Program outcomes, program specific outcomes and course outcomes for all programs offered by the Institution

Kirori Mal College offered the courses based on Learning Outcomes-based Curriculum Framework (LOCF) for the B.A.(Hons.)/B.Sc. (Hons.)./ B.A.(Prog.)/B.Sc. (Prog.)./B.Com (Hons.)/ B.Com.(Prog.) approved by University of Delhi. It provides a broad structural framework that can accommodate the current curricular needs as well as gives sufficient flexibility to include changes in content that assume importance as the frontiers of courses grow. The inherent flexibility in framework allows design of course basket in tune with individual preferences. The basic uniformity in core course design ensures smooth movement across universities in the country.

1. Department of Bengali

B.A. (Prog.) Course:

- B.A. (Program) Bengali course is designed to develop communication skills in the chosen language and help to acquire a broad understanding of the society, history and culture within which the language has developed and are used.
- Integrate knowledge of social and political institutions, historical events, and cultural movements into the acquisition of the ability.
- Enable students to attain the linguistic skill for domain specific writings and critical writings.
- Provide students with the competences necessary to immediately enter professional life for a variety of employment opportunities (in translation, interpretation, creative writing, official writing, print and electronic media and in other emerging areas where knowledge of a language is either required or seen as an advantage).

Semester-I:

(i) Bengali-A: Bangla Byakaran Parichay
(ii) Bengali-C: Bangla Byakaran Parichay
(iii) Bengali Discipline: Bangla Sahityer Itihas, Chanda O chitrokolpo.

Program outcomes:

- These courses would enlighten the students on the topic such as Dhawani, Barna, Pada etc.
- The students could be able to understand and analyze the basic knowledge of Bengali language.
- These courses will enable students to understand various social and literary movements and literature of ancient and medieval Bengal. This course will also help students to understand prosody and imagery of Bengali Poetry.
- It is impossible for a student of literature to know tha vast number of written-literature intricately in a particular language. History of Literature will let the students know and study about the outline of Bengali literature and its development from time to time with special reference to its background.

Semester-II:

(i) Bengali-A: Bangla Byakaran Parichay
(ii) Bengali-C: Bangla Byakaran Parichay
(iii) Bengali Discipline: Bangla Sahityer Itihas O Alankar

Program outcomes:

- These courses would enlighten the students on the topic such as Dhawani, Barna, Pada etc.
- The students could be able to understand and analyze the basic knowledge of Bengali language.
- By studying these papers, the students will know the social and political history of Bengal during this period, which led to the creation of a whole bunch of literary works. They will also be able to appreciate the major achievements Bengali prose, essay and literary journals in the 19^{th} -20^{th} century.

Semester-III:

(i) Bengali-A: History of Indian Language (Bengali)
(ii) Bengali Discipline: Novel and Short Stories
(iii) Skill Enhancement Course: Language in Advertisement

Program outcomes:

- Students would be able to understand the Phonology, Morphology and Syntax of Bengali language and able to understand to the definition of language and its' varieties and the linguistic features of Bengali.
- Students who have just passed the 12th standard examination will be introduced to the abundance of their literature and they will be expected to know after going through these papers that studying literature is not only to read some novels and stories but they have to inculcate the habit of working and research of the given literature. Students will be able to study the development of their society and culture through literature.
- Students will enable to understand the basic features of advertisement, types of advertisement, advertisement and society and the ability to create advertisement.

Semester-IV:

- Bengali-A: History of Indian Language (Bengali)
- Bengali Discipline: Poetry & Plays
- Skill Enhancement Course: Language in Film

Program outcomes:

- Students would be able to understand the Phonology, Morphology and Syntax of Bengali language and able to understand to the definition of language and its' varieties and the linguistic features of Bengali.
- Students will be able to follow the development of Bengali Poetry from the 14th century to the contemporary time with a through reading of some of the masterpieces of different phases.
- Students will have an understanding of the history of film and the techniques of filmmaking, which they would be able to use in film-criticism and screenplay writing.

Semester-V:

- Bengali DSE: Science Fiction & Fantasy
- Skill Enhancement Course: Language in Printing and Publishing

Program outcomes:

- Students will be enabled to understand the history of printing in India, editing, preparation of books, proofreading etc.
- Students will be guided to read and discuss the concept of Popular literature and its' genres. They would also understand the features of Science fiction and would be able to critical appreciate selected Bengali Science fictions.

Semester-VI:

- Bengali DSE: Children's Literature
- Skill Enhancement Course: Mass Communication and Journalism

Program outcomes:

- Students will be guided to read and discuss the concept of Popular literature and its' genres. They would also understand the features of Children's Literature and would be able to critical appreciate selected Bengali Children's Literature.
- These courses will enable the students to understand the basic features of Mass Communication, News, News Paper, News writing, Editing and Interviewing.

2. Department of Botany

B.Sc. Botany (Hons.) Course:

- B.Sc. (Hons) Botany offer essential knowledge and technical skills to study plants in a holistic manner. Students would be trained in all areas of plant biology using a unique combination of core and elective papers with significant inter-disciplinary components. It imparts knowledge on various fields of plant biology through teaching, interactions and practical classes.
- Combination of Theoretical and Practical components will provide comprehensive information and insight into the Biodiversity ranging from Microbes (Viruses and Bacteria), to Fungi, including diverse plant groups (Algae and Archegoniates-Bryophytes, Pteridophytes and Gymnosperms).
- The organization of cell, cell organelles and biomolecules so that students can understand the various metabolic processes such as respiration, photosynthesis etc. which are important for life.
- Understanding of biotechnological processes such as recombinant DNA technology
- Understanding of plant classification systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various plants groups.
- Understanding of various analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and the use of transgenic technologies for basic and applied research in plants

Semester I:

Core Course: 1- Microbiology and Phycology

Course Outcomes

- After studying this paper students gain the knowledge of diversity of life forms from ancestors to evolved form, life cycles of microbes, Physiochemical and biological properties, characteristics, classification and reproduction in Virus and Bacteria.
- The knowledge of various plants and animal diseases caused by these microbes is also provided to the students.
- Use of microbes in industry, agriculture and medicine especially in vaccination.
- The second part includes diverse genera of algae its classification, characteristic features, cell structure and growth and reproduction in various groups of marine and fresh water algae and their ecological and economic importance.
- Evolutionary aspect of algae from single cell to filament to colonial form and evolution of pigment and chlorophyll. The applied part of the paper strengthens the practical aspect about the use and importance of the microbes and algae in agriculture, industry, environment and biotechnology**.**
- In the practical through diagrams and models structure of various types of Virus and Bacteria and their mode of reproduction was taught.
- Hand on experience was given about the gram staining of bacteria from curd and root nodules.
- Morphology, general characters and life-cycles of *Chlamydomonas, Volvox, Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus* and *Polysiphonia.*

Core Course: 2- Biomolecules and Cell Biology

Course outcomes

- The students will gain foundational knowledge about the relationship between the properties of macromolecules, their cellular activities and biological responses and understanding the molecular structure of biomolecules and their role in cell.
- Understanding the concept of “Cell as a fundamental unit of Life” Differentiating between different types of cells-prokaryotic and eukaryotic, plant and animal cell through Electron micrographs.

- Learning the concept of cell-to-cell communication and membrane transport.
- Understanding the structure, mechanism of action, the role of enzyme in cell and demonstrate their activity in the lab.
- Learning the role of cell wall, understanding the concept of vitality.
- Understanding the organization of cell, its features and regulation at different levels of the cell cycle, the role of regulators in various phases of cell cycle and thus comprehending the cause of cancer.
- Understanding of contemporary approaches in modern cell and molecular biology.

Semester II

Core Course: 3- Mycology and Phytopathology

Course Outcomes

- After studying this paper students will be familiar with various fungal groups, mycorrhiza and lichens, their ecology, classification (Webster and Weber, 2007 in which concept of monophyletic and paraphyletic was given) characteristics, reproduction and economic importance.
- General characters of fungi, parasexual cycle, heterokaryosis, classification of fungi, fungal nutrition is taught to the students in detail.
- Understanding the affinity of fungi with plants, animals and protozoa due to which ICBN (International code of Botanical Nomenclature) has changed to ICN.
- Learning of various types of fruiting bodies in fungi. Different types of Bioluminescent fungi.
- The life cycle of *Chytrids, Rhizopus, Penicillum, Albugo, Phytophthora, Peziza, Saccharomyces, Neurospora, Puccinia, Ustilago, Agaricus* is taught.
- Students learn Mushroom cultivation techniques.
- The course helps in understanding the application of fungi in food industry, secondary metabolites production, mycotoxins, mycoherbicides, myconematicides, biological control agents and medical mycology.
- Students understand phytopathology, host parasite relationships, types of disease, biocontrol agents, systemic fungicides, prevention and control of diseases by various methods. Role of quarantine in disease control, forecast of disease.
- During practical classes, student study many genera and study AM fungi in angiosperm roots which a part of sustainable agriculture used as a biofertilizer.
- Trip to various institutes is organized to make them aware of phytopathology and quarantine methods. This year students visited NBPGR Quarantine lab

Core Course: 4. Archegoniatae

Course Outcomes

- The students become aware of the group of plants that have given rise to land habit and the flowering plants,
- Students are able to understand and comprehend the evolutionary trends in plants and appreciate the relevance of diverse plant groups to environment (ecological significance) and human well-being (economic and importance).
- Hands on training help students to learn use of microscope, mounting, section-cutting and staining techniques for the study of plant materials.
- Making drawings in Practical Records enhances understanding morphological and structural details and related functional aspects in diverse plant groups.
- Use of Illustrations, Photographs, Charts, Permanent Slides, Museum and Herbarium Specimens along with ICT Methods provides an interesting insight into the beautiful world of diverse plant groups.
- Students are able to learn the steps in collecting and processing of the plant material during field study and excursion.

Semester-III:

Core course: 5- Anatomy of Angiosperm

Course outcomes

- Understanding the integrated role of various cells and types of tissues, and tissue system, their development and function in plants.
- Relating the various aspects of growth, development of the tissues and differentiation of various plant organs anatomically.
- Getting the knowledge of basic structure and organization of plant parts in angiosperms with internal basic structure and cellular composition of the plant body.
- Correlating the anatomical structure of the cell with morphology and functions of different plant parts.
- Understanding the commercial importance of the plant parts and its important role in studying systematics, forensics and pharmacognosy.
- Students are encouraged to attend lectures related to the relevant topics.

Core Course: 6- Economic Botany
Course outcomes

- Understanding the economic value of different plants along with the importance of the plant part used.
- Learning and identifying the regional diversity in food crops and other plants and their ethno-botanical importance as well.
- Getting the balanced information of plants used as food, for their important component and able to analyze these components qualitatively by performing micro chemical tests.
- Understanding about the Concept of Centers of Origin, plant introductions and importance of germplasm diversity.

Core Course:7- Genetics
Course outcomes

- This course gives flavor of different branch of genetics; viz, transmission, molecular and population genetics.
- Students learn the classical genetics concept through
  Mendelian and non- Mendelian principles of inheritance.
- Understanding of Chromosomal theory of inheritance; sex determination; Probability and Pedigree analysis
- Deviation from Mendelian principles using examples Incomplete dominance and co-dominance; lethal alleles; Epistasis; Pleiotropy; Polygenic inheritance; epigenetics.
- Learning the extra chromosomal inheritance and maternal inheritance
- Student will learn the concept of linkage and crossing over by solving numerical based on these concepts.
- This course will make them aware of molecular mechanism of mutations, role of transposons and DNA repair mechanisms.
- Students learn Hardy-Weinberg principles, selection of population and concept of speciation.
- Pedigree analysis, human syndromes through karyotypes, and meiosis stages using onion buds are being taught in practical class.
- Oral presentations and assignment enhance the understanding of the concept of gene, allele, allele frequency, heterozygous, homozygous, genotype and phenotype

Skill Enhancement Course I: Intellectual Property Rights (IPR)
Course Outcomes

- Understanding the concept of laws & process of obtaining patent, copyright, trademark, bio-prospecting, biopiracy
- Gaining knowledge of farmers rights and importance of indigenous plant varieties, concept of novelty and biotechnological inventions
- Students are given hand on experience about the check of Plagiarism by Urkund and Plagiarism checker Programme.
- Evaluation done on the basis of class test and presentation. Presentations by students improve their reasoning and communication skills. Presentation is evaluated on the basis of content and understanding of the presentation.

Semester IV:

Core Course: 8- Molecular Biology
Course outcomes

- Enabling in depth knowledge about structure and function of DNA and RNA, organization of DNA in prokaryotes and Eukaryotes.
- Understanding the nature of genetic code, molecular process of DNA replication and transcription.
- Understanding processing and modification of RNA and translation process, function and regulation of expression.
- To develop capabilities for corelating theoretical knowledge and practical application in biotechnology.
- Students will be enriched with knowledge about various high throughput technologies and common laboratory practices used in molecular biology.
- Students will be able to isolate and quantify amount of extracted DNA.
- Understand and comprehend original research papers related to molecular biology.
- Student are assessed by presenting literature/ presentation related to molecular biology.

Core Course:9- Ecology
Course outcomes

- Understanding the basic principles of ecology and phytogeography and various environmental factors that affects the plants.
- Identifying the complex pattern of community, the processes, and functioning till ecosystem level.

- Realizing the complex interrelationship between organisms and environment and able to study vegetation, community patterns and processes, ecosystem functions by adopting various methods.
- Understanding the concept of Ecosystem as a whole and this thinking is very crucial in evolving strategies for sustainable natural resource management and biodiversity conservation.
- Getting proper knowledge of the Flora of Delhi with the help of online field visit and also promoting them to familiarize with local plant species, and to understand community pattern and processes.

Core Course: 10-Plant Systematics

Course Outcomes

- Student will gain the knowledge about the process of plant identification, nomenclature and classification. Students will learn the technique of plant collection, pressing, and herbarium preparation by hands on training.
- The knowledge about important Herbarium of the world, Floras and Manuals is also given to the students.
- By studying the examples from palynology, embryology, molecular biology, phytochemistry students learned the importance of multidisciplinary sciences.
- The Rules, Principles of Nomenclature, Typification, Type method, Rules for rejection of names and author citation gives theoretical knowledge of the concepts.
- Students learn the concept of cultivated varieties and naming of plants.
- The paper provides the understanding of systematic, its importance in bioresource utilization and biodiversity management, Phylogeny and classification systems.
- Study of vegetative and floral characters of the families Ranunculaceae, Brassicaceae, Fabaceace, Myrtaceae, Umbelliferae, Asteraceae, Solanaceae, Euphorbiaceae, Liliaceae and Poaceae helps the students in identifyimg the plants in fields and also differentiating the plants based on the key features.
- Students make edge punched cards on the basis of family features and how to use those cards for identification of family.
- Students get acquainted with flora of college campus as well ridge forest near university gate.
- Students learn the herbarium technique also for preserving the plants.
- As this paper is related to the study of live plants we avoid Power Point Presentation in this paper.

