Theory and Keynes' views on Trade Cycles

Text Book:

- N. Gregory Mankiw (2010): *Macroeconomics*, 7th edition, Cengage Learning India Private Limited, New Delhi

Reference Book:

- Richard T. Froyen (2005): *Macroeconomics*, 2nd Edition, Pearson Education Asia, New Delhi.

Discipline Specific Elective Paper I
DSE Group I
(A student has to choose any one from group I under DSE-1)

1. ECONOMIC DEVELOPMENT AND POLICY IN INDIA

Introduction: : This paper introduces the students to the essentials of Indian economy with an intention of understanding the basic feature of the Indian economy and its planning process. It also aids in developing an insight into the agricultural and industrial development of India. The students will understand the problems and policies relating to the agricultural and industrial sectors of India and current challenges of Indian economy.

Unit I: Introduction to Indian Economy and Current Challenges

Colonialism & British Rule: Exploitation and under-development in India; Basic features of India Economy; Indian Economy as a developing economy; Demographic trends in India - Size and growth of population, Occupational structure, Sex composition, Age structure and demographic dividend; Causes of population growth and population policy; The problem of unemployment and recent policies for employment generation; the problem of inequality in income distribution and its causes, Policies to address inequality.

Unit II: Indian Agriculture

Role of agriculture in Indian Economy; Cause of low productivity, Green Revolution and Land Reforms, Agricultural Finance-Sources and Problems; Agricultural Marketing in India

Unit III: Industrial Development in India

Role of Industrialization in Indian Economy; Small Scale & Cottage Industries: Meaning, Role, Problems and Remedies; Industrial Policies of 1948,1956,1977 and1991; Problems of Industrial Development in India; Industrial Sickness

Unit IV: Service Sector in India

Growth & Contribution to GDP; Composition and relative importance of service sector; Factors determining growth of the sector; ICT and IT – Spread and Policy; Sustainability of services led growth

Text Book:

- Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya Publishing House, Mumbai

Reference Book

- Dutt R. and Sundharam K. P. M. *Indian Economy*. S. Chand & Company Ltd., New Delhi.

Discipline Specific Elective Paper I

2. ECONOMIC HISTORY OF INDIA 1857-1947

Introduction:

This course analyses key aspects of Indian economic development during the second half of British colonial rule. In doing so, it investigates the place of the Indian economy in the wider colonial context, and the mechanisms that linked economic development in India to the compulsions of colonial rule. This course links directly to the course on India‘s economic development after independence in 1947.

Unit I: Colonial India: Background and Introduction

Overview of colonial economy, Macro trends in national Income; population; occupational structure

Unit II: Agriculture

Agrarian structure and land relations; agricultural markets and institutions – credit, commerce and technology; trends in performance and productivity; famines

Unit III: Railways and Industry

Railways; the de-industrialization debate; evolution of entrepreneurial and industrial structure; nature of industrialization in the interwar period; constraints to industrial breakthrough; labor relations

Unit IV: Economy and State in the Imperial Context

The imperial priorities and the Indian economy; drain of wealth; international trade, capital flows and the colonial economy – changes and continuities; government and fiscal policy

Text Book:

- Tirthankar Roy, *The Economic History of India 1857-1947*, Oxford University Press, 3rd edition, 2011.

Discipline Specific Elective Paper II
DSE Group II
(A student has to choose any one from group II under DSE - 2)

1. ODISHA ECONOMY

Introduction

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in Odisha in pre- and post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in Odisha, the reading list will have to be updated annually.

Unit I: Odisha Economy before 1947

Orissa's Economy in the Nineteenth Century: Benevolence or Exploitation, Forces of Nature, Animal Power, The Company Steps in, Public Works and Public Health, Education, Disintegration of Village Economy, New Social Environment, Changing Position of Social Classes, The

Moneylenders, The Borrowers, Money-flows from Village to Metropolis, Pauperization of Peasantry, The Wage Earners, Demographic Changes, Profiting from Rural Adversity; Diarchy in 1919 and Separation of Provincial Finances from Central Government in 1937; Emergence of Federal Finance (Ref.: Das 1976a and 1976b, GoO 2016).

Unit II: Macro Economy of Odisha

A macro glance of Odisha economy: aggregate income, broad sectoral decomposition, performance of districts, employment, child labour and bonded labour, employment programmes, consumption expenditure, cost of living; Odisha State public finances (Chapter 14 and 15 of Ref 1; & Chapter 2 and 9 of Ref 2)

Unit III: Agriculture, Industry, Infrastructure and Environment in Odisha

Agriculture: land ownership and land tenure, agricultural wages and rural unemployment, production and productivity of major crops, agricultural inputs, agricultural policy; Animal Husbandry; Fisheries (Chapter 1 to 3 of Ref 1; & Chapter 3 of Ref 2)
Industry: Investment, industrial policy, and the growth of large industries, mining and quarrying; Construction; tertiary sector: tourism, transport and power; Water Resources, Forest Resources (Chapter 4 to 8 of Ref 1; & Chapter 4 & 5 of Ref 2)

Unit IV: Social Sector in Odisha

Poverty: income poverty and inequality; health sector: outcomes, infrastructure, finance, public health, NRHM; education: Literacy, Primary education, secondary education, higher education, SSA; human development (Chapter 9 to 13 of Ref 1; & Chapter 7 & 8 of Ref 2)

Text Book:

- Nayak, P., Panda, S. C., Pattanaik, P. K. (2016): The Economy of Odisha: A Profile, Oxford University Press, New Delhi

Reference Book:

1. GoO (Latest): Odisha Economic Survey, Planning and Convergence Department, Directorate of Economics and Statistics, Government of Odisha, Bhubaneswar
2. GoO (2004): *Human Development Report 2004 Orissa*, Planning and Coordination Department, Government of Odisha, Bhubaneswar
3. GoO (2018): 80 Years Odisha Budget: Commemorative Volume, Department of Finance, Bhubaneswar

Discipline Specific Elective Paper II

2. MONEY AND BANKING

Introduction: This paper intends to explain the ideas and institutions concerning money and banking. It will help the students to understand the meaning, functions and theories of money the working of different types of banks in an economy.

Unit I: Money

Money: Meaning, functions and classification; Gresham's law; Monetary standards: Metallic and paper systems of note issue; Value of money: (Uses and limitations of index number); Construction of price index number – its limitations.

Unit II: Quantity theory of money

Quantity theory of money - Cash transaction approach, cash balance approach, Keynesian approach; Inflation: meaning, types, causes – demand pull and cost push, effects, measures to control inflation, Trade-off between inflation and unemployment; Stagflation and deflation: meaning; Phillip's curve.

Unit III: Banking

Banking: meaning and types; Commercial banks: evolution, functions, the process of credit creation and its limitations, liabilities and assets of banks; A critical appraisal of the progress of commercial banking in India after nationalization; Recent reforms in banking sector in India

Unit IV: Central Bank

Central Bank: Functions, Quantitative and qualitative methods of credit control - bank rate policy, open market operations, variable reserve ratio and selective methods; Relative efficacy of quantitative and qualitative methods of credit control.
Reserve Bank of India: Role and functions; Repo rate and reverse repo rate; Components of money supply in India; Objectives and limitations of monetary policy with special reference to India

Text Book:

- Paul R.R. (2017) Money Banking and Public Finance, Kalyani Publishers

Reference Book:

- Reserve Bank of India – The Reserve Bank of India, functions and working, Bombay, 1983.

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SKILL ENHANCEMENT COURSES (SEC)

Optional for SECC II paper

Total Marks- 100

Skill Enhancement Courses (SECC II Option-I)

DATA ANALYSIS AND COMPUTER APPLICATION

Introduction:
The purpose of this course is to introduce basic computer skills to students at UG level in non-technical subjects. After completion of this course, the students are expected to acquire some basic knowledge about computers and to develop some basic skills in using computers for data storage, compilation, analysis and presentation.

Unit I: Introduction to Computers and Networks

Introduction to computer- Components of Computer System, concepts of Hardware and Software, Classifications of computers; Concepts of data processing, Basic data types, Storage of data/Information as files, operating system and The User Interface (windows, Linux), Windows Setting- Control Panels, Accessories (windows)
Basic of Computer networks- LAN and WAN, Internet, Service on Internet; WWW and Web Browsers, Web Browsing software, Surfing the Internet, Chatting on Internet, Email-Basic of electronic mail, Using Emails, Document handling in Email.

Unit II: Basic Word Processing

Introduction to Word Processing, Opening Word Processing Package, Opening and closing documents, Using a Document/Help Wizard, Text Creation and Manipulation, Formatting the Text, Handling Multiple Documents, Table Manipulation, Printing, saving documents in different formats

Unit III: Spreadsheets and Basic Data Analysis

Spread Sheet, Elements of Electronics Spread Sheet, Application/usage of Electronic Spread Sheet, Manipulation of cells, Formulas and functions; Spread sheets for Small accountings- maintaining invoices/budgets, basic practical data analysis works (Maintaining daily and monthly sales reports)

Unit IV: Basic Presentations
Basics- Difference between presentation and document, Using Power Point, Creation of Presentation, Preparation of Slides, Selection of type of Slides, Importing text from word documents, Providing aesthetics- Slide Designs, Slide Manipulation and Slide Show, Presentation of the Slides

Text Book:

- C.S. French "Data Processing and Information Technology", BPB Publications 1998

Reference Books:

- P.K Sinha, Computer Fundamentals, BPB Publications, 1992

Skill Enhancement Courses (SECC II Option-II)

FINANCIAL ECONOMICS

Introduction:

This course intends to explain the ideas on financial system in India. It will help the students to enhance their knowledge on concepts like financial institutions, instruments and markets, their functioning and usage in real world.

Unit I: Financial System

The structure of the financial system- Functions of the financial sector-Indicators of financial development; Financial System and Economic Development; financial inclusion: concept and its evolution; policy initiatives on financial inclusion.

Unit II: Interest Rate Policy

Theories of interest rate determination-Level of interest rates-Long period and short period rates-Administered interest rates; Deregulation of interest rates; financial sector reforms in India.

Unit III: Money and Capital Market

Money Market: features; objectives; and importance of money market; composition of money market; money market institutions and instruments; features and problems of Indian money market. Capital market: composition; Primary and secondary market for securities. Functions of new issue and secondary market; organizations of stock exchanges in India; defects in Indian stock exchange; SEBI; its objectives and functions

Unit IV: Non-Banking Financial Companies

Non-Banking Financial Companies: Hire purchase Companies-Venture Capital Companies. Insurance Sector: objectives, functions, life insurance and general insurance; IRDA and its role and functions in financial markets.

Text Book:

- L.M.Bhole: Financial institutions and Market, Tata McGraw hill, New Delhi.

Reference Books:

- Gorden & Natrajan: Financial Market and institutions, Himalaya Publishing house.

HISTORY

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for non History students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm: 20 Marks, End term: 80 Marks Total – 100 marks
Credit per paper – 6

Teaching hours per paper – 50 hours (Theory) + 10 hours (Tutorial)

Core Paper I

HISTORY OF INDIA- I

Unit-I: Reconstructing Ancient Indian History

1. Early Indian notions of History
2. Sources of Historical Writings
3. Historical Geography (Major Harappan Sites and Sixteen Mahajanapadas).