Skill Enhancement Course II: **Medicinal Botany**

Course outcomes

- Understanding and exploring the concept of various system of medicine along with the importance and diverse nature of Indian System of Medicine and importance of the plants as medicine for treating ailments to modern pharmaceuticals.
- Learning and identifying the processes and difficulties involve in manufacturing, promoting and marketing of medicinal plants.
- Understanding Professional and Practical Skills adopted in practical part using importance of plants along with the various combinations.
- Getting practical knowledge and developing entrepreneurship skills to establish value addition products, botanical extracts and isolation of bioactive compounds. aspects of male reproductive parts (Anther structure, pollen development) and female reproductive parts (Ovule, embryo sac development) of a flower; and ways of germline transformation.
- Students are able to understand factors governing Induction of flowering, pollination, and fertilization, endosperm development and; importance of conservation of plants, pollinators and fruit development.
- Alternative pathways of reproduction and their importance.

<u>Semester V:</u>

Core Course: 11-Reproductive Biology of Angiosperms

Course outcomes

- The students understand about molecular and genetic

Core Course: 12-Plant Physiology

Course outcomes

- Understanding the concept of plant functioning, mostly the importance of water, minerals, hormones and light in plant growth and development.
- Correlation of morphology, anatomy, cell structure and biochemistry with plant functioning.
- Students learn short and long distance of transport of food and water through phloem and xylem respectively
- The role of nutrient, soil and mycorrhizae in the plant growth and their deficiency symptoms are taught.
- The overall growth and development of plant and role of different hormones and environmental factors in morphogenesis is taught through experimental demonstration.

Discipline Specific Elective I: Analytical Techniques in Plant Sciences

Course Outcomes

- Understanding of principles and use of light, confocal, transmission and electron microscopy, centrifugation, chromatography and spectrophotometry.
- Gaining the knowledge on various techniques and instruments used for the study of plant biology.
- Evaluation done on the basis of class test and PowerPoint Presentation. Evaluation of presentation is done on the basis of content and effectiveness of the presentation.

Discipline Specific Elective II: Biostatistics

Course outcomes

- Students will appreciate the power of data and understand the importance of data collection.
- Understanding of interpreting the statistical data that is generated during scientific experiments.
- Students will understand the significance of variation, replicates in experiments and the concept of reproducibility of results in biological experiments.
- Students will be enabled to create and interpret graphs.
- Students will be enabled to choose and apply statistical method for analyzing one or two variables.
- Understanding valid inferences that can be used to solve problems in public health, diagnosis, biology etc.
- Students will be enabled to design basic experiment and apply statistical tools.
- Professionally present literature/ presentation related to biostatistics.

Semester VI:

Core Course:13- Plant Metabolism

Course outcomes

- Gaining the knowledge of physiological and biochemical processes in the plant system
- Understanding the concept and significance of metabolic redundancy in plants
- Understanding of regulation and integration of metabolic pathways in plants with reference to crop productivity
- Learning the similarity and differences in metabolic pathways in plants and animals
- Students learn the fundamental concept of two of the most important metabolic processes, i.e, Photosynthesis and Respiration.
- This courses also teaches the lipid, carbohydrate and nitrogen metabolism in plants
- The students learn role of different enzymes in metabolism and are given hands on the demonstration of the activity of some of the enzymes.
- Experiment based on photosynthesis and respiration are included in the course which further enhances the concept of these two processes.

Core Course: 14- Plant Biotechnology

Course Outcomes

- Learning the basic concepts, principles and processes in plant biotechnology
- Having the ability of explanation of concepts, principles and usage of the acquired knowledge in biotechnological, pharmaceutical, medical and agricultural application
- Explaining how biotechnology is used for plant improvement and discuss the biosafety concern and ethical issues.
- Understand various statistics tools used in original research papers.
- The portfolio of skills developed on the programme is also suited to academic research or work within the industry for their future career options.

Discipline Specific Elective III: Industrial and Environmental Microbiology

Course Outcomes

- Understanding the diversity of microbes.
- Gaining knowledge of various types of fermenters and enzyme production.
- Preparation of various types of media. Isolation of microbes from soil and sewage water.
- Hands on experience of study of VAM fungi from roots of angiosperm plants and isolation from soil which is a part of sustainable agriculture.
- Innovative ideas for the production of CO_2 and its estimation by simple method are used instead of using costly chemicals.
- Evaluation done on the basis of class test and Power Point Presentations by students improve their reasoning and communication skills.

Discipline Specific Elective IV: Bioinformatics

Course outcomes

- Understanding the need of storing, retrieving, sharing and analysing data.
- Students will be imparted basic understanding of Bioinformatics and will be able to extract relevant information from available databases.

- To impart capabilities in the students for practical applications of bioinformatics in solving unanswered research questions.
- Students will be enabled with hands on interactive sessions analyse unknown sequences using computer programs to explore new horizons of research.
- Students will be enabled to understand and comprehend concepts and principles of biology with the help of framework and tools developed by computational biology.
- Professionally present literature/ presentation related to bioinformatics research in original research papers.
- The portfolio of skills developed on the programme is also suited to academic research or work within the bioinformatics industry as well as range of commercial settings. They will develop deep sense of interest for their future career options.

Program Outcomes

- Students enrolled in B.Sc. (Program) Life Sciences will study and acquire complete knowledge of disciplinary and allied biological sciences.
- Students should be able to identify, classify and differentiate in biodiversity based on their morphological, anatomical and systemic organization.
- Acquire practical skills in biochemistry and biotechnology.
- Students will be gaining basic experimental skills in genetics, biotechnology, qualitative and quantitative microscopy, and also enzymology that will give them an edge to pursue higher studies.

B.Sc. Life Science (Porgram) Course:

Semester I:

Core Course: 1-Biodiversity

Course outcomes

- Course enabled the students with awareness about Biodiversity ranging from Microbes (Viruses and Bacteria), to Fungi, to various plant groups (Algae and Archegoniates-Bryophytes, Pteridophytes and Gymnosperms); its economic and ecological importance.
- Understanding of basic structure, cellular composition, diversity, life forms, life cycles, morphology and importance of the Bacteria, Viruses, Fungi, Bryophytes and Pteridophytes and Gymnosperms.
- Knowledge of various plant diseases caused by bacteria and fungi, the phytopathology, and control measures.
- Understanding about the line of Plant Evolution, group of plants that have given rise to land habit and the flowering plants on Earth and the consequent Biodiversity.
- Awareness about the threats to biodiversity and need towards Biodiversity Conservation for sustainable development.

Semester-II:

Core Course: 2-Plant Ecology and Taxonomy

Course outcomes

- Course equipped the students with adequate knowledge about basic ecological principles and concepts, environmental factors affecting the plants, basic instruments to study environmental parameters phytogeography and interrelation between the living world and environment.
- Methodical studies related to identification, nomenclature and classification methods of flowering plants and its application for phenology studies, bioresource utilization and biodiversity management.

Semester III:

Core Course: 3-Plant Anatomy and Embryology

Course outcomes

- Course enabled the learners to identify different types of tissues, correlate it with internal architecture, for better understanding of plant physiology and reproductive biology.
- understand how different plant tissue and reproductive organs evolved and modified their structure and functions with respect to their environment.
- to understand the factor governing pollination, fruit set, yield and thus how reproduction plays a significant role in defining population structure, natural diversity and sustainability of ecosystem.
- To evaluate the importance of the various plant parts and its role in systematics, forensics and pharmacognosy studies.

Paper: Plant Physiology and metabolism

Course outcomes

- Course enabled the students to correlate morphology, anatomy, cell structure and biochemistry with plant functions namely the importance of water, minerals, hormones, and light in plant growth and development.
- understand the transport mechanisms and translocation in the phloem, and appreciate the commercial applications of plant physiology.

- to plan, discuss and interpret experiments that can be done for basic understanding and explanation of various physiological phenomenon.

Skill Enhancement Course I: Biofertilizer

Course Outcomes:

- The paper provides the information about general account of microbes used as biofertilizer – *Rhizobium, Azotobacter, Azospirillum, Cyanobacteria.*
- Develop a deep understanding of ecofriendly fertilizers. Enable them to understand the growth and multiplication conditions of useful microbes such as Rhizobium, cyanobacteria, mycorrhizae, *Azotobactor* etc, their role in mineral cycling and nutrition to plants.
- Provide practical knowledge about the technique of bio composting, vermicomposting and organic farming by doing project work.
- The paper gave theoretical knowledge about various ways of recycling of biodegradable municipal, agricultural and industrial wastes. The applicability of VAM fungi as biofertilizer and use of Azolla-Anabaena in rice cultivation

Semester-IV:

Core Course: Plant Physiology and Metabolism

Course outcomes

- Students learn to correlate morphology, anatomy, cell structure and biochemistry with plant functions namely the importance of water, minerals, hormones, and light in plant growth and development.
- Understanding the transport mechanisms and translocation in the phloem and xylem, and appreciate the commercial applications of plant physiology.
- To plan, discuss and interpret experiments that can be done for basic understanding and explanation of various physiological phenomenon.
- Understanding of regulation and integration of metabolic pathways in plants with reference to crop productivity
- Learning the similarity and differences in metabolic pathways in plants and animals
- Students learn the fundamental concept of two of the most important metabolic processes, i.e, Photosynthesis and Respiration.
- The students learn role of different enzymes in metabolism and are given hands on the demonstration of the activity of some of the enzymes.

Semester V:

Discipline Specific Course I: Cell and Molecular Biology

Course outcomes

- Students learn principles of various types of microscopies.
- Understanding concept of biomolecules, existence of life on earth and Prokaryotes and Eukaryotes, Role of nucleic acid its organisation, replication of DNA in Prokaryotes and Eukaryotes.
- Students get acquainted with regulation of protein synthesis, transcription, translation and operon concept and various techniques regarding the isolation of DNA and RNA.
- Students are given hand on experience of preparation of squash from onion root tip.
- Using innovative ideas students learn the measurement of chromosomes from photograph and prepare karyotype of it.
- Evaluation done on the basis of class test and power point presentation.
- Presentations by students improve their reasoning and communication skills. Presentation evaluated on the basis of content, effectiveness of the presentation

Semester VI

Skill Enhancement Course IV-Intellectual Property Rights

Course Outcomes

- Understanding the concept of laws & process of obtaining patent, copyright, trademark, bio-prospecting and biopiracy.
- Gaining knowledge of farmers rights and importance of indigenous plant varieties, traditional knowledge, concept of novelty and biotechnological inventions. Students get to know the rules, regulations infringement under various acts to protect the intellectual property. Become familiar with the rights of the owner of patent or copyright holder.
- Students learn about the concept of plagiarism and also apply the concept in checking their content by using online available programs for the same. This would help them not to use the others work in any way and to become more sensitive and responsible towards their activities. The subject enhances their skill and can be of great importance for their future.

Discipline Specific Elective II: Economic Botany and Biotechnology

Course outcomes

- Understanding the economically importance of plants, their life cycle, processing, plant part used.
- Learning and identifying the important component present in the plants, their nutritional aspects by performing micro chemical test.
- Understanding the concept of biotechnology and well relate the use of it in producing new varieties and in the upgrading the quality and quantity of the desired crop.
- Understanding about the Concept of Centers of Origin of economically important crops

Generic Elective (course offered to other Dept. students):

Semester I:

GE I: Biodiversity

Course outcomes

- Course enabled the students with awareness about Biodiversity ranging from Microbes (Viruses and Bacteria), to Fungi, to various plant groups (Algae and Archegoniates-Bryophytes, Pteridophytes and Gymnosperms); its economic and ecological importance.
- Understanding of basic structure, cellular composition, diversity, life forms, life cycles, morphology and importance of the Bacteria, Viruses, Fungi, Bryophytes and Pteridophytes and Gymnosperms.
- Knowledge of various plant diseases caused by bacteria and fungi, the phytopathology, and control measures.
- Understanding about the line of Plant Evolution, group of plants that have given rise to land habit and the flowering plants on Earth and the consequent Biodiversity.
- Awareness about the threats to biodiversity and need towards Biodiversity Conservation for sustainable development.

Semester-II:

GE II- Plant Ecology and Taxonomy

Course Outcomes

- Course equipped the students with adequate knowledge about basic ecological principles and concepts, environmental factors affecting the plants, basic instruments to study environmental parameters phytogeography and interrelation between the living world and environment.
- Understanding methodical studies related to identification, nomenclature and classification methods of flowering plants and its application for phenology studies, bioresource utilization and biodiversity management.

Semester-III:

GE III- Environmental Biotechnology

Course Outcomes

- Understanding various regional and global concerns regarding the environment and able to identify the different types of environmental issues.
- Identifying the causes and consequences of environmental pollution, pollutants and the way to prevent degradation of environment and management of pollutants.
- Learning the specific roles of chemical, biological and molecular sciences to identify and correct the emerging environmental issues.
- Applying the existing and emerging technologies to eradicate the issues arising due to anthropogenic activity.
- Understanding the national and international legislations, policies and the importance of public participation in Protection of the Environment.

Semester IV:

General Elective II: Economic Botany and Biotechnology

Course Outcomes

- Understanding the economically importance of plants, their life cycle, processing, plant part used.
- Learning and identifying the important component present in the plants, their nutritional aspects by performing micro chemical test.
- Understanding the concept of biotechnology and well relate the use of it in producing new varieties and in the upgrading the quality and quantity of the desired crop.
- Understanding about the Concept of Centers of Origin of economically important crop

3. Department of Chemistry:

B.Sc.(Hons.) Chemistry Course:

- The B.Sc. (Hons.) Chemistry course is a six semester course spread over three academic years. The teaching – learning process involves theory and practical classes and will be student centered.
- Students will be encouraged to carry out short term projects and participate in industrial and institutional visits, seminars and workshops. Assessment will be based on continuous evaluation (class test, presentation, group discussion, quiz, assignment etc.) and end of semester examination. Each theory paper will be of 100 marks out of which 25% marks are for internal assessment while a practical paper will be of 50 marks comprising 50% internal assessment.
- The B.Sc. (Hons) programme in Chemistry is designed to develop in students in depth knowledge of the core concepts and principles that are central to the understanding of this core science discipline. Undergraduates pursuing this programme of study go through laboratory work that specifically develops their quantitative and qualitative skills, provides opportunities for critical thinking and team work, and exposes them to techniques useful for applied areas of scientific study.