Unit-II: Pre-historic Hunter-Gatherers and Food Production

1. Paleolithic Culture: Upper, Middle and Lower; Tool making habit
2. Mesolithic Culture: New developments in Technology and Economy;
3. Neolithic and Chalcolithic Settlements
4. Food Production : Beginning of Agriculture

Unit-III: The Harappan Civilization

1. Origins; Settlement Patterns and Town Planning;
2. Economic Life: Agriculture, Craft Productions and Trade;
3. Social and Political Organization; Religious Beliefs and Practices; Art;

Unit-IV: Cultures in Transition

1. Early Vedic Age: Society. Polity, Religion and Literature
2. Later Vedic Age: Social Stratification (Varna and Gender), Polity, Religion, and Culture

Reading List:

1. R. S. Sharma, Material Culture and Social Formations in Ancient India, 1983.
2. Upinder Singh, A History of Ancient and Early Medieval India.

Suggested Reading:

1. Romila Thapar, Early India: From Beginning to 1300 CE, Penguin.
2. A.L. Basham, The Wonder that was India, Vol.1
3. B. Fagan, Digging from the Earth
4. H.D. Sankhalia, Prehistory of India.
5. B.R. Alchin, The Birth of Indian Civilization.

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Core Paper II

SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD

Unit-I:

1. Evolution of Man;
2. Paleolithic Cultures
3. Mesolithic Cultures.

Unit-II: Neolithic Culture:

1. Food Production
2. Development of Agriculture
3. Animal Husbandry

Unit-III: Bronze Age Civilizations

1. Egypt
2. Mesopotamia (Sumeria & Babylonia)
3. China (Shang)

Unit-IV: Ancient Greece:

1. Athens and Sparta
2. Politics, Economic
3. Culture

Reading List:

1. Burns and Ralph. World Civilizations, Vol. A.
2. V. Gordon Childe, What Happened in History?

Suggested Reading:

1. G. Clark, World Prehistory: A New Perspective.
2. Bisman Basu, The Story of Man
3. H.Neil & M.C.Willam, A World of History, Oxford, New York, 1907.
4. H.R. Hall, Ancient History of the Near East, 1932.
5. H.S. Baghela, World of Civilization

Core Paper III

HISTORY OF INDIA-II (300BCE-750CE)

Unit-I: Economy and Society (circa 300 BCE to circa CE 300):

1. Expansion of Agrarian Economy: Production relations.
2. Urban growth: Trade & Commerce
3. Social stratification: Class, Varna, Jati, Gender

Unit-II: Changing political formations (circa 300 BCE to circa CE 300):

1. The Mauryan Empire: Chandragupta Maurya and Asoka-Conquest and Administration
2. Post-Mauryan Polities: Kushanas, and Satavahanas
3. The Cholas

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Unit-III: Towards Early Medieval India [circa CE fourth century to CE 750]:

1. Gupta Age: Agrarian Expansion, Land Grants, Graded Land Rights and Peasantry.
2. Varna, Proliferation of Jatis: changing norms of marriage and property.
3. The Nature of Polities: The Gupta Empire
4. Post- Gupta Polities - Pallavas, Chalukyas, and Vardhanas

Unit-IV: Religion, Culture, Philosophy and Society

1. Consolidation of the Brahmanical Tradition: Dharma, Varnashram, Purusharthas,
2. Buddhism: Hinayan and Mahayana
3. Jainism: It's major Priniples
4. Development of Art and Architecture: Mauryan, and Gupta

Reading List:

1. D. D. Kosambi, An Introduction to the Study of Indian History, 1975.
2. A. L. Basham, Wonder That Was India, Rupa.

Suggested Reading:

1. Romila Thapar, Early India: From the Origins to 1300, 2002.
2. Dharma Kumar and Irfan Habib, Cambridge Economic History of India, vol-I.
3. Romila Thapar, Ancient India.
4. K.M. Ashraf, Life and Condition of the People of Hindustan.
5. D.N. Jha (ed.), Feudal Social Formation in Early India.

Core Paper IV

SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD

Unit-I: Polity and Economy in Ancient Rome

1. Polity and Empire in Ancient Rome
2. Crises of the Roman Empire-Rise and fall of Julius Caesar
3. Agrarian Economy
4. Urbanization and Trade

Unit-II: Economic Developments in Europe from 7th to 14th Centuries:

1. Agricultural Production
2. Towns and Trade,
3. Feudalism- Origin, Growth and Decline

Unit-III: Religion and Culture in Medieval Europe:

1. Medieval Church,
2. Monastic Communities
3. Papacy

Unit-IV: Societies in Central Islamic Lands:

1. The Tribal background, Rise of Islam; Rise of Sultanates
2. Religious Developments: the Origins of Shariah,

Reading List:

1. Perry Anderson, Passages from Antiquity to Feudalism.
2. Marc Bloch, Feudal Society, 2 Vols.

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Suggested Reading:

1. J. Barrawclough, The Medieval Papacy.
2. Cambridge History of Islam, 2 Vol.
3. Will Durant, The Story of Civilization (vols. I & II).
4. T.W. Wallbank & N.M. Bailey, Civilization –Past and Present.
5. R. Coulborne, Feudalism in History.