INORGANIC SECTION

SEMESTER-I

Paper Name:Chemistry-C I: Inorganic Chemistry-I, Atomic Structure & Chemical Bonding

Key Words: Atomic Structure, Wave function, Quantum Numbers, Electronegativity, Ionic Bonding, Dipole Moment, VSEPR Theory, Covalent Bonding, Multiple Bonding, Molecular Orbitals, Bonding MO, Antibonding MO, Homonuclear, Heteronuclear, Metallic Bonding, Weak Chemical Forces.

Objectives: The topic reviews the structure of the atom, which is a necessary pre-requisite in understanding the nature of chemical bonding in compounds. It provides basic knowledge about ionic, covalent and metallic bonding and explains that chemical bonding is best regarded as a continuum between the three cases. It discusses the periodicity in properties with reference to the s and p block, which is necessary in understanding their group chemistry.

Outcomes: By studying this paper, students will be able to:

- Solve the conceptual questions using the knowledge gained by studying the quantum mechanical model of the atom, quantum numbers, electronic configuration, radial and angular distribution curves, shapes of s, p, and d orbitals, and periodicity in atomic radii, ionic radii, ionization energy and electron affinity of elements.
- Draw the plausible structures and geometries of molecules using Radius Ratio Rules, VSEPR theory and MO diagrams (homo- & hetero-nuclear diatomic molecules).
- Understand the concept of lattice energy using Born-Landé and Kapustinskii expression.
- Explain the conductivity of metals, semiconductors and insulators based on the Band theory.
- Comprehend the importance and application of chemical bonds, inter-molecular and intramolecular weak chemical forces and their effect on melting points, boiling points, solubility and energetics of dissolution.

SEMESTER-III

Paper Name: ***Chemistry-CV: Inorganic Chemistry-II, s- and p-Block Elements***

Keywords: s-block elements, p-block elements, metallurgy, Ellingham Diagram, Zone Refining, Borazine, Silicates, Interhalogen, Pseudo halogen compounds.

Objectives: The topic explain the general principles of metallurgy and s-, p-block elements. It reviews the terms minerals, ores, concentration, benefaction, calcination, roasting, refining, etc. and explains the principles of oxidation and reduction as applied to the extraction procedures. Methods of purification of metals,suchas electrolytic,oxidative refining, Van Arkel-De Boer process and Mond's process are discussed.The applications of thermodynamic concepts like that of Gibbs energy and entropy to the extraction of metals are studied (Ellingham Diagram). It further discusses the patterns and trends exhibited by s and p block elements and their compounds with emphasis on synthesis, structure, bonding and uses.

Outcomes: By studying general principles of metallurgy and s-, p-block elements, students will be able to:

• Learn the fundamenta principles of metallurgy and understand the importance of recovery of by-products during extraction.
• Understand the basic and practical applications in various fields of metals and alloy behaviour and their manufacturing processes.
• Apply the thermodynamic concepts like that of Gibbs energy and entropy to the principles of extraction of metals.
• Understand the periodicity in atomic and ionic radii, electronegativity, ionization energy, electron affinity of elements of the periodic table.
• Understand oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides.
• Understand vital role of sodium, potassium, calcium and magnesium ions in biological systems and the use of caesium in devising photoelectric cells.

SEMESTER- IV

Paper Name:Chemistry-CVIII: Inorganic Chemistry-III, Coordination Chemistry

Keywords: Crystal field theory, Dq, CFSE, Nomenclature, Latimer diagram, Lanthanoids, Magnetic properties.

Objectives: The topic of Coordination Chemistry introduces the students to coordination compounds which find manifold applications in diverse areas like qualitative and quantitative analysis, metallurgy, as catalysts in industrial processes as medicines, paints and pigments as well as in life. The student is also familiarized with the d and f block elements and get an idea about horizontal similarity in a period in addition to vertical similarity in a group.

Outcomes: By the end of studying Coordination Chemistry, students will be able to:

- Understand the terms, ligand, denticity of ligands, chelate, coordination number and use standard rules to name coordination compounds.
- Discuss the various types of isomerism possible in such compounds and understand the types of isomerism possible in a metal complex.
- Use Valence Bond Theory to predict the structure and magnetic behaviour of metal complexes and understand the terms inner and outer orbital complexes
- Explain the meaning of the terms Δo., Δt, pairing energy, CFSE, high spin and low spin and how CFSE affects thermodynamic properties like lattice enthalpy and hydration enthalpy
- Explain magnetic properties and colour of complexes on basis of Crystal Field Theory
- Understand the important properties of transition metals like variable oxidation states, colour, magneticand catalytic properties and use Latimer diagrams to predict and identify species which are reducing, oxidizing and tend to disproportionate and calculate skip step potentials
- Understand reaction mechanisms of coordination compounds and differentiate between kinetic and thermodynamic stability.

SEMESTER-VI

Paper Name: ***Chemistry- CXIII: Inorganic Chemistry - IV, Organometallic Chemistry & Bio-inorganic Chemistry*** **UPC:32171601**

Key Words: Qualitative analysis; solubility products; common ion effect; interfering anion; Organometallic Compounds; carbonyls; 18-electron rule; synergic bonding; IR spectra of carbonyls; Zeise's salt; metal alkyls; ferrocene; Bioinorganic Chemistry; sodium-potassium pump; carboxypeptidase; carbonic anhydrase; haemoglobin, myoglobin; trace metals; metal toxicity; chelates in medicine; cisplatin; homogeneous and heterogeneous catalysis; Ziegler Natta catalyst; Wilkinson's catalyst; Fischer Tropsch process; ZSM 5.

Objectives: The topic introduces some important topics of Inorganic Chemistry in a compact way. Unit 1: introduces students to the basic principles of qualitative inorganic analysis. The influence of solubility products and the common ion effect on the separation of cations is made clear. Interfering anions are identified and their removal is studied. Unit 2:an introduction to the very important area of Organometallic Chemistry including classification of organometallic compounds, the concept of hapticity and the 18-electron rule governing the stability of a wide variety of organometallic species. Specific organometallic compounds are studied in detail to further understand the basic concepts: metal carbonyls, metal alkyls, Zeise's salt and ferrocene. Unit 4 takes this a step further by covering catalysis, an important application of organometallic compounds.

Under Unit 3:Bioinorganic Chemistry, the student learns the importance of inorganic chemical species, especially metals, in biological systems, through discussions on metal-containing enzymes, the sodium-potassium pump and the applications of iron in physiology, including iron transport and storage system.

Outcomes: By the end of this course, students will be able to:

• Understand and explain the basic principles of qualitative inorganic analysis
• Apply 18-electron rule to rationalize the stability of metal carbonyls and related species.
• Understand the nature of Zeise's salt and compare its synergic effect with that of carbonyls.
• Identify important structural features of the metal alkyls tetrameric methyl lithium and dimeric trialkyl aluminium and explain the concept of multicentre bonding in these compounds.
• Diagrammatically explain the working of the sodium-potassium pump in organisms and the factors affecting it and understand and describe the active sites and action cycles of the metalloenzymes carbonic anhydrase and carboxypeptidase.

• Explain the sources and consequences of excess and deficiency of trace metals and learn about the toxicity of certain metal ions, the reasons for toxicity and antidotes.
• Explain the use of chelating agents in medicine and, specifically, the role of cisplatin in cancer therapy and explain the applications of iron in biological systems with particular reference to haemoglobin, myoglobin, ferritin and transferrin.
• Get a general idea of catalysis and describe in detail the mechanism of Wilkinson's catalyst, Zeigler- Natta catalyst and synthetic gasoline manufacture by Fischer-Tropsch process.

DISCIPLINE ELECTIVE COURSES (DSE)

Paper Name:*Chemistry-DSE-1, Novel Inorganic Solids*

Keywords: Solid State Chemistry, Nanomaterials, Solid electrolyte, Inorganic Pigments, Self-assembled, Composite Materials, Instrumentation, Polymers.

Objectives: Novel Inorganic Solids course has found enormous applications in both industrial and research arenas and has helped to shape modern day recyclable adsorbents and catalysts. Novel inorganic-organic hybrid nanocomposites have received a lot of attention because of their abundance and cost-effective nature they can be utilized as catalysts, as a nano reactor to host reactants for synthesis and for the controlled release of biomolecules. Materials such as semiconductors, metals, composites, nanomaterials, carbon or high-tech ceramics make life easier in this era and are great sources of industrial growth and technological changes. Therefore, its exposure to the students can prepare them for future researches.

Outcomes: By studying this course, students will be able to:

• Understand the mechanism of solid-state synthesis.
• Explain about the different characterization techniques and their principle.
• Understand the concept of nanomaterials, their synthesis and properties.
• Explain the mechanism of growth of self-assembled nanostructures.
• Appreciate the existence of bioinorganic nanomaterials.
• Explain the importance of composites, conducting polymers and their applications.
• Understand the usage of solid materials in various instruments, batteries, etc. which would help them to appreciate the real-life importance of these materials.

SKILL-ENHANCEMENT COURSES (SEC)

Paper Name:*Chemistry-SEC-2, Basic Analytical Chemistry* UPC:32173902

Keywords: Analytical chemistry, Sampling, Accuracy, Precision, Significant figures, Soil analysis, Analysis of water, Chromatography, Ion exchange chromatography, Flame photometry.

Objectives: The objective of this course is to make students aware about the importance and the concepts of chemical analysis of water and soil,using separation techniques like chromatography and instrumentation techniques like flame photometry and spectrophotometry.

Outcomes: By the end of this course, students will be able to:

• Handle analytical data
• Determine composition and pH of soil, which can be useful in agriculture
• Do quantitative analysis of metal ions in water
• Separate mixtures using separation techniques
• Estimate macro nutrients using Flame photometry

ORGANIC SECTION

Semester-II

Name of the Paper : Basics and Hydrocarbons

Content in Brief:

The content of this core course Organic Chemistry I has been designed in such a way that it forms a **fundamental part of the learning of organic chemistry** for the succeeding semesters. The given course in this paper gives basic insights regarding the **recapitulation/or rejuvenation of fundamentals of organic chemistry** and also the introduction of visualizing the organic molecules in a three-dimensional space i.e. **stereochemistry of organic molecules**. To further demonstrates the real use of these concepts, the study of **functional groups- alkanes, alkenes, alkynes and aromatic hydrocarbons** has been applied. The given course robustly helps in the learning of the basic concepts and their applications in the field of organic chemistry.

Outcome/Knowledge gain:

After completing the semester-II, students will be able to understand and explain the different nature and behavior of organic compounds based on fundamental concepts that they learnt. They will learn to formulate the mechanism of organic reactions using the fundamental properties of the reactants involved. Further, they will know the mechanisms for Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution reactions. Lastly, but not the least they will understand the fundamental concepts of stereochemistry.

Semester-III

Name of the Paper : Halogenated Hydrocarbons and Oxygen Containing Functional Groups

Content in Brief:

The core course Organic Chemistry II is designed to give a better understanding of the **organic functional group chemistry**. The course includes **halogenated hydrocarbons and oxygen containing functional groups** and their reactivity patterns. Mechanistic pathways for each functional group are discussed to unleash concept of organic transformations or synthesis.

Outcome/Knowledge gain:

The main benefit of learning this paper is to understand preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups. They will use the synthetic chemistry learnt in this course to perform functional group transformations. Also, one can propose plausible mechanisms for any relevant reaction concerning the above said functional groups.

Semester-III

Name of the Paper: Chemistry of Cosmetics and Perfumes

Content in Brief:

This paper has been designed to impart the theoretical and practical knowledge on **basic principles of cosmetic chemistry, manufacture, formulation of various cosmetic products**.

Outcome/Knowledge gain:

Keeping in view the tremendous potential which the cosmetic industry has today around the globe, this course will be useful for introducing students of Chemistry honours to the world of cosmetic chemistry. They learn basic of cosmetics, various cosmetic formulation, ingredients and their roles in cosmetic products and also the use of safe, economic and body-friendly cosmetics.

Semester-IV

Name of the Paper: Nitrogen containing functional groups, Polynuclear Hydrocarbons, Heterocyclic Chemistry, Alkaloids and Terpenes

Content in Brief:

Organic Chemistry III core course contains the details of **Nitrogen containing functional groups** and **introduction of polynuclear hydrocarbons, heterocyclic systems** and **natural compounds *viz.* terpenes and alkaloids**. Representative members of each class were comprehensively taken to understand these topics. The chemical synthesis, properties and reactions of these compounds are discussed in detail. Key applications of each class of compounds in diverse fields have also been discussed.

Outcome/Knowledge gain:

Students gain theoretical understanding of nitrogen containing functional groups, heterocyclics, polynuclear hydrocarbons, alkaloids and terpenes which includes various methods for the synthesis through application of the synthetic organic chemistry concepts learnt so far. They become familiar with their particular properties, chemical reactions, criterion of aromaticity with reference to polynuclear hydrocarbons and heterocyclic compounds, trends in basicity of amines and heterocyclic compounds and their behaviour at different pH.A partly, they also learn practical approach to structural elucidation of organic compounds with specific examples of terpenes and alkaloids. Furthermore, to predict the carbon skeleton of amines and heterocyclic compounds via use of Hoffmann's exhaustive methylation and Emde's modification methods is elaborately taught.

Semester-V

Name of the Paper: Biomolecules UPC: 32171501

Content in Brief:

The core course of this Semester-V gives reader some biological concepts related to **biomolecules i.e., amino acids, peptides, proteins, carbohydrates, lipids and nucleic acids** from the biological systems. It aims to build the **concept of metabolism** by the study of chemistry and energetics of biological system.

Outcome/Knowledge gain:

After learning the above paper, students gain valuable insight regarding the structural aspects of biomolecules which determine their reactivity and biological functions. They also get important conceptual knowledge of heredity through the study of genetic code, replication, transcription and translation. Understanding of metabolic pathways, their inter-relationship, regulation and energy production from biochemical processes were among the key features of this paper.

Semester-V

Course Code: CHEMISTRY –DSE-8 Paper name : Green Chemistry

Content in Brief:

There is rising concern of environmental pollution, depleting resources, climate change, ozone depletion, heaps and heaps of landfills piling up, legislation which is getting stringent with strict environmental laws, rising cost of waste deposits and so on. We are faced with a challenge to work towards sustainable practices. Green chemistry has arisen from these

concerns. It is not a new branch of chemistry but the way chemistry should be practiced. The given paper not only gives **basic fundamental knowledge of green ways** to perform chemistry but also the modern ways/techniques of **preventing the hazardous chemicals and synthetic pathways. Tweleve basic principles of green chemistry, designing a chemical synthesis, real world cases of green chemistry, alternate ways of sustainable energy and some future perspectives** are some of the key topics that are taught in this paper.