Core Paper V
HISTORY OF INDIA-III (c. 750 -1206)

Unit –I: Studying Early Medieval India: Political Structures

1. Sources: Literary and Archaeology
2. Evolution of Political structures: Rajputs and Cholas
3. Legitimization of Kingship; Brahmanas and Temples
4. Arab conquest of Sindh: Causes and Impact

Unit-II: Agrarian Structure and Social Change:

1. Agricultural Expansion; Crops
2. Landlords and Peasants
3. Proliferation of Castes
4. Peasantization of Tribes

Unit-III: Trade and Commerce:

1. Inter-regional Trade
2. Maritime Trade and Forms of Exchange
3. Process of Urbanization
4. Merchant Guilds of South India

Unit-IV: Religious and Cultural Developments:

1. Puranic Traditions; Buddhism and Jainism
2. Islamic Intellectual Traditions: Al-Biruni
3. Regional Languages and Literature
4. Art and Architecture: Evolution of Regional styles: Kalingan and Dravidian style of Temple Architecture

Reading List:

1. B.D. Chattopadhyaya, The Making of Early Medieval India.
2. R.S. Sharma and K.M. Shrimali, (eds), Comprehensive History of India, Vol. IV (A & B).

Suggested Reading:

1. Satish Chandra, Medieval India, Vol. I, Har Anand.
2. D. D. Koasambi, The Culture and Civilization of Ancient India: In Historical outline New Delhi; Vikas 1971.5th Print.
3. K. A. Nilakantha Sastri, The Colas, South Indian History.
4. Mittal, Socio-Cultural History of India.
5. R.C.Majumdar (ed) History and Culture of Indian people. Bombay; Bharatiya Vidya Bhavan 1960.Relevant Vol.

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Core Paper VI

RISE OF THE MODERN WEST - I

Unit-I: Transition from feudalism to capitalism:

1. The problems of Transition: Economic Expansion, Industrial production
2. Trade and Commerce
3. Urban Development, Town Life

Unit-II: Early Colonial Expansion:

1. Motives, Voyages and Explorations.
2. The Conquests of America
3. Mining and Plantation, The African Slaves.

Unit-III: Renaissance and Reformation:

1. Its Social Roots Spread of Humanism in Europe.
2. The Renaissance: Art, Architecture, Sculpture, Painting and Literature
3. Origins and Spread of Reformation Movements.
4. Emergence of European State system: Spain, France, England, Russia

Unit-IV: Economic Developments of the Sixteenth Century:

1. Shift of economic balance from the Mediterranean to the Atlantic.
2. Commercial Revolution- Causes and Nature
3. Growth of Industries and its Impact

Reading List:

1. Charles A. Nauert, Humanism and the Culture of the Renaissance (1996).
2. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 û1600.

Suggested Reading:

1. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.
2. F. Rice, The Foundation of Early Modern Europe.
3. Toynbee, A.J, A Study of History (12 volumes).
4. Maurice Dobb, Transition from Feudalism to Capitalism.
5. Wallbank, T.W. & Bailey, N.M. Civilization: Past and Present.

Core Paper VII

HISTORY OF INDIA IV (c.1206 - 1526)

Unit-I: Sultanate: Political Structures

1. Survey of Sources: (a) Persian Tarikh Tradition, (b) Vernacular Histories; (c) Epigraphy.
2. Consolidation of the Sultanate of Delhi: Balban, Alauddin Khaljis and Mahammad-bin Tughluqs.
3. Theories of kingship: The Ruling Elites: Ulema, Sufis and the Imperial Monuments

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Unit-II: Emergence of Regional Identities

1. Bahamanis, Vijayanagar and Odisha.
2. Regional Art, Architecture and Literature in Vijayanagar and Odisha

Unit-III: Society and Economy:

1. Iqta and the Revenue-free Grants.
2. Agricultural production, Technology.
3. Market Regulations, Growth of Urban Centers.
4. Trade and Commerce, Indian Overseas Trade.

Unit-IV: Religion, Society and Culture:

1. Sufi Silsilas: Chishtis and Suhrawardis; doctrines and practices, Social roles
2. Bhakti Movements and Monotheistic Traditions: Kabir, Nanak, Ravidas and Sri Chaitanya.
3. Social Impact of the Bhakti Tradition: Rise of Liberal Thought, Ideology of Equality and Gender Relations

Reading List:

1. Satish Chandra, Medieval India, Vol. I, Har Anand Publications, New Delhi.
2. J.L. Mehta, An Advanced Study of the History of Mevieval India, Vol.I.

Suggested Reading:

1. Irfan Habib, Medieval India: The Study of a Civilization, NBT, New Delhi.
2. ABM Habibullah, The Foundation of Muslim Rule in India.
3. SBP Nigam, Nobility under the Sultans of Delhi.
4. R.P. Tripathy, Some Aspects of Muslim Administration in India.
5. R.S.Sharma, Early Medieval Indian Society: Orient Blackswan 2001.

Core Paper VIII
RISE OF THE MODERN WEST - II

Unit-I: The English Revolution and European politics in the 18th century:

1. Background: Socio-Economic and Political Crisis in 17th Century Europe.
2. Major Issues-Political and Intellectual Currents;
3. Parliamentary Monarchy;
4. Patterns of Absolutism in Europe

Unit-II: Rise of Modern Science

1. Development of Science from Renaissance to the 17th century
2. Impact of Modern Science on European society

Unit-III: Mercantilism and European Economics

1. Origin and spread of Mercantilism
2. Impact of Mercantilism on European economy
3. Agricultural and Scientific Background to the Industrial Revolution

Unit-IV: The American Revolution

1. Political currents
2. Socio-Economic Issues
3. Significance of the American Revolution

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Reading List:

1. H. Butterfield, The Origins of Modern Science.
2. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.

Suggested Reading:

1. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 - 1600.
2. C.A Fisher, History of Modern Europe.
3. F. Rice, The Foundation of Early Modern Europe
4. David Thomson, Europe since Napoleon, Pelican Books, 1985
5. Swain, J.E., A History of World Civilization, Eurasia Publishing House Pvt. Ltd., New Delhi, 1994

Core Paper IX
HISTORY OF INDIA V (c. 1526 - 1750)

Unit-I: Establishment of Mughal rule:

1. India on the eve of advent of the Mughals
2. Military Technology: Fire Arms,
3. Sher Shah: Administrative and Revenue Reforms

Unit-II: Consolidation of Mughal rule:

1. Incorporation of Rajputs and other Indigenous Groups in Mughal Nobility
2. Evolution of Administrative Institutions: zabti, mansab, jagir,madad-i-maash
3. Emergence of the Marathas; Shivaji; Expansion under the Peshwas

Unit-III: Society and Economy:

1. Land rights and Revenue system: Zamindars and Peasants
2. Trade Routes and patterns of Internal Commerce; overseas trade
3. Urban Centres, Craft and Technology

Unit-IV:Cultural ideals:

1. Religious tolerance and sulh-i-kul; Sufi mystical and Intellectual Interventions
2. Art and Architecture
3. Mughal and Rajput Paintings: Themes and Perspectives

Reading List:

1. J.L. Mehta, An Advanced Study of the History of Mevieval India, Vol.II.
2. Satish Chandra, Medieval India, vol.2, Har Anand Publications, New Delhi.

Suggested Reading:

1. Irfan Habib, Agrarian System of Mughal India, 1526-1707.
2. A.B.Pandey, Later Medieval Period.
3. R.P.Tripathi, Rise and Fall of the Mughal Empire
4. S.Nurul Hassan, Thoughts on Agrarian Relations in Mughal India.
5. Ishwari Prasad, Life and Times of Humayun.

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Core Paper X
HISTORICAL THEORIES & METHODS

Unit-I: Meaning and Scope of History

1. Definition, Nature and Scope of History.
2. Object and Value of History.
3. History, Science and Morality.

Unit-II: Traditions of Historical Writing

1. Ancient Greek Traditions – Herodotus, Thucydides
2. Ancient Roman Traditions - Polybius, Livy and Tacitus
3. Medieval Understanding: Western – St. Augustine, Arabic – Ibn Khaldun.

Unit-III: History as Interdisciplinary Practice

1. History and Archaeology, History and Anthropology.
2. History and Psychology, History and Literature.
3. History and Political Science

Unit-IV: Historical Methods

1. Sources of History: Written, Oral. Visual & Archaeological.
2. Historical facts.
3. Historical Causation.
4. Historical Objectivity

Reading List:

1. B. Sheik Ali, History: Its Theory and Method, Macmillan, Reprinted, 1996.
2. E. H. Carr, What is History? , Penguine Books, Reprinted, 1983.

Suggested Reading:

1. E. Sreedharan, A Text Book of Historiography, Orient Longman, Reprinted, 2004.
2. Marc Bloch, The Historians Craft.
3. R.G. Collingwood, The Idea of History
4. G.T.Reiner, History: Its Purpose and Method.
5. K.Rajayyan, History: it's Theory & Method

Core Paper XI
History of Modern Europe- I (c. 1780-1880)

Unit-I: The French Revolution (1789):

1. Socio, Religious, Economic and Political Conditions
2. Intellectual Currents.
3. Role of the Middle Classes

Unit-II: Revolution and its European Repercussions:

1. National Constituent Assembly
2. National Legislative Assembly
3. Napoleonic Consolidation- Reform and Empire

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Unit-III: Restoration and Revolution: c. 1815 - 1848:

1. Congress of Vienna Restoration of old Hierarchies
2. Revolutionary and Radical Movements-

   A) July Revolution (1830) and
   B) February Revolution (1848)

Unit-IV: Socio-Economic Transformation and Remaking of States (Late 18th Century to Late 19th Century)

1. Process of Capitalist Development: Agrarian and Industrial Revolutions in England and German States.
2. Evolution of Social Classes: Land Owners, Peasantry: Bourgeoisie and Proletariat
3. Popular Movements and the Formation of National Identities in Germany and Italy, Ireland

Reading List:

1. T.S. Hamerow, Restoration, Revolution and Reaction: Economics and Politics in Germany.[1815 - 1871].
2. Anthony Wood, History of Europe, 1815 to 1960 (1983).

Suggested Reading:

1. E.J. Hobsbawm, Nations and Nationalism.
2. A .Wesley Rohem, The Record of Mankind, Health and Company, Boston, 1952.
3. CMD Ketelbey, History of Modern Times since 1789, OUP, 2009.
4. David Thomson, Europe since Napoleon, Pelican Books, 1985.
5. Edward Mac Nall Burns et al, World Civilizations, vols. A,B,C,Goyal Saab, New Delhi.

Core Paper XII
HISTORY OF INDIA VII (c. 1750 - 1857)

Unit-I: Expansion and Consolidation of Colonial Power:

1. Foreign Trade and Early forms of Economic Exploitations in Bengal
2. Dynamics of Expansion, with special reference to Bengal, Mysore and Odisha

Unit-II: Colonial State and Ideology:

1. Arms of the Colonial state: army, Police, Law.
2. Imperial Ideology: Orientalism and Utilitarianism
3. Education: Indigenous and Modern.