Outcome/Knowledge gain:

After studying this paper, students get a better understanding of the twelve principles of green chemistry and impart key knowledge for toxicity, hazard and risk of chemical substances. They learn about atom economy and distinguish it from percentage yield. Also, they learn to design safer chemical, products and processes that are less toxic than current alternatives.

Semester-VI

Name of the Paper: Spectroscopy and Applied Organic Chemistry

Content in Brief:

This paper introduces students to various tools and techniques for **identifying and characterizing the organic compounds** through their interactions with electromagnetic radiation viz. **UV-Visible, IR and NMR spectroscopy**. Also, organic compounds which find applications in day to day life namely; **polymers, dyes, and pharmaceutical compounds** have been comprehensively taught in this paper. The chemistry of these compounds in general is explained through naturally occurring and synthetic compounds.

Outcome/Knowledge gain:

A very important aspect to not only organic chemistry but also to other branches of chemistry is to gain insight into the basic principles of UV, IR and NMR spectroscopic techniques. The use of these spectroscopic techniques to determine structure and stereochemistry of known and unknown compounds is the main goal to learn this technique. Developing such skills give students a sound understanding of the structure of Pharmaceutical Compounds. They also understand the importance of different classes of drugs and their applications for treatment of various diseases. Furthermore, they also learn about the chemistry of natural and synthetic polymers including fabrics and rubbers in this paper. Students also learn about the theory of colour's and constitution as well as the chemistry of dyeing which helps them to inculcate the knowledge of foods and textiles industry.

Concluding benefits of studying Organic papers in BSc H Chemistry course:

B.Sc. Chemistry can offer a wide range of career opportunities in both government and private sector beside higher studies including M.Sc/P.hd and then go for teaching.

B.Sc. graduate in Chemistry having a sound knowledge of Organic chemistry can find a variety of areas/industries like Polymer, oil and petrochemicals, pharmaceuticals, soap and detergents, perfume, cosmetics, agricultural/fertilizers, medicines/healthcare etc. where they can attain new heights in their careers.

B.Sc. (H) PhysicalChemistry

The curriculum of B.Sc. (H) Chemistry offer Physical Chemistry papers (Core Courses) in all the six semesters.The programme includes Core Courses and Elective Courses. The Core Courses are all compulsory courses. There are three types of Elective Courses – Discipline Specific Elective (DSE), Generic Elective (GE), Skill Enhancement Courses (SEC). All the Physical Chemistry papers are having defined objectives and Learning Outcomes, which will help the students to broaden their skills in the field of chemistry and interdisciplinary areas. The courses will train students with detailed theoretical and experimental knowledge that suits the need of academics and industry.

SEMESTER-I

Paper Name:Chemistry-C I: Physical Chemistry-I, States of Matter and Ionic Equilibria

Content (in brief):

I. Gaseous State: States of matter, ideal/real gases, Kinetic Theory of Gases, Maxwell-Boltzmann Equation, critical constants

II. Liquid State: viscosity, surface tension

III. Solid State: Symmetry, Crystal lattice/Systems, X-ray diffraction, Bragg's law, Liquid Crystals

IV. Ionic Equilibrium: Electrolytes, solubility product, pH, indicator, buffer solutions

Objectives: The topicaims to develop basic and advance concepts regarding the three states of matter, to derive the expressions for determining the physical properties of gases, liquids andsolids and to study the concept of ionization in aqueous solution, pH, buffers and various applications of ionization.

Outcomes:At the end of this course, the students should be able to

- Explain the difference between solid, liquid and gases in terms of intermolecular interactions
- Derive mathematical expressions for different properties of gas, liquid and solids and understand their physical significance.

- Explain the crystal structure and calculate related properties of cubic systems.
- Explain the concept of ionization of electrolytes with emphasis on weak acid and base and hydrolysis of salt.
- Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses and everyday life.
- Explain buffers and use them in different experiments.

SEMESTER-II

Paper Name: ***Chemistry-C IV: Physical Chemistry-II, Chemical Thermodynamics and its Applications***

Keywords:Laws of Thermodynamics, State/Path Functions, Heat, Thermal equilibrium, Spontaneity, Work Function, Entropy, Chemical Potential, Free Energy, Partial Molar Quantities, Le Chatelier's Principle, Colligative Properties

Objectives: The aim of this course is to make students understand thermodynamic concepts, terminology, propertiesof thermodynamic systems, laws of thermodynamics and their correlation with other branches of physicalchemistry and make them able to apply thermodynamic concepts to the system of variable compositions,equilibrium and colligative properties.

Outcomes:At the end of this course, the students should be able to

- Understand the three laws of thermodynamics, concept of State and Path functions, extensive and intensive properties.
- Derive the expressions of ΔU, ΔH, ΔS, ΔG, ΔA for ideal gases under different conditions.
- Explain the concept of partial molar properties.
- Derive the expression of equilibrium constants.
- Explain the thermodynamic basis of colligative properties.

SEMESTER- III

Paper Name:Chemistry-CVII: Physical Chemistry-III, Phase Equilibria and Electrochemical Cells

Keywords: I. Phase equilibrium: Degree of freedom, Gibbs Phase Rule, Eutectic, Congruent and Incongruent Melting Point mixtures, Binary Liquids, CST, Fractional Distillation

II. Electrochemistry: Electrode potential, Galvanic cell, Battery, Fuel Cells, Nernst Equation

III. Surface chemistry: surface phenomenon, adsorption isotherms, BET Equation.

Objectives: The aim of this course is to make students understand phase, co-existence of phases, phase diagram,CST and distribution law and concepts of electrochemical cells, electrode potential, electrochemicalseries and learn about surface phenomenon, adsorption isotherms, BET Equation.

Outcomes: At the end of this course, the students should be able to

- Explain the terms of electrochemistry, cell battery, corrosion and happenings in surroundings.
- Understand and apply the concept of Fuel Cells
- Explain phase equilibrium, criteria, CST, Gibbs-Duhem-MargulesEqn
- Apply the principle of fractional distillation in industries
  Apply the knowledge to the separation of polymers from solvents

SEMESTER-IV

Paper Name: ***Chemistry- CX: Physical Chemistry - IV, Conductance and Chemical Kinetics***

Key Words:I. Conductance: Conductance, Transference Number, anomaly of strong electrolytes, laws governing migration of ions in solutions and application of conductance measurement for titration methods

II. Chemical Kinetics: Order and molecularity of a reaction, Rate law, Elementary and Complex Reactions, Reaction mechanism, Steady state Principle. Activation Energy, Collision theory of reaction rates, Lindemann mechanism, qualitative treatment of the theory of absolute reaction rates.

III. Catalysis: specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces. Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis.

IV. Photochemistry: Jablonski Diagram. Lambert-Beer's law, Laws of photochemistry, quantum yield, actinometry, photostationary states, chemiluminescence.

Objectives:This course aims to make the students understand conductance, anomaly of strong electrolytes, lawsgoverning migration of ions in solutions and application of conductance measurement for titrationmethods and have understanding of kinetics of chemical reaction, catalysis and photochemical reactions.

Outcomes:At the end of this course, the students should be able to

- Understand the concept of ionic dissociation and types of electrolytes.
- tell about laws governing migration of ions in solutions, various ways of quantifying conductance and its experimental determination
- apply this knowledge in determining important parameters like solubility product, dissociation constants
- apply the conductance measurements in studying properties of soil and water.
- define rate of reactions and the factors that affect the rates of reaction
- understand the concept of rate laws e.g., order, molecularity, half-life etc. and their determination
- learn about various theories of reaction rates and how these account for experimental observations.
- able to deduce rate laws from reaction mechanisms thereby grasping the concepts of elementary and complex reactions and chain reactions, steady state approximation and rate determining step.
- understand the mechanism of catalytic action on reactions for homogeneous, surface catalyzed and enzyme catalyzed reactions.
- learn about the laws of absorption of light energy by molecules and the subsequent photochemical reactions.
- understand the concept of quantum efficiency and mechanisms of photochemical reactions.

SEMESTER- V

Paper Name:Chemistry-C XII: Physical Chemistry-V, Quantum Chemistry and Spectroscopy

Content (in brief):

I. Quantum Chemistry: limitations of classical mechanics, Quantum mechanics, Operators, postulates of quantum chemistry, Schrodinger equation, Hydrogen like atoms, Approximation methods

II. Spectroscopy: Understand the basis of molecular spectroscopy and its applications. Rotational, Vibrational, Electronic, Raman and NMR Spectroscopy.

Objectives: The aim of this course is to make students understand the limitations of classical mechanics and the needof quantum chemistry, familiarize them with postulates of quantum chemistry and apply the same toderive equations for various models and hydrogen atoms.Understand the basis of molecularspectroscopy and its applications.

Outcomes: At the end of this course, the students should be able to

- Inadequacy of classical mechanics to deal with microscopic systems.
- Relation between observables and quantum mechanical operators.
- Concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values.
- Application of quantization to spectroscopy.
- Interpretation of various types of spectra and know about their application in structure elucidation

Applications of quantum chemistry to nano-particles, quantum dots, nanotubes etc..

DISCIPLINE ELECTIVE COURSES (DSE)

Paper Name:*Chemistry-DSE-3, Applications of Computers in Chemistry*

Keywords:Hardware, software, programming language, ASCII, BCD, QBASIC, Library commands, mathematical operators, QBASIC commands. Numerical Methods, Strings, Graphics.

Objectives: The aim of this paper is to make the students learn the working of computer and its applications inchemistry via programming language, QBASIC and use of software as a tool to understand chemistryand solve chemistry based problems.

Outcomes:At the end of this course, the students should be able to

- Have knowledge of most commonly used commands and library functions used in QBASIC programming.
- Develop algorithm to solve problems and write corresponding programs in BASIC for performing calculations involved in laboratory experiments and research work.
- Use the numerical methods to perform the differential and integral calculus and apply it to solve various chemistry problems.
- Use various spreadsheet software to perform theoretical calculations and plot graphs

Paper Name:*Chemistry-DSE-6, Polymer Chemistry*

Keywords:Bonding, Texture, Polymerization, Degradation, Polymer solution, Crystallization, Properties, Applications of popular polymers.

Objective: The primary objective of this paper is to help the student to know about the synthesis, properties andapplications of polymers.

Outcomes: At the end of this course, the students should be able to

- Know about history of polymeric materials and their classification
- Learn about different mechanisms of polymerization and also polymerization techniques
- Evaluate kinetic chain length of polymers based on their mechanism
- Differentiate between polymers and copolymers

- Learn about different methods of finding out average molecular weight of polymers
- Differentiate between glass transition temperature (T_g) and crystalline melting point (T_m)
- Determine T_g and T_m
- Know about solid and solution properties of polymers

B.Sc. (Prog.) Analytical Chemistry

B.Sc (Prog.) Analytical Chemistry is a specialized course that offer in Kirori Mal College, Department of Chemistry. It includes specialized papers that is very important for industrial applications. The students studies these papers along with other papers of B.Sc (P) Physical Science and B.Sc (P) Life Science courses. Following are the details of ***specialize papers*** for B.Sc (P) Analytical Chemistry.

Semester I

Name of Paper: ***Basic Principles and Laboratory Operations***

Content in Brief:

- SI Units, Chemical concentrations, Preparing solutions: standard solutions, primary standards, secondary standards.
- Introduction to Analytical Chemistry and Analytical Methods, Laboratory Operations
- Errors in Chemical Analysis

Outcome/knowledge gained:

- Understand about SI units and Learn use of analytical equipments
- Know types of errors in chemical analysis which are very important to eliminate to have accurate results.
- Handle statistical tests of data and tools, Practice of numerical for handling these statistical tools.
- Know safety with chemicals and waste as well as their disposals. It is very important in day to day life as well as a Chemist.

Semester II

Name of Paper: ***Separation Methods I***

Content in Brief:

- Chromatography : Techniques of paper chromatography , Thin layer chromatographySolvent
- Extraction
- Dialysis and membrane filtration

Outcome/knowledge gained:

- Become familiar with fundamental concepts of partition coefficients and their role in achievingseparations across different types of chromatography.
- Develop the core skills to parse existing chromatographic protocols and identify the keyfactors influencing a chromatography experiment.
- Understand the underlying assumptions of the most common chromatographic separationtechniques and approaches to method validation.
- Understand the concept of solubility and their application in separation using distribution law.
- Learn application of dialysis and membrane for various techniques.

Semester III

Name of Paper: ***Quantitative Methods of Analysis***

Content in Brief:

- Gravimetric Analysis
- Centrifugation Methods
- Introduction to Environmental Analysis

Outcome/knowledge gained:

The objective of this course is to make students aware about the gravimetric and volumetric methodsof analysis, various types of titrations, equilibria principles, the Henderson-Hasselbalchequation, various centrifugation methods andenvironmental analysis. At the completion of this course, students should be able to understand:

- Various quantitative methods of analysis like : Gravimetric Analysis , Volumetric methods of analysis, Various Centrifugation Methods, Environmental Analysis

Semester IV
Name of Paper: Separation Methods II
Content in Brief:
1. Column Chromatography
2. High performance liquid chromatography
3. Liquid-liquid partition chromatography
4. Ion-exchange chromatography
5. Gas-liquid chromatography
6.Electrophoretic Techniques
7. Radioisotopic Techniques

Outcome/knowledge gained:
At the end of the course, student should be able to understand various types of separation techniques and their applications. They learn about Electrophoretic techniques, Radioisotopic techniques

Semester V
Name of Paper: Analytical Biochemistry
Content in Brief:
***** Carbohydrates and Proteins *Enzymes *Lipids
# Concept of Energy in Biosystems: Nucleic Acids, Biochemistry of disease

Outcome/knowledge gained:
- Learn how the structure of biomolecules determines their reactivity and biological uses.
- Know basic principles of drug-receptor interaction and structure activity relationship (SAR).
- Know biochemistry of diseases.