Unit-III: Economy and Society:

1. Land revenue systems- Permanet, Ryotwari and Mahalwari.
2. Commercialization of Agriculture- Consequences
3. Drain of Wealth- Causes and Consequences
4. Growth of Modern Industry

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Unit-IV: Popular Resistance:

1. Santhal Uprising (1856-57)
2. Indigo Rebellion (1860)
3. Movement of 1857- Causes and Consequences

Reading List:

1. Dharma Kumar and Tapan Raychaudhuri, (ed.)., The Cambridge Economic History of India, Vol. II.
2. Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's Struggle for Independence.

Suggested Reading:

1. Sumit Sarkar, Modern India (1885-1947), Mac Milan.
2. A.R.Desai, Social Background of Indian Nationalism
3. R. Vlyanovsky, Agrarian India between the World Wars.
4. Sekhar Bondhapadhaya, From Plessey to Partition.
5. G.Kaushal, Economic History of India, 1757-1956

Core Paper XIII

C.C. XIII: HISTORY OF INDIA VIII (c. 1857 - 1950)

Unit-I: Cultural Changes, Socio and Religious Reform Movements:

1. The advent of Printing and its Implications
2. Reform and Revival: Brahmo Samaj, Arya Samaj, Aligarh Movement.
3. Emancipation of Women, Sanskritization and Anti-Caste Movements

Unit-II: Nationalism: Trends up to 1919:

1. Political Ideology and Organizations, Formation of INC
2. Moderates and Extremists.
3. Swedish Movement
4. Revolutionaries

Unit-III: Gandhian Nationalism after 1919: Ideas and Movements:

1. Mahatma Gandhi: His Perspectives and Methods
2. Non- Cooperation, Civil Disobedience, Quit India,
3. Subhas Chandra Bose and INA
4. Nationalism and Social Groups: Peasants, Tribes, Dalits and Women

Unit-IV: Communalism and Partition:

1. Ideologies and Practices, Muslim League
2. Hindu Maha Sabha
3. Partition and Independence
4. Making of the Constitution

Reading List:

1. Sumit Sarkar, Modern India, 1885-1947.
2. Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's, Struggle for Independence, Penguin

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Suggested Reading:

1. Sekhar Bandopadhyaya, From Plessey to Partition
2. N.S. Bose, Indian Awakening and Bengal
3. A. R. Desai, Social Background of Indian Nationalism, Popular, Bombay.
4. S.Gopal, British Policy in India, 1858-1905.
5. Bipan Chandra, Indian National Movement.

Core Paper XIV

HISTORY OF MODERN EUROPE II (c. 1880 - 1939)

Unit-I: Liberal Democracy, Working Class Movements and Socialism in the 19th and 20th Centuries:

1. The Struggle for Parliamentary Democracy and Civil Liberties in Britain.
2. Forms of Protest during early Capitalism: Food Riots in France and England: Luddites and Chartism.
3. Early Socialist Thought; Marxian Socialism

Unit-II: The Crisis of Feudalism in Russia and Experiments in Socialism:

1. Emancipation of Serfs
2. Revolutions of 1905; the Bolshevik Revolution of 1917.
3. Programme of Socialist Construction.

Unit-III: Imperialism, War, and Crisis: c. 1880-1939:

1. Growth of Militarism; Power Blocks and Alliances: Expansion of European Empires –First World War (1914 – 1918)
2. Fascism and Nazism.
3. The Spanish Civil War.
4. Origins of the Second World War.

Unit-IV: Intellectual Developments since circa 1850: Major Intellectual Trends:

1. Mass Education and Extension of Literacy.
2. Institutionalization of Disciplines: History, Sociology and Anthropology.
3. Darwin and Freud.

Reading List:

1. C.M. Cipolla, Fontana Economic History of Europe, Volume II the Present (1981). I : The Industrial Revolution.
2. T.S. Hamerow, Restoration, Revolution and Reaction: Economics and Politics in Germany [1815 - 1871].

Suggested Reading:

1. George Lichtheim, A Short History of Socialism.
2. K.B. Keswani, International Relations in Modern World (1990-1995).
3. C.D.M. Ketelby, A History of Modern Times.
4. Carr.E.H., International Relations between the Two World Wars, 1919-1939, New York, 1966.
5. Garden Green Wood, The Modern World –A History of Our Times.

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Discipline Specific Elective Paper-1

History and Culture of Orissa - I

Units: I

1. Historical Geography: Kalinga, Utkal, Kosal
2. Kalinga War (261 B.C.) and its Significance.
3. Kharavela –Career and Achievements

Unit: II

1. Matharas and Eastern Gangas and Sailodbhavas
2. Bhaumakaras
3. Somavamsis

Unit: III

1. Imperial Gangas
2. Suryavamsi Gajapatis
3. Post- Gajapati Political developments upto 1568.

Unit: IV

1. Social and Cultural Life in Early and Medieval Odisha
2. Growth and Decay of Urban Centres
3. Trade and Commerce
4. Taxation and Land Revenue

Reading List:

1. K.C. Panigrahi, History of Odisha, Kitab Mahal.
2. Sahu, Mishra & Sahu, History of Odisha.

Suggested Reading:

1. S.K. Panda, Political and Cultural History of Odisha.
2. A. C Pradhan, A Study of History of Orissa
3. B.K. Mallik, etal (eds) Odia Identity, Page Maker Publications, Bhubaneswar, 2019.
4. R. D Banarjee, History of Orissa, 2 vols.
5. M.N. Das(ed), Sidelights on History and Culture of Orissa, Vidyapuri,Cuttack, 1977

Discipline Specific Elective Paper-II

History and Culture of Orissa -II

Units: I

1. Afghan Conquest and Mughal Rule in Odisha- Administration
2. Maratha rule in Odisha – Administration
3. British Occupation and Early Colonial Administration: Land Revenue, Salt Policy, Jail and Police Administration.