Semester VI
Name of Paper: Instrumental Methods of Analysis
Content in Brief:
- An introduction to spectroscopic methods of analysis
  * UV- Visible Spectrophotometry, * IR Spectrophotometry *Atomic Spectroscopy
  * ^{1}H NMR Spectroscopy

Outcome/knowledge gained:
- Spectroscopic methods of analysis
- Principles of UV and Visible spectrophotometry and its applications
- Various components of UV and Visible spectrophotometry
- Single and double beam instruments
- Atomic spectroscopy types and its applications
- ^{1}H NMR instrumentation and its applications

B. Sc (P) Life Science, Physical Science & Analytical Chemistry
The curriculum of B.Sc. (P) Physical Science, Life Science and Analytical Chemistry offer Ino Chemistry papers as Core Courses as well as Skill Enhancement Courses (SEC). The B.Sc. (P) Analytical Chemistry studies few specialize paper of Chemistry in addition to core course and SEC papers. All the Chemistry papers are having defined objectives and Learning Outcomes, which will help the students to broaden their skills in the field of chemistry and interdisciplinary areas. The courses will train students with detailed theoretical and experimental knowledge that suits the need of academics and industry.

INORGANIC SECTION OF CHEMISTRY PAPERS
SEMESTER –I
Name of paper: Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons
Content in Brief:
The course reviews the structure of the atom, which is a necessary pre-requisite in understanding the nature of chemical bonding in compounds. It provides basic knowledge about ionic, covalent and metallic bonding and explains that chemical bonding is best regarded as a continuum between the three cases. It discusses the Periodicity in properties with reference to the s and p block, which is necessary in understanding their group chemistry. The course is also infused with the recapitulation of fundamentals of organic chemistry and the introduction of a new concept of visualizing the organic molecules in a three- dimensional space. To establish the applications of these concepts, the classes of alkanes, alkenes,

alkynes and aromatic hydrocarbons are introduced. The constitution of the course strongly aids in the paramount learning of the concepts and their applications.

Outcomes:

Through this course students gain the knowledge to solve the conceptual questions using the knowledge gained by studying the quantum mechanical model of the atom, quantum numbers, electronic configuration, radial and angular distribution curves, shapes of s, p, and d orbitals, and periodicity in atomic radii, ionic radii, ionization energy and electron affinity of elements. Draw the plausible structures and geometries of molecules using radius ratio rules, VSEPR theory and MO diagrams (homo- & hetero-nuclear diatomic molecules).

- Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
- Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
- Learn and identify many organic reaction mechanisms including free radical substitution, electrophilic addition and electrophilic aromatic substitution.

SEMESTER-IV

Name of Paper: Chemistry of s- and p-Block Elements, States of Matter and Chemical Kinetics

Content in Brief:

The objective of this paper is to provide basic understanding of the fundamental principles of metallurgy through study of the methods of extraction of metals, recovery of the by-products during extraction, applications of metals, alloy behaviour and their manufacturing processes. The course illustrates the diversity and fascination of inorganic chemistry through the study of properties and utilities of s- and p- block elements and their compounds. The students will learn about the properties of ideal and real gases and deviation from ideal behaviour, properties of liquid, types of solids with details about crystal structure. The student will also learn about the reaction rate, order, activation energy and theories of reaction rates.

Outcomes: Understand the chemistry and applications of s- and p-block elements.

- Derive ideal gas law from kinetic theory of gases and explain why the real gases deviate from idealbehaviour.
- Explain Maxwell-Boltzmann distribution, critical constants and viscosity of gases.
- Explain the properties of liquids especially surface tension and viscosity.
- Explain symmetry elements, crystal structure specially NaCl, KCl and CsCl
- Define rate of reactions and the factors that affect the rates of reaction.
- Understand the concept of rate laws e.g., order, molecularity, half-life and their determination
- Learn about various theories of reaction rates and how these account for experimentalobservations.

Name of the Paper: Basic Analytical Chemistry

Content in Brief:

The objective of this course is to make students aware about the importance and the concepts of chemical analysis of water and soilusing separation techniques like chromatography and instrumentation techniques like flame photometry and spectrophotometry.

Outcomes:

- Handle analytical data
- Determine composition and pH of soil, which can be useful in agriculture
- Do quantitative analysis of metal ions in water
- Separate mixtures using separation techniques
- Estimate macro nutrients using Flame photometry

SEMESTER-V

Name of the Paper: Chemistry of d-Block elements, Quantum Chemistry and spectroscopy

Content in Brief:

The objective of this course is to introduce the students to d and f block elements and highlights the concept of horizontal similarity in a period and stresses on their unique properties. It familiarizes them with coordination compounds which find manifold applications in diverse fields. This course also disseminates the concepts and methodology of quantum mechanics, its applications to spectroscopy and establishes relation between structure determination and spectra.

Outcomes:

Understand chemistry of d and f block elements, Latimer diagrams, properties of coordination compounds and VBT and CFT for bonding in coordination compounds

- Understand basic principles of quantum mechanics: operators, eigen values, averages, probability distributions.
- Understand and use basic concepts of microwave, IR and UV-VIS spectroscopy for interpretation of spectra.
- Explain Lambert-Beer's law, quantum efficiency and photochemical processes.

SEMESTER-VI

Name of the Paper: Organometallics, Bio-inorganic chemistry, Polynuclear Hydrocarbons and UV, IR Spectroscopy

Content in Brief:

The purpose of the course is to introduce students to some important 3d metals and their compounds which they are likely to come across. Students learn about organometallic compounds and bioinorganic chemistry which are currently frontier areas of chemistry providing an interface between organic chemistry, inorganic Chemistry and biology.The functional group approach to organic chemistryintroduced in the previous courses is reinforced through the study of the chemistry of carboxylic acids and their derivatives, Amines and diazonium salts, active methylene compounds. The students will also be introduced to the chemistry and applications of polynuclear hydrocarbons and heterocyclic compounds.The learners are introduced to spectroscopy, an important analytical tool which allows identification of organic compounds by correlating their spectra to structure.

Outcomes:

Understand the chemistry and applications of 3d elements including their oxidation states and important properties of the familiar compound's potassium dichromate, potassium permanganate and potassium ferrocyanide

- Use IR data to explain the extent of back bonding in carbonyl complexes
- Get a general idea of toxicity of metal ions through the study of Hg^{2+} and Cd^{2+} in the physiological system
- Understand the fundamentals of functionalgroup chemistry, polynuclear hydrocarbons and heterocyclic compounds through the study of methods of preparation, properties and chemical reactions with underlying mechanism.
- Gain insight into the basic fundamental principles of IR and UV-Vis spectroscopic techniques.
- Use basic theoretical principles underlying UV-visible and IR spectroscopy as a tool for
- functional group identification in organic molecules.

ORGANIC SECTION OF CHEMISTRY PAPERS

Name of Paper: Atomic Structure, Bonding, General Organic Chemistry & AliphaticHydrocarbons

Learning Outcomes:

- Demonstrate important terminology in Organic chemistry, Synthesis, Structure of Organic compounds, their classification, nomenclature, hybridization, stereo chemistry and conformation of aliphatic and aromatic hydrocarbons
- Construct Fisher projection, Newmann, Sawhorse formulas and their interconversion. Access Geometrical isomerism, Cis-trans and Syn anti with CIP rules. Interpretation of optical isomerism, specific rotation, chirality and enantiomers with D/L and R/S designations.
- Compose chemistry of alkanes, alkenes, alkynes with the help of Wurtz, wurtz-fittig and different addition, elimination, substitution reactions.

Name of Paper: Chemical Energetics, Equilibria and Functional Group Organic Chemistry-I

Learning Outcomes:

- Know, recall and explain the fundamental principles of organic chemistry that include chemical reactions, mechanism and properties in the allied field of sciences to solving the basic problems of industry and environment.
- Illustrate Chemical compounds, chemical structures, stereochemistry, and chemical reactions and apply appropriate techniques for lifelong learning skills in society industry.
- Develop the skill for designing the multi-step synthesis of organic compounds for the Industry, society and Environment. Also develop the solutions of synthesis for scientific problems and communicate effectively
- Apply the contextual knowledge of chemical compounds to assess the health issues.

Name of Paper: Solutions, Phase Equilibrium, Conductance, Electrochemistryand Functional Group Organic Chemistry-II

Learning Outcomes:

- Understanding of the various concepts regarding reaction mechanism in organic synthesis.
- The fundamental properties and reactivity of biologically important molecules (e.g. carbohydrates, amines and amino-acids).
- Develop knowledge of various types of reactions involved in multinuclear compounds and familiar with aromatic substitution reaction.

PHYSICAL CHEMISTRY SECTION OF CHEMISTRY PAPERS

Semester II

Name of paper: Chemical Energetics, Equilibria and Functional Group Organic Chemistry

Content in Brief: objective of this paper is to develop basic understanding of the chemical energetics, laws of thermodynamics, chemical and ionic equilibrium. It provides basic understanding of the behaviour of electrolytes and their solutions

Outcome/knowledge gain (brief):

All the refrigerators, deep freezers, industrial refrigeration systems, all types of air-conditioning systems, heat pumps, etc work on the basis of the second law of thermodynamics. All types of air and gas compressors, blowers, fans, run on various thermodynamic cycles. The main application of Chemical Equilibria in industrial process is to maximise the desired product concentration by minimising the leftover reactants.

B.Sc. (Prog.) Semester III

Name of paper: Solutions, Phase Equilibrium, Conductance, Electrochemistry and Functional Group Organic Chemistry-II

Content in Brief:

The students will learn about ideal and non-ideal solutions, Raoult's law, partially miscible and immiscible solutions and their applications. The student will also learn about equilibrium between phases with emphasis on one component and simple eutectic systems. In electrochemical cells the students will learn about electrolytic and galvanic cells, measurement of conductance and its applications, measurement of emf and its applications.

Outcome/knowledge gain (brief):

From metal protection to semiconductors to advanced batteries as well as established industrial chemical production processes, an understanding of electrochemistry is required for safe, effective and efficient operations. On a personal level it will help you to understand common problems like corrosion.

Conductivity cell measurements are used for a wide range of applications such as the production of ultrapure water or determining the salinity of sea water. Conductivity is measured by using a conductivity cell to make a measurement of the electrical resistance.

B.Sc. (Prog.) Semester IV

Name of paper: Chemistry of s- and p-Block Elements, States of Matter and Chemical Kinetics

Content in Brief:

The students will learn about the properties of ideal and real gases and deviation from ideal behaviour, properties of liquid, types of solids with details about crystal structure. The student will also learn about the reaction rate, order, activation energy and theories of reaction rates.

Outcome /knowledge gain (brief):

Chemical reactions occur all around us, whether it be combustion in the engine of a car or photosynthesis in the leaves of a plant. Kinetics is utilized by scientists to determine the optimal conditions and variables required to speed up the reaction time of certain reactions.It is important to understand the particle nature of matter. The particles that make up matter are not 'small bits of solid' or 'small drops of liquid' but atoms and molecules. The physical characteristics of those atoms and molecules decide its state.

B.Sc. (P) Semester V

Chemistry Paper: CHEMISTRY –DSE-11

Name of paper: Chemistry of d-Block Elements, Quantum Chemistry and Spectroscopy

Content in Brief:

This course disseminates the concepts and methodology of quantum mechanics, its applications to spectroscopy and establishes relation between structure determination and spectra.

Outcome /knowledge gain (brief):

Quantum chemistry strives to accurately predict chemical and physical properties of molecules and materials, which is useful to many fields of science and engineering. Predicting chemical properties using a first principles approach at the atomic scale is a theoretical and computational challenge.Spectroscopy is used as a tool for studying the structures of atoms and molecules. The large number of wavelengths emitted by these systems makes it possible to investigate their structures in detail, including the electron configurations of ground and various excited states.

4. Department of Commerce:

B.com (H) Course:

Programme Learning Outcomes for B.Com. (Hons.) is to equip students with the knowledge, skills and attitude to meet the challenges of the modern-day business organizations. The curriculum of B.Com. (Hons.) degree provides a carefully selected subject combination of Accounting, Economics, Finance, Management, Tax, Marketing and Law etc. The programme aims to nurture the students in intellectual, personal, interpersonal and social skills with a focus on Holistic Education and development to make informed and ethical decisions and equips graduates with the skills required to lead management position. This programme brings out reflective and scientific thinking in the students which makes them inquisitive and curious to get deep insights of the business world and tackle the complex situations with much knowledge and wisdom.

Semester-I:

Financial accounting (CC)
Business law (CC)
Business organisation and management (GE)

(GE papers offered by commerce department to non-commerce students)

Program outcomes:

- Understand the theoretical framework of accounting and to prepare financial statements. Explain and determine depreciation and value of inventory ,learn accounting for hire purchase transactions, leases, branches and department, understand the concepts of partnership firm and prepare accounts for dissolution of a partnership firm, develop the skill of preparation of trading and profit and loss account and balance sheet using computerized accounting.
- To impart basic knowledge of the important business laws relevant for conduct of general business activities in physical and virtual spaces along with relevant case laws. Business law helps students to get deep knowledge about various types of laws. This paper serves as a basis for further development of knowledge of this paper like corporate law, mercantile law etc.
- Generic Elective papers have been introduced to enhance the knowledge of students apart from their own structured syllabus. ***The course aims to familiarize the non-commerce students with the world of business organization and management***.After completing the course, the student shall be able to learn business activities to compete in competitive world and understand entrepreneurship from local to international perspective. They can evaluate the application of functional areas of business activity and also analyze decision making and evaluate the impact of legal, social, and economic environment on business.

Semester-II:

Corporate accounting (CC)
Corporate law (CC)
Entrepreneurship (GE)

(GE papers offered by commerce department to non-commerce students)

- To acquire the conceptual knowledge of corporate accounting and to understand the various techniques of preparing accounting and financial statements. Corporate Accounting course helps students to acquire the conceptual knowledge of corporate accounting and it helps students to understand the various techniques of preparing the financial statements.
- 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. Corporate law paper imparts basic knowledge of the companies Act, 2013.
- Entrepreneurship paper gives the introduction of importance, scope and requisites of becoming an entrepreneur by studying the various case studies of successful entrepreneurs around the globe.

CHOICE BASED CREDIT SYSTEM (CBCS):

The B.com (Hons) programme is designed to develop in students in depth knowledge of the core concepts and principles that are relevant in field of Commerce. Undergraduates pursuing this programme of study go through rigorous analytical approach that specifically develops their quantitative and qualitative skills, provides opportunities for critical thinking and team work, and exposes them to techniques useful for applied in different areas of commerce.

Semester-III:

HRM (CC)
INCOME TAX (CC)
PRINCIPLES OF MANAGEMENT (CC)
E-COMMERCE (GE)
BUSINESS STATISTICS (SEC)

- Human resource paper introduce students with the basic understanding of what is Human resource, how to procure human resource and how to use it efficiently. Different theories of Human resorce management has been introduced in this paper.
- Income tax paper is very practical paper and introduce students to the world of income tax. As a commerce graduate one should poses the deep understanding of this paper and it has been designed in this way only.
- Principles of management gives important understanding of important concepts of management which is very crucial for all the students who plan to pursue MBA after graduation from commerce stream.
- E-commerce is paper which talks about real life trade which is taking place on day-to-day basis. Online trading and understanding of this platform in technical terms is fulfilled by this paper which also include practical portion for how to develop your own websites.
- Generic elective paper offered in this semester is business statistics to give basic knowledge about the statistical tools and data analysis.

Semester-IV:

Cost Accounting (CC)
Business Mathematics (CC)
Computer application in business (CC)
Economics of regulation of domestic and foreign Exchange market (GE)
Entrepreneurship (SEC)

- Cost accounting acquaint the students the basic concepts used in cost accounting and various methods involved in cost ascertainment system and use of costing data for planning control and decision making.
- Business math's paper give practical usage of mathematical concepts into business situation for the optimal utilization in business.
- Computer Applications in Business course provides skills and knowledge for the commerce students and enhance the student understanding of usefulness of information technology tools for the business operations.
- Economic regulation paper is a perfect blend of economic theories and their practical application in understanding the economy.
- Entrepreneurship paper gives the introduction of importance, scope and requisites of becoming an entrepreneur by studying the various case studies of successful entrepreneurs around the globe.

Semester-V:

Principles of Marketing (CC)
Financial markets and institutions (CC)
Management accounting (DSE-1)
Advertising (DSE-2)

- Management accounting is an important branch of accounting which focuses of decision-making techniques by management of the company through accounting procedures.
- This paper introduces students with different financial market and institutions which play an important role in cracking different competitive exams.
- Advertising as a branch of marketing talks about the role of advertising in business as well as consumers.
- Marketing paper is one of the most important papers to understand the marketing concepts and principles for further development of understanding of this very informative paper.

Semester-VI:

Auditing and Corporate Governance (CC)
Indirect Taxes and Law (CC)
Fundamentals of Investment (DSE-3)

International Business (DSE-4)

- Auditing paper gives the introduction of basic concepts of auditing and familiarize them with the need of corporate governance in today's business world.
- Indirect taxes impart knowledge of various indirect taxes and their related law.
- Fundamentals of investment paper introduce students to all the technicalities of investment proposals. Different types of investments and their evaluation play an important role in any type of business structure.
- International business clears all the concepts of international trade and different policies for the same. This paper talks about the various trade cycles and parameters that one should know before hand while trading globally.

B.com (P) Course:

B.Com offers a deep dive into various facets of commerce and business. The curriculum of this programme provides a carefully selected subject combination of Accounting, Management, Tax, Finance, Marketing and Law. The programme will be able to make the students blend theoretical concepts with practice, furthering students with a better skillset and a fresh perspective. This programme will be able to give insight to the students of the day to day commercial procedures for becoming good leaders and assets for an organization.

Semester-I

Financial Accounting (CC)
Business Organization & Management (CC)

- Financial Accounting course helps students to get knowledge of financial accounting and provides knowledge about the techniques for preparing accounts in different type of business organisations.
- Business Organization & Management course helps students to develop an understanding about functions of management and challenges faced by management and organisations with changing dynamics.

Semester-II

Business Law (CC)
Business Mathematics & Statistics (CC)

- Business Law paper impart basic knowledge of the important business laws relevant to conduct general business activities in physical and virtual spaces along with relevant case laws.
- Business Mathematics & Statistics course helps students to familiarize with the applications of Mathematics and Statistical techniques in business decision making.

CHOICE BASED CREDIT SYSTEM (CBCS):

- The B.com programme is designed to develop in students in depth knowledge of the core concepts and principles that are relevant in field of Commerce. Undergraduates pursuing this programme of study go through rigorous analytical approach that specifically develops their quantitative and qualitative skills, provides opportunities for critical thinking and team work, and exposes them to techniques useful for applied in different areas of commerce.

Semester-III

Company Law (CC)
Income Tax Law and Practice (CC)
Computer Application in Business (AECC-1)

- Company law paper imparts basic knowledge of the companies Act, 2013.
- Income Tax Law and practice course equip students with application of principles and provisions of Income Tax Act, 1961.
- Computer Applications in Business course provides skills and knowledge for the commerce students and enhance the student understanding of usefulness of information technology tools for the bu siness operations.

Semester- IV

Corporate Accounting (CC)
Cost Accounting (CC)
E-Commerce (AECC-2)

- Corporate Accounting course helps students to acquire the conceptual knowledge of corporate accounting and it helps students to understand the various techniques of preparing the financial statements.
- It acquaint the students the basic concepts used in cost accounting and various methods involved in cost ascertainment system and use of costing data for planning control and decision making.
- E-commerce paper helps students to become competent to understand the mechanism for excelling in E-Commerce based employments and self-employment opportunities

Semester-V

Principle of Marketing (DSE-1)
Fundamentals of Financial Management (DSE-2)

Entrepreneurship (AECC-3)
Economics of regulation of domestic and foreign exchange markets (GE)

- Principle of Marketing helps students to learn students in gaining knowledge of concepts, principles, tools and technology of marketing.
- Financial Management course helps the students to learn principle and practices of financial management.
- After studying entrepreneurship paper students may have orientation towards entrepreneurship as a career option and it encourage students creative thinking towards work and in life
- It acquaint the students with the economics of regulation of domestic and foreign exchange markets

Semester-VI

Management Accounting (DSE-3)
International Business (DSE-4)
Personal Selling and Salesmanship (AECC-3)
Project Management (GE)

- After studying Management Accounting students gets knowledge about use of costing data for planning control and decision making.
- After studying international business course students will be exposed to the concept, importance and dynamics of international business and India's involvement with global business operations. The course also discusses theortical foundation of international business to the extent these are relevant to understand the mechanics of global business operations and development
- Personal Selling and Salesmanship course familiarize the students with the fundamentals of personal selling and the selling processes.
- Project management paper evolves a suitable framework for preparation, appraisal, monitoring and control and hedge risk of industrial project

5. Department of Computer Science:

B.Sc. (P) Physical Science with Computer Science:

- The B.Sc. (P) Physical Science with Computer Science is a six-semester course spread over three academic years. This course offers three core subjects with Maths and Physics as compulsory and allows students to choose any one between chemistry and computer science as the third subject. This course offers Computer science as the third core subject. The teaching – learning process involves theory and practical classes and is student centered. Assessment is based on continuous evaluation (class test, presentation, group discussion, quiz, assignment etc.) and end of semester examination. Each theory paper is of 100 marks out of which 25% marks are for internal assessment and a practical paper of 50 marks comprising 50% internal assessment.

Semester-I:
BSCS01: Problem Solving using Computers
Program outcomes:

- This course is designed as the first course in programming to develop problem solving skills. The course focuses on modularity, reusability, code documentation, and debugging skills. It also introduces the concept of object-oriented programming. On successful completion of the course, students are able to:
  - describe the components of a computer and the notion of an algorithm.
  - apply suitable programming constructs and data structures to solve a problem.
  - develop, document, and debug modular python programs.
  - use classes and objects in application programs.
  - use files for I/O operations.

Semester-II:
BSCS02: Database Management Systems

Program outcomes:

- The course introduces the students to the fundamentals of database management systems and methods to store and retrieve data. The course gives students hands-on practice of structured query language in a relational database management system. On successful completion of the course, students are able to:
  - ✓ use database management system to manage data.
  - ✓ create entity relationship diagrams for modeling real-life situations and design the database schema.
  - ✓ use the concept of functional dependencies to remove data anomalies and arrive at normalized database design.
  - ✓ write queries using relational algebra and SQL

Semester-III:
Core : Operating Systems
Program outcomes:

- This course introduces Operating System concepts and its importance in computer system. It focuses on the basic facilities provided in modern operating systems. On successful completion of the course, students are able to:
  - ✓ understand the rationale behind the current design and implementation decisions in modern Operating Systems by considering the historic evolution.
  - ✓ identify modules of the operating systems and learn about important functions performed by operating system as resource manager.
  - ✓ use the OS in a more efficient manner

Semester-IV
Core : Computer System Architecture
Program outcomes:

- The course introduces students to the fundamental concepts of digital computer organization, design and architecture. It aims to develop a basic understanding of the design of a computer system. On successful completion of the course, students will be able to :
  - ✓ design combinational circuits using basic building blocks. Simplify these circuits using Boolean Algebra and Karnaugh maps.
  - ✓ represent data in binary form, convert numeric data between different number systems and
  - ✓ perform arithmetic operations in binary.
  - ✓ determine various stages of instruction cycle, various instruction formats and instruction set.
  - ✓ explain how CPU communicates with memory and I/O devices

SEC 1: BSCS07A: Data Analysis using Python Programming

Program outcomes:

- The course enables students to analyse data using python. They learn how to prepare data for analysis and create meaningful data visualizations. They learn to use Pandas, Numpy and Scipy libraries to work with different data sets. On successful completion of the course, students will be able to:
  - ✓ develop a python script for data analysis and execute it.
  - ✓ install, load and deploy the required packages.
  - ✓ clean and prepare the data for accurate analysis.
  - ✓ analyse the data stored in files in different formats.
  - ✓ experiment with data visualization methods

SEC 2: BSCS08B: Programming in Java

Program outcomes:

- This course builds over basic Java language skills acquired by the student in earlier semester. The students are exposed to the advanced features available in Java such as exception handling, file handling, interfaces, packages and GUI programming. On successful completion of the course, students will be able to:
  - ✓ implement Exception Handling and File Handling.
  - ✓ implement multiple inheritance using Interfaces.
  - ✓ logically organize classes and interfaces using packages
  - ✓ use AWT classes to design GUI applications.

Semester-V

DSE1 : Programming in JAVA

Program outcomes:

- This course introduces fundamental concepts of Object-Oriented Programming using Java. Basic concepts such as data types, expressions, control structures, functions and arrays are covered. Students are exposed to extensive Java programming to solve practical programming problems. On successful completion of the course, students are able to:
  - ✓ develop and execute Java programs using iteration and selection.
  - ✓ create classes and their objects.
  - ✓ implement OOPS concepts to solve problems using JAVA

Semester-VI

DSE 2: Internet Technologies

Program outcomes:

- This course gives a basic introduction to Web Design, Introduction to hypertext markup language (html) document type definition. It also includes introduction to CSS, Javascript, JDBC and JSP. On successful completion of the course, students are able to:
  - ✓ creating web pages, graphical elements, lists, hyperlinks, tables, web forms.
  - ✓ Use Cascading style sheets, (css) for text formatting
  - ✓ Use JavaScript for events and event handling., Designing classes, Inheritance etc.
  - ✓ Use of Input/Output, Exception Handling.
  - ✓ Basic JDBC Fundamentals, Establishing Connectivity and working with connection interface.
  - ✓ Setting Up the JSP Environment, Implicit JSP Objects, JSP Processing and JSP Application Design with MVC.

SEC3: System Administration and Maintenance

Program outcomes:

- This course is designed for students to learn basics of services provided by Linux and Windows operating system. On successful completion of the course, students are able to:
  - ✓ Installation, configuration and maintenance of linux/unix Operating systems
  - ✓ Kernal Configuration of Windows operating system
  - ✓ Application installation, configuration and maintenance
  - ✓ Server services and Client services
  - ✓ Difference between WindowsXP/windows7 and windows server 2003/2008

SEC4: Android Programming

Program outcomes:

- The course is designed for students to learn to develop android applications. They will learn android architecture and key principles underlying its design. On successful completion of the course, students will be able to:
  - ✓ describe the design of Android operating system.
  - ✓ describe various components of Android applications.
  - ✓ design user interfaces using various widgets, dialog boxes, menus.
  - ✓ design application with interaction among various activities/applications using intents.
  - ✓ develop application(s) with database handling

Generic Elective Papers (GE) (Minor – Computer Science) for other Departments/Disciplines:

GE – 1 Introduction to Programming

Program outcomes:

- This course is designed as the first course that introduces computers and programming to non Computer Science students. The course focuses on the use of computer and programming to solve problems of different domains. It also introduces the concept of object-oriented programming. On successful completion of the course, students will be able to:
  - ✓ describe the components of a computer and notion of an algorithm.
  - ✓ apply suitable programming constructs and built-in data structures to solve a problem.
  - ✓ develop, document, and debug modular python programs.
  - ✓ use classes and objects in application programs and visualize data.

GE 2 Introduction to Database Systems

Program outcomes:

- The course introduces the concepts of database management systems to students, focusing on LOCF - Page: 5 of 16 basics such as the importance and significance of a database, data model, schema creation and normalization. On successful completion of the course, students are able to:
  - ✓ describe the features of database management systems.
  - ✓ differentiate between database systems and file systems.
  - ✓ model an application's data requirements using conceptual modelling tools like ER.diagrams and design database schemas based on the conceptual model.
  - ✓ write queries in relational algebra / SQL.
  - ✓ normalize a given database schema.

GE 3 Computer Networks and Internet Technologies

Program outcomes:

- This course covers the fundamental concepts of computer networks, standard models of computer networks having layered architecture, data communication, network topologies, web technologies and internet applications. On successful completion of this course, a student will be able to:
  - ✓ state the use of computer networks and different network topologies.
  - ✓ distinguish between LAN, MAN, WAN.
  - ✓ distinguish between Intranet, Extranet and Internet.
  - ✓ compare OSI and TCP/IP architectures
  - ✓ enumerate different transmission media and describe the use of each of them. 6. design web pages using HTML

GE 4 Information Security and Cyber Laws

Program outcomes:

- This course introduces the students to the concepts of information security and different type of attacks in the cyber space. The course also introduces countermeasures to mitigate attacks and different existing cyber laws. On successful completion of the course, students will be able to:
  - ✓ Learn structure, mechanics and evolution of various crime threats
  - ✓ Learn to protect information systems from external attacks by developing skills in enterprise security, wireless security and computer forensics.
  - ✓ Analyse the risks involved while sharing their information in cyber space and numerous related solutions like sending protected and digitally signed documents
  - ✓ Insights of ethical hacking and usage of password cracking tools 5. get an overview of different ciphers used for encryption and decryption.

6. Department of Economics

- The Economics department of the Kirori Mal College offered courses based on Learning Outcomes-based Curriculum Framework (LOCF) for the B.A. (Hons.), Economics and B.A. (Prog.) as approved by the University of Delhi.