Unit: II

1. Resistance Movements: Ghumsar Rebellion, Paik rebellion, Revolt of 1857 and Surendra Sai, Keonjhar Uprisings.
2. Famine of 1866 – Causes and Consequences
3. Growth of Education and Language Movement

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Unit: III

1. Growth of Nationalism
2. Formation of Separate Province of Orissa.
3. Prajamandal Movement

Unit: IV

1. Nationalist Politics in Odisha
2. Quit India Movement
3. Merger of Princely States

Reading List:

1. P.K. Mishra & J.K. Samal, A Comprehensive History and Culture of Orissa- Vol. I & II.
2. A. C. Pradhan, Sidelights on Freedom Struggle in Orissa.

Suggested Reading:

1. K.M. Patra, Freedom Struggle in Odisha.
2. J.K.Samal, Orissa under the British Crown.
3. K.M.Patra, Orissa State Legislature & Freedom Struggle.
4. B.C. Ray, Orissa under the Mughals, Punthi Pustak.
5. B.C. Ray, Orissa under the Marathas, Punthi Pustak.

Discipline Specific Elective Paper-III

History and Culture of Odisha - III

Unit: I

1. Buddhism in Odisha
2. Jainism in Odisha
3. Shaivism in Odisha

Unit: II

1. Saktism and Tantricism in Odisha
2. Growth of Vaishnavism in Odisha and Cult of Jagannath
3. Growth of Odia Literature : Sarala Mahabharata
4. Pancha-Sakha Literature

Unit: III

1. Buddhist Art and Architecture
2. Jaina Art
3. Evolution of Temple Architecture -Parsurameswar, Mukteswar, Lingaraja, Jagannath and Konarka

Unit: IV

1. Christian Missionaries – Education and Health
2. Mahima Movement and its Impact
3. Neo-Hindu Movements – Brahmo, Arya Samaj.

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Reading List:

1. A.C. Pradhan, A Study of the History of Odisha, Panchasheel.
2. B.K. Mallik, Paradigm of Dissent and Protest :- Social Movements in Eastern India (1400-1700 AD)

Suggested Reading:

1. K.S. Behera,Temples of Orissa.
2. P.K. Mishra(ed), Comprehensive History and Culture of Orissa, Vol-I Pt. II.
3. N.K. Bose, Canons of Orissan Architecture
4. M.N. Das (ed), Sidelights on History and Culture of Orissa.
5. N.K. Sahu, Buddhism in Orissa.

Discipline Specific Elective Paper-IV (Optional/ Project)

History of Contemporary Odisha (1947-1980)

Unit I: Political Developments

1. Second Congress Ministry (1946-1950):

a) Integration of Princely States with Odisha
b) New Capital
c) Hirakud Dam Project

2. Years of Uncertainties (1950-1980)

a) Third Congress Ministry and Abolition of Zamindary System
b) Biju Patnaik's First Ministry Achievements

Unit II: United Political Initiatives

1. Coalition Politics- Achievements and Challenges
   a) R.N. Singdeo,
   b) Sadasiba Tripathy

2. Panchayati Raj Institutions-Its Working and Impacts.
   a) Rural Stages
   b) Urban Stages

Unit III: Economic Development

a) Growth of Industries- Rourkela Steel Plant and Odisha Sponge Iron Ltd.
b) Irrigation and Agricultural Infrastructure
c) Development in Transport and State communication- National and State High Ways in Odisha

Unit IV: Social Developments and Problems

a) Government Community Development Programmes- Its Impact
b) Peasant Movements: Causes and Effects
c) Growth of Art and Craft: Raghunathpur, Pipli and Bargarh

Reading List:

1. Hemant K. Mohapatra, Odisara Etihasha (Odia), Friends Publishers, Cuttack, 2019.
2. Sukadeva Nanda, Coalition Politics in Odisha, Sterling Publishers, Delhi.

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Suggested Reading:

1. Sunit Ghosh, Orissa in Turmoil: A Study in Political Developments, Bookland International, Bhubaneswar, 1991.
2. Basant Das, Odisha Rajanitira Gopan Katha (Odia), Anusandhan Publication, Bhubaneswar, 2001.
3. B.B. Jena & J.K. Baral (eds), Government and Politics in Orissa, Print House (India), Lucknow, 1988.
4. Chittaranjan Das, Nabakrushna Chaudhury, NBT, New Delhi.
5. Dasarathi Bhuyan, Orissa Politics: From 1936 to Contemporary Politics, Mangalam Publishers, New Delhi, 2010.

OR

Project Report

The Students may be allotted topics of their interest in the beginning of 5th Semester Classes. They may write the Project Reports on local History and Culture, local personalities with their significant contribution to change the Society and economy with historical perspective containing up to 50 double spaced typed pages. The students may consult the sources like local archaeology, manuscripts, community documents, oral traditions, oral narratives, local biographies and family sources for writing the project dissertation. The Teachers will guide the students to complete their Project assignments. The students may be allowed to fill up their forms after their submission of the projects assigned to them. The student has to secure fifty percent of marks from the evaluation of the project and fifty percent of the marks in the viva voce test which are compulsory.