B.A. (Hons.) ECONOMICS:
The objectives and the outcomes of the course B.A. (Hons.) Economics and various papers offered under it are as below:
Programme Objectives: The new curriculum of B.A. (Hons) Economics offers a rigorous basis for much of the advanced thinking in the Economics discipline. It provides the student with a logical paradigm for conceptualising and interpreting the behaviour and interactions of households, firms, and government institutions. The curriculum allows students to choose elective courses from a set of courses with contemporary relevance, thereby offering students the flexibility to prepare for careers in academia, law, management, journalism, government, and many other fields. The programme is consistent with global standards in the Economics discipline. It offers training that is comparable to that of an undergraduate student at the world's best universities.
Programme Outcomes: The students of the course are expected to get an understanding of basic economic theory and learn the mathematical and statistical techniques necessary for a proper understanding of the discipline; get an introduction to real world economic issues and problems facing the country and the world; gain an understanding of proper policy responses to economic problems; get trained to collect primary data and learn sampling techniques; learn to use scientific empirical methods to arrive at conclusions about the validity of economic theories and get trained in the art of economic modelling.

Courses offered under the programme
Core Courses (CC)
Semester I:

(i) Mathematical Methods for Economics I

Course Objective: 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.

Course Learning Outcomes: The course hones and upgrades the mathematical skills acquired in school and paves the way for the second semester course Mathematical Methods in Economics II. Collectively, the two papers provide the mathematical foundations necessary for further study of a variety of disciplines including economics, statistics, computer science, finance and data analytics. The analytical tools introduced in this course have applications wherever optimisation techniques are used in business decision-making. These tools are necessary for anyone seeking employment as an analyst in the corporate world. The course additionally makes the student more logical in making or refuting arguments.

(ii) Principles of Microeconomics

Course Objectives: 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.

Course Learning Outcomes: The course introduces the students to the first course in economics from the perspective of individual decision making as consumers and producers. The students learn some basic principles of microeconomics, interactions of supply and demand, and characteristics of perfect and imperfect markets.

Semester II:

(i) Mathematical Methods for Economics II

Course Objectives: 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.

Course Learning Outcomes: The course provides the mathematical foundations necessary for further study of a variety of disciplines including postgraduate economics, statistics, computer science, finance and data analytics. The analytical tools introduced in this course have applications wherever optimization techniques are used in business decision-making for managers and entrepreneurs alike. These tools are necessary for anyone seeking employment as an analyst in the corporate world.

(ii) Principles of Macroeconomics

Course Objectives: This is the first module in a three-module sequence that introduces 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 GDP, savings, investment, money, inflation, and the balance of payments. It also introduces students to simple analytical frameworks (e.g., the IS-LM model) for determination of equilibrium output.

Course Learning Outcomes: This course aims to develop the broad conceptual frameworks which will enable students to understand and comment upon real economic issues like inflation, money supply, GDP and their interlinkages. It will also allow them to critically evaluate various macroeconomic policies in terms of a coherent logical structure.

Semester III:

(i) Intermediate Microeconomics I

Course Objective: The course is designed to provide a sound training in microeconomic theory to formally analyze the behaviour 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 behaviour of the consumer and the producer and also covers the behaviour of a competitive firm.

Course Learning Outcomes: The course trains the students of Economics about the basic elements of consumer theory and production theory and the functioning of perfectly competitive market. This course aims to give students a solid grasp of microeconomic analysis at the intermediate-level using mathematical techniques where appropriate. This builds up capacity for third year papers. These learning outcomes have been achieved.

(ii) Intermediate Macroeconomics I

Course Objective: This is the second module of a three-module sequence on Macroeconomics. This course introduces students to formal modelling of the 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 students to various micro-founded theories of macro behaviour, namely consumption, investment and the demand for money generated in the household sector.

Course Learning Outcomes: Students can evaluate macroeconomic policies and their implications for different sectors of the economy, under varied circumstances. They have developed a basic understanding of the implications of policies for the distribution of factor-incomes, namely wages, rents, interest and profits. Students can compare and contrast the macroeconomic performance of various countries.

(iii) Statistical Methods for Economics

Course Objective: The course teaches the students the basics of probability theory and inferential statistics. The probability distributions are discussed which form the necessary foundation for the econometrics courses offered later in the Honours programme. The familiarity with probability theory will also be valuable for courses in advanced microeconomic theory.

Course Learning Outcomes: At the end of the course, the student should understand the concept of random variables and be familiar with some commonly used discrete and continuous distributions of random variables. They will be able to estimate population parameters based on random samples and test hypotheses about these parameters. An important learning outcome of the course will be the capacity to analyze statistics in everyday life to distinguish systematic differences among populations from those that result from random sampling. The descriptive statistics techniques taught in the course equip the students with necessary tools to undertake simple research exercise of a data analysis nature.

Semester IV:

(i) Intermediate Microeconomics II

Course Objective: This course is a sequel to Intermediate Microeconomics I. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning. It covers general equilibrium and welfare, imperfect markets and topics under information economics.

Course Learning Outcomes: This course helps the students to understand efficiency of markets and the environment where the standard market mechanism fails to generate the desirable outcomes. The issues of market imperfection and market failures are important building blocks of this course. These learning outcomes have been achieved.

(ii) Intermediate Macroeconomics II

Course objective: This course introduces students to long run issues like growth, technical progress, economics of ideas, R&D, innovation and knowledge creation. This course also provides insights into modern business cycle analysis. Finally, it introduces students to open economy macro issues. At the end, it provides a long run perspective to policy making by framing policies in a dynamic context.

Course learning outcomes: This course will enable the students to combine their knowledge of the working of macroeconomy with long run economic phenomena like economic growth, technological progress, R&D and innovation. It will also enable students to understand business cycles and the concomitant role of policies.

(iii) Introductory Econometrics

Course Objective: This course introduces students to the econometric methods used to conduct empirical analysis in Economics. The course is designed to provide the students with the basic quantitative techniques needed to undertake applied research projects. It also provides the base for more advanced optional courses in econometrics.

Course Learning Outcomes: Students will learn to estimate linear models using ordinary least squares and make inferences about population parameters. They will learn about CLRM assumptions and consequences of violation of the assumptions. They will also understand the biases created through mis-specified models, such as those that occur when variables are omitted.

Semester V:

(i) Indian Economy I

Course Objective: By using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post -Independence period, with particular focus on paradigm shifts and turning points.

Course Learning outcomes: At the end of the course, a student should be able to understand the development paradigm adopted in India and evaluate its impact on economic as well as social indicators of progress and wellbeing.

(ii) Development Economics I

Course Objective: 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.

Course Learning Outcomes: This course introduces students to the basics of development economics, with in-depth discussions of the concepts of development, growth, poverty, inequality, as well as the underlying political institutions.

Semester VI:

(i) Indian Economy II

Course Objective: The course aims to give a comprehensive view of the Indian economy from a medium term perspective focusing on various macroeconomic development aspects. 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.

Course Learning Outcome: At the end of the course, a student should be able to understand the role of economic policies in shaping and improving economic performance in agriculture, manufacturing and services. The empirical papers discussed in the course would familiarize students with the methodologies employed by the researchers and motivate them to take up research in the area.

(ii) Development Economics II

Course Objective: This is the second course 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.

Course Learning Outcomes: This course teaches the student various aspects of the Indian economy, as well as important themes relating to the environment and sustainable development. It also introduces them to some issues of globalisation.

Discipline Specific Elective Courses (DSE)
Semester V:

(i) Political Economy I

Course Objective: This course explores the systemic structures and institutions of capitalist economies and their evolution in a political economic framework. Students will be exposed to alternative schools of thought and are expected to read some classic texts and commentaries as well as more contemporary essays on the subject.

Course Learning Outcomes: This course prepares the students to develop critical thinking by exposing them to elements of economic thought, juxtaposing ideas and theoretical structures. Students learn to assimilate from a diverse range of opinions and crystallize their own thought processes and standpoints. It further enables them to think and analyse in an interdisciplinary manner linking the social and political domains to the economic structures and processes. It also prepares the students to face the practical world of work, where economics, business, civil society organisations, social institutions and politics often cohabit in a complex interlinked structure.

(ii) International Economics

Course Objective: The purpose of this course is to inform the basics of international trade theory and to examine the effects of international economic policies on domestic and world welfare. The course aims to introduce students to the main theoretical and empirical concepts
in international trade and familiarise them with the main issues in trade policy and the basic features of the international trading regime. This course develops a systematic exposition of models that try to explain the composition, direction, and consequences of international trade, and the determinants and effects of trade policy. Although the course is based on abstract theoretical models, students will also be exposed to real-world examples and case studies.

Course Learning Outcomes: At the end of the course, the students should be able to demonstrate their understanding of the economic concepts of trade theory. In some models, the student will be required to deal with simple algebraic problems that will help them to better understand these concepts, use diagrammatic analysis to demonstrate and compare the economic welfare effects of free trade and protection, demonstrate their understanding of the usefulness and problems related to topics in international trade, and demonstrate their critical understanding of trade policies.

(iii) Public Economics

Course Objective: 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. The paper is divided into two sections, one dealing with the theory of public economics and the other with the Indian public finances.
Course Learning Outcomes: The module aims to introduce students to the main theoretical and empirical concepts in public economics, equip students with a thorough analytical grasp of implications of government intervention for allocation, distribution and stabilization, and familiarise students with the main issues in government revenues and expenditure. At the end of the module the students should be able to demonstrate their understanding of the public economics. In some models, the student will be required to deal with simple algebra problems that will help them to better understand these concepts, use diagrammatic analysis to demonstrate and compare the economic welfare effects of various environmental policy options, demonstrate their understanding of the usefulness and problems related to taxation and government expenditure, and demonstrate their critical understanding of public policies.

Semester VI:

(i) Political Economy II

Course Objective: This course exposes the students to the realities of the contemporary world economy and teaches them to develop critical analysis in an integrated and broader political economy framework. The course explores some of the fundamental structural changes and dynamics of the advanced capitalist systems. Particularly, the course analyses the changes in the domains of production, corporate forms and inter-firm relations, work and labour processes, and financial instruments and structures. It also analyses the role of the state in the era of globalization through a political economy lens. It further integrates contemporary issues of gender and environment in this framework.

Course Learning Outcomes: The course offers a layered and contrasting perspective to some of the issues analysed in the core theoretical courses, such as microeconomics and macroeconomics. It also provides a more global and interdisciplinary context for analysing the issues studied in the compulsory courses on the Indian Economy and Development Economics. It thus enables the students to form a more informed view of the world we inhabit by analysing some of the most contemporary socioeconomic trends and developments from different perspectives. It prepares the students to face the practical world of work, where economics, business, civil society organisations, social institutions and politics often cohabit in a complex interlinked structure. This also enables the students for pursuing studies in diverse related areas such as development studies, economic sociology, critical geography, and gender studies.

(ii) Financial Economics

Course Objective: This course provides a strong theoretical foundation and an economic framework to understand the world of modern finance. Major topics in the course include: time value of money; fixed-income securities; bond pricing and the term structure of interest rates; portfolio theory and asset pricing models. The course also covers the risk negotiating practices of hedging, speculation, arbitrage and futures and options contracts as well as determination of forward and futures prices; trading strategies involving options; binomial trees; and the Black-Scholes-Merton option pricing model.

Course Learning Outcomes: Students acquire extensive theoretical knowledge in portfolio risk management, capital asset pricing, and the operation of financial derivatives. The course familiarises the students with the terms and concepts related to financial markets and helps them comprehend business news/articles better. The course also helps to enhance a student's understanding of real life investment decisions. The course has a strong employability quotient given the relatively high demand for skilled experts in the financial sector.

(iii) Money and Financial Markets

Course Objective: This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It highlights the organisation, structure, and role of financial markets and institutions. It also discusses interest rates, monetary management, and instruments of monetary control. It discusses the risk and return profile of different investment opportunities and importance of information in smooth functioning of any market. It discusses Financial and banking sector reforms and monetary policy with special reference to India.
Course Learning Outcomes: This allows students to understand current monetary policies and financial market outcomes. It enables them to understand various aspects of economy. It also enables them to critically evaluate policies. It allows them to understand various developments and hurdles in the financial world which promotes/hinders growth and expansion of our economy.

General Electives (GE)
Semester I
Introductory Microeconomics
Course Objective: 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 analyse real-life situations.

Course Learning Outcomes: The course introduces the students to the first course in Economics from the perspective of individual decision making as consumers and producers. The students learn some basic principles of microeconomics, such as interactions of supply and demand and characteristics of perfect and imperfect markets.

Semester II:
Introductory Macroeconomics
Course Objective: 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 GDP, savings, investment, money, inflation, and the balance of payments. It also introduces students to simple analytical frameworks (e.g., the IS-LM model) for determination of equilibrium output.

Course Learning Outcomes: This course will allow students to understand the basic functioning of the macroeconomy.

Semester III:
Money and Banking

Course Objective: This course highlights the organisation, 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. It covers instruments and targets of monetary policy with special reference to India. It also covers the innovations in financial market and instruments to reduce risk.

Course Learning Outcomes: This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It provides them with practical knowledge about the functioning of market and transmission mechanism of the monetary policies.

Semester IV:
Global Political Economy
Course Objective: This generic elective course introduces students to the contemporary structures, trends and developments in the global economy through a political economy lens. It explores the period since the end of Second World War up to recent global economic crisis – from the 'Golden age of capitalism' to the 'neoliberal' shift. This is done through an analysis of changes in the organization of production and corporate structure; changes in labour processes and labour regimes; and the increasing dominance of finance in the contemporary world. All of this is grounded in a study of the shifts in the nature, scope and ideology of the state under globalisation.

Course Learning Outcomes: The course enabled students to develop a critical understanding and have an informed view of the global economy as it has evolved since the latter half of the twentieth century. Students from different academic backgrounds are better prepared for the professional world by using this knowledge base to face the challenges of group discussions and general interviews for corporate or civil service jobs. Students who intend to pursue higher studies and research, have gained from this course by being able to develop an interdisciplinary understanding of basic economic structures and processes, which are crucial to the understanding of their core subjects.

Skill Enhancement Courses (SEC)
Semester III:
Research Methodology
Course Objective: The course begins with the formulation of a research problem and covers the issues concerning the generation of primary sample data. In this regard the designing of a
questionnaire, the methods of design of a sample and its size, the modes of data collection from direct interview to online surveys, the appreciation of possible sources of errors, and the cleaning of data forms the bulk of the classroom instruction.
Course Learning Outcomes: The course imparts skills to undertake data-based research. The student enrolling in this course would develop competency in executing sample surveys and would have reasonable exposure to a variety of secondary data sources.