Generic Elective Paper I
History of India - I (Early Times to 1750)

Unit – I : Reconstructing Ancient Indian History

1. Sources of Historical Writings.
2. Vedic Age : Society, Polity and Culture
3. Buddhism and Jainism : Principles and Impact

Unit – II : Polity and Administration

1. The Mauryan Empire : Conquest and Administration
2. Gupta Society : Land Grants, Peasantry and beginning of Feudal Society
3. Gupta Polity : Conquests and Administration
4. Harshavardhan : Achievements

Unit – III: Early Medieval Society, Economy and Culture

1. Post Gupta Trade and Commerce
2. Delhi Sultanate : Conquests and Administration
3. Bhakti and Sufi Movements in India
4. Development of Regional Language and Literature

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Unit – IV: India on the eve of the advent of the Mughals

1. Sher Shah : Administration and Reforms
2. Mughal Administrative Institutions : Zabti, Mansab and Jagir
3. Religious Tolerance Sulh-i- Kul
4. Mughal Art and Architecture

Reading List:

1. Upindra Singh, History of Ancient & Early Medieval India.
2. Romila Thappar, The Early India

Suggested Reading:

1. Irfan Habib, Medieval India, NBT, New Delhi
2. R.S. Sharma, India's Ancient Past
3. S.A.A. Rizri, Wonder that was India, Vol.II, Rupa
4. Cultural Heritage of India, Bharatiya Vidyabhaban Series, Vol-1-IV
5. A.L. Basheon (ed), Cultural History of India, OUP, New Delhi, 2011

Generic Elective Paper II

History of India - II (1750-1950)

Unit – I Foundation and Expansion of British Rule

1. Battle of Plessey (1757) and Conquest of Bengal
2. Conquest of Mysore and Maharashtra
3. Expansion through Diplomacy : Subsidiary Alliance and Doctrine of Lapse

Unit – II Consolidation of British Rule and Indian Responses

1. Peasant & Tribal Resistance against British Rule: Sanyasi Reballion (1763); Kondh Rebellion in Ghumusar, Santal Rebellion
2. Revolt of 1857 : Nature and Significance
3. Land Revenue Settlements : Permanent Settlement, Ryotwari and Mahalwari Settlement

Unit – III – Social and Cultural Policies

1. Socio-Religious Reform Movements: Brahmo Samaj, Arya Samaj, Theosophical Society, Aligarh Movement.
2. Growth of Press and Education
3. Issues of Caste and Gender : Jyotiba Phule- Women Question and Issues, Depressed Class.

Unit – IV – Indian National Movement

1. Politics of Moderates and Extremists (1885-1920)
2. Gandhian Mass Movements (Non-Cooperation, Civil Disobedience and Quit India Movements), (1920-1940)
3. Communal Politics and Partition
4. Making of the Democratic Constitution

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Reference

1. A.R. Desai, Social Background of Indian Nationalism, Popular, Mumbai
2. Priyadarshi Kar, Comprehensive History of Modern India.

Suggested Reading:

1. Sumit Sarkar, Modern India : 1885-1947, Mac Millon.
2. B.R.Mani, Debrahminising History: Dominance and Resistance in Indian Society, Manohar, New Delhi, First Published 2005.
3. Chandra Bharil, Social and Political Ideas of B.R.Ambedkar, Aalekh Publishers, Jaipur, 1977.
4. Sumit Sarkar, Modern India (1885-1947), Mac Millan, Delhi, First Published 1983.
5. Hirendra N.Mukherjee, Gandhi, Ambedkar and the Extirpation of Untouchablility, PPT, New Delhi.

Generic Elective Paper III
RISE OF THE MODERN WEST - I

Unit-I: Transition from feudalism to capitalism:

4. The problems of Transition: Economic Expansion, Industrial production
5. Trade and Commerce
6. Urban Development, Town Life

Unit-II: Early Colonial Expansion:

4. Motives, Voyages and Explorations.
5. The Conquests of America
6. Mining and Plantation, The African Slaves.

Unit-III: Renaissance and Reformation:

5. Its Social Roots Spread of Humanism in Europe.
6. The Renaissance: Art, Architecture, Sculpture, Painting and Literature
7. Origins and Spread of Reformation Movements.
8. Emergence of European State system: Spain, France, England, Russia

Unit-IV: Economic Developments of the Sixteenth Century:

4. Shift of economic balance from the Mediterranean to the Atlantic.
5. Commercial Revolution- Causes and Nature
6. Growth of Industries and its Impact

Reading List:

3. Charles A. Nauert, Humanism and the Culture of the Renaissance (1996).
4. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 û1600.

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Suggested Reading:

6. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.
7. F. Rice, The Foundation of Early Modern Europe.
8. Toynbee, A.J, A Study of History (12 volumes).
9. Maurice Dobb, Transition from Feudalism to Capitalism.
10. Wallbank, T.W. & Bailey, N.M. Civilization: Past and Present.

Generic Elective Paper IV

G.E. IV: RISE OF THE MODERN WEST - II

Unit-I: The English Revolution and European politics in the 18th century:

5. Background: Socio-Economic and Political Crisis in 17th Century Europe.
6. Major Issues-Political and Intellectual Currents;
7. Parliamentary Monarchy;
8. Patterns of Absolutism in Europe

Unit-II: Rise of Modern Science

3. Development of Science from Renaissance to the 17th century
4. Impact of Modern Science on European society

Unit-III: Mercantilism and European Economics

4. Origin and spread of Mercantilism
5. Impact of Mercantilism on European economy
6. Agricultural and Scientific Background to the Industrial Revolution

Unit-IV: The American Revolution

4. Political currents
5. Socio-Economic Issues
6. Significance of the American Revolution

Reading List:

3. H. Butterfield, The Origins of Modern Science.
4. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.

Suggested Reading:

6. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 - 1600.
7. C.A Fisher, History of Modern Europe.
8. F. Rice, The Foundation of Early Modern Europe
9. David Thomson, Europe since Napoleon, Pelican Books, 1985
10. Swain, J.E., A History of World Civilization, Eurasia Publishing House Pvt. Ltd., New Delhi, 1994

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