Semester IV:
Contemporary Economic Issues
Course Objective: This course aims to familiarize students with basic concepts related to the Economic Survey and the Union Budget. It aims to equip students with sufficient knowledge and skills to analyze these documents.
Course Learning Outcomes: Students will have the capability to understand government policies and will be informed participants in economic decision making.

B.A. (Programme)
Core Courses (CC)
Semester I:
Principles of Microeconomics I
Course Objective: This course intends to expose the students to the basic principles in Microeconomics and their applications. The course will illustrate how microeconomic concepts can be applied to analyze real-life economic situations.
Course Learning Outcomes: The students learn some basic principles of microeconomics and interactions of supply and demand, characteristics of perfect competition, efficiency and welfare.

Semester II:
Principles of Microeconomics I
Course Objective: This is a sequel to Principles of Microeconomics–I covered in the first semester. The objective of the course is to introduce the students to different forms of market
imperfections and market failures, input demand, factor incomes and international
trade.

Course Learning Outcomes: This course helps the students to understand different forms of market imperfections and market failures observed in real life situations. The students learn about the environment where the standard market mechanism fails to generate the desirable outcomes. They develop a sense of how the production is distributed among the different factors of production and the demand for inputs. Some preliminary concepts of international trade are also covered in this course.

Semester III:
Principles of Macroeconomics I
Course Objective: This course introduces students to the basic concepts in Macroeconomics.
Macroeconomics deals with the aggregate economy. In this course the students are introduced to the definition, measurement of the macroeconomic variables like GDP, consumption, savings, investment and balance of payments. The course also discusses various theories of determining GDP in the short run.
Course Learning Outcomes: This course is useful for understanding various real economic issues and evaluating policy outcomes.

Semester IV:
Principles of Macroeconomics II
Course Objective: This is a sequel to Principles of Macroeconomics I. It analyses various theories of determination of National Income in greater detail. It also introduces students to concept of inflation, its relationship with unemployment and some basic concepts in an open economy.
Course Learning Outcomes: This course provides students with an analytical framework to understand the basic functioning of the macroeconomy. It also allows them to critically examine and comment on effectiveness of various policies.

Semester V:
Economic Development & Policy in India I
Course Objective : Starting from basic definition of development and growth this course reviews major trends in aggregate economic indicators in India. Comparing the situations in developed and developing world this paper provides a wide range of data and knowledge to students to understand world economics. It provides an understanding or linkages between various sectors of economy, and role of government.

Course Learning Outcomes: This course will help students understand the key issues related to the Indian economy. It will broaden their horizons and enable them to analyze current economic policy and help in decision making. It allows student to look at the bigger picture and to find solutions for Economic Development. The course also serves as the base for further study of sector specific policy discussion that is pursed in the course in the next semester.

Semester VI:
Economic Development & Policy in India II
Course Objective : The course seeks to equip students with sector-specific knowledge and skills to analyse key economic issues and policy documents. It will also enable them to relate
theoretical frameworks of macroeconomics and microeconomics to the Indian context.This paper provides a deep understanding of various sectors of Indian Economy and possible solutions.
Course Learning Outcomes: Students will have capability to understand government policies and will enable informed participation in economic decision making. This paper allows student to expand their critical thinking. It will make them aware of the current state of Indian Economy and what actions are needed in terms of policies and institutional changes.

7. Department of English

B.A. (H) English Courses:

- The B.A. (Hons.) English course is a six semester course spread over three academic years. The teaching – learning process involves theory classes along with usual practice of test/presentation/assignments as in the form of internal assessment. It all remains student centered to bring the desired outcome in their academic life and endeavour.
- Students are encouraged to carry out their performance based on classroom lectures based by way of the assignments and the presentations they are given by each tutor. Each theory paper is of 100 marks out of which 25% marks are for internal assessment

Semester-I:

(i) **Indian Classical Literature**
(ii) **European Classical Literature**

Course outcomes:

Paper (i)

- Understanding the Sanskrit Drama, a Natak, a Prakarna and Natyashashtra while having a deep acquaintance with the rich and diverse literature from two classical languages of India, Sanskrit and Tamil alongside getting to know about features of the poetics in the epics of both languages, including their literary traditions and their representations of a pluralist society in terms of linguistic, religious, and generic diversity.
- Learning and identifying critically the foundation in Indian poetics, theories of representation, aesthetics, aspects of Indian theatre, and traditions of story-telling and narrative structures.
- Understanding the significant sections of Vyasa's Mahabharata that determine conceptualisation and representation of class, caste, gender, and disability in the context of the epic battle over rights and righteousness. Similarly, through selections from Ilango's *Cilapattikaram*, to understand the interplay of Tamil poetics and the lifestyle of communities, negotiating ideas related to love, justice.
- Exploring the central concerns of Sanskrit drama in relation to notions of the ideal ruler, lover, friend, and spouse; the presence of Buddhist edicts, the voices of the poor and the marginalised, the position of women in different social strata, the subversive use of humour, and the performative aspects of Sanskrit theatre.

Paper (ii)

- Understanding the humanist foundation to English studies by exploring the classical Greek, Roman, and Hebrew literature in English translation, tracing its impact and influence on English literature from the period of the Renaissance to the Modern.
- Exploring a wide-ranging perspective on the aesthetic, philosophical, and social concerns of classical literature alongside understating multiple genres and forms, including the epic, tragedy, comedy, the lyric, and the dialogue.
- Selections from the Old and New Testament of The Bible provide the context to literary styles and ideas governing Western literature's interface with the community and its spiritual needs.
- Understanding the historical, cultural, and philosophical origins of tragedy and comedy by engaging with both genres in their distinctive form, style, and characterization, including their representation of human aspirations, foibles, grandeur, and vulnerability.
- Examining the representations of disability in mythology through the reading of selections from Ovid and the Book of Job from the Old Testament of The Bible for its literary style, including its debate over tragic fate and human suffering, and to locate its enduring influence over subsequent humanist writings.
- Understanding the history of ideas pertaining to the human-social-divine interface in theorisations on form, narrative, social organization, and aesthetics in the writings of Plato, Aristotle, and Horace.

Semester-II:

(iii) **Indian Writing in English**
(iv) **British Poetry and Drama: 14th to 17th Centuries**

Course Outcomes:

Paper (iii)

- introduce students to Indian English Literature and its major movements and figures through the selected literary texts across genres;

- enable the students to place these texts within the discourse of post-coloniality and understand Indian literary productions in English in relation to the hegemonic processes of colonialism, neo-colonialism, nationalism and globalization; and
- allow the students to situate this corpus within its various historical and ideological contexts and approach the study of Indian writing in English from the perspectives of multiple Indian subjectivities.

Paper (iv)

- introduce students to the tradition of English Literature from the Medieval till the Renaissance;
- explore the key writers and texts within their historical and intellectual contexts;
- offer a perspective on the history of ideas including that of disability and its varied meanings within this period.

Semester (iii)

(v) **American Literature**
(vi) **Popular Literature**
(vii) **British Poetry and Drama: 17th and 18th Centuries**

Course Outcomes:

Paper (v)

- The course aims to acquaint students with the wide and varied literatures of America: literature written by writers of European, particularly English, descent reflecting the complex nature of the society that emerged after the whites settled in America in the 17th century; include Utopian narrative transcendentalism and the pre- and post-Civil War literature of the 19th century; introduce students to the African American experience both ante-bellum and post-bellum reflected in the diversity of literary texts, from narratives of slavery, political speeches delivered by Martin Luther King Jr. and Frederick Douglass, as well as the works of contemporary black woman writers; familiarize students with native American literature which voices the angst of a people who were almost entirely wiped out by forced European settlements; and include modern and contemporary American literature of the 20th century.
- critically engage with the complex nature of American society, given its journey from specific religious obligations and their literary transformations (such as Puritanism, Unitarianism, Transcendentalism, etc.) to the growth of anti- or non-Christian sensibilities.
- analyze the American mind from global and Indian perspectives and situate the American in the contemporary world.

Paper (vi)

- enable students to trace the rise of print culture in England, and the emergence of genre fiction and bestsellers;
- familiarize students with debates about culture, and the delineation of high and low culture; and
- help them engage with debates about the canonical and non-canonical, and hence investigate the category of literary and non-literary fiction.
- investigate the role of popular fiction in the literary polysystem of various linguistic cultures
- demonstrate how popular literature belongs to its time
- use various methods of literary analysis to interpret popular literature

Paper (vii)

- help students explore poetry, drama and prose texts in a range of political, philosophical and cultural material from the end of the Renaissance through the English Civil War and Restoration in the seventeenth century;
- examine the turmoil about succession and questions on monarchy as they lead up to the civil war, both in drama like Shakespeare and Behn as well as in the poetry of Milton;
- show a new interweaving of the sacred and the secular subjects of poetry17th C;
- study Bacon's essay on deformity through the lens of disability and its definitions, linked back to Montaigne in the earlier paper;
- analyse Cartesian dualism that provides a basis for reading ideas of body and mind in the period and after;
- explore Hobbes's views on materialism and the equality of men, as they are interestingly juxtaposed with his argument for a strong state and his view of man as selfish by nature;
- show how Winstanley's writing, on the other hand, brings together Christianity and communality in an argument for equality after the civil war; and
- explore the newness of this century in Cavendish's bold exploration of natural philosophy or science as a domain for women
- identify the major characteristics of the Comedy of Manners and Mock-Heroic poetry
- demonstrate in-depth knowledge and understanding of the religious, socio-intellectual and cultural thoughts of the 17th and 18th centuries

- examine critically keys themes in representative texts of the period, including Sin, Transgression, Love, Pride, revenge, sexuality, human follies, among others

Semester (iv)

(viii) **British Literature: 18th Century**
(ix) **British Romantic Literature**
(x) **British Literature: 19th Century**

Course Outcomes:
Paper (viii)

- explain and analyze the rise of the critical mind
- trace the development of Restoration Comedy and anti-sentimental drama
- examine and analyze the form and function of satire in the eighteenth century
- appreciate and analyze the formal variations of Classicism
- map the relationship between the formal and the political in the literature of the neoclassical period
- examine the eighteenth century as a great period for non-fictional forms of writing, drawing attention to the ways in which the periodical essay, for instance, sought to be like philosophy, just as Locke's treatise sought to be like a popular essay, thus pointing out the play with genre in these texts; and encourage an extended discussion on the meanings of disability in the early modern period through the Enlightenment

Paper (ix)

- understand Romanticism as a concept in relation to ancillary concepts like Classicism
- understand the Romantic period in English literature in terms of its social, philosophical, intellectual, literary backgrounds including German and French influences
- analyze and understand the main characteristics of Romanticism.
- appreciate the canonical and representative poems and prose of the writers of the Romantic period.
- develop skills of critical analysis and interpretation of selected poems in order to understand the theme, language, style, and elements of prosody.
- appreciate and analyze the sensibility of the British Romantic period: common man, equality, freedom, sense of community and fraternity
- relate Romantic literary texts to other forms of expression such as painting, for instance.

Paper (x)

- identify and analyze the socio-economic-political contexts that inform the literature of the period.
- comment on the historical and political awareness of literary texts as reflected in the transition from nature to culture across various genres.
- understand the conflict between self and society in different literary genres of the period.
- link the rise of the novel to the expansion of Colonialism and Capitalism.
- understand the transition from Romantic to Victorian in literature and culture.
- link the Victorian temper to political contexts in English colonies.
- link the changes in the English countryside to changes brought about in similar settings in India.

Semester (V):

(xi) **Women's Writing**
(xii) **British Literature: The Early 20th Century**

Discipline Centric Electives:

Paper 1: **Modern Indian Writing in English Translation**
Paper 2: **Literature of the Indian Diaspora**
Paper 3: **British Literature: Post-World War II**
Paper 4: **Nineteenth Century European Realism**
Paper 6: **Literary Criticism**
Paper 7: **Science Fiction and Detective Literature**

Course Outcomes:
Paper (xi)

- recognise the importance of gender specificity in literature.

- understand and appreciate the representation of female experience in literature, across a wide range of texts written by women from Emily Dickinson to Mahashweta Devi.
- explain the difference between the feminine and the feminist as opposed to the female.
- examine and appreciate the role played by socio-cultural-economic contexts in defining woman.
- link critically the status of woman to social discrimination and social change.
- draw a location specific trajectory of female bonding or empowerment.
- understand the complexity of social and biological constructions of manhood and womanhood.
- examine the relationship of women to work and production.

Paper (xii)

- trace the history of modernism in the socio-cultural and intellectual contexts of late nineteenth century and early twentieth century Europe.
- link and distinguish between modernity and modernism.
- explain the links between developments in science and experiments in literature.
- explain the history of early twentieth-century modernism in the light of stream of consciousness, Jungian and Freudian ideas, Psychoanalysis, Imagism, Cubism, Vorticism.
- identify and analyze the use and modernist technique in different genres of poetry and prose in early twentieth century British literature.
- trace the history of the self and subjectivity in literature in the light of colonial consciousness.
- explain and analyze the idea of from in modernist literary texts from across major genres.

DCE 1:

- appreciate the diversity of modern Indian literatures and the similarities between them.
- understand and creatively engage with the notion of nation and nationalism, through the study of writers like Rabindranath Tagore and Dharamvir Bharati.
- appreciate the impact of literary movements, such as the Progressive Writers Association, on various Indian literatures.
- critically engage with significant social issues like caste and gender.
- understand the historical trajectories of Indian literatures across the modern period.

DCE 2:

- understand the concept of 'diaspora' in its historical and cultural contexts.
- identify different aspects of Indian diasporic consciousness and the literary features of diasporic texts.
- develop a clear understanding of the formation of Indian diasporic movements within and outside India.
- develop a critical understanding of the writings of the Indian diaspora within the discourse of postcoloniality, postmodernity, hybridity, globalization and transnationalism.
- develop the analytical ability to read diasporic texts and analyze key diasporic issues such as displacement, nostalgia, alienation, belonging, identity, gender, racism and assimilation.
- understand the main currents of Indian diasporic narratives.
- examine how texts function as diasporic markers, broadening the understanding of Indian diasporic lives, cultural practices, experiences, religion and the new medium.

DCE 3:

- understand the social-historical-political-economic contexts of Post-World War II British Literature.
- understand the relationship between World War II and the end of colonialism, as felt in English society.
- identify the social-historical-political changes in England after World War II.
- trace through representative texts like Hanif Kureishi's *My Beautiful Laundrette* the rise of multiculturalism in England in the wake of migrations of people from colonial territories.
- grasp the changing role of English in the new world order that has succeeded the British Empire.
- critically analyze and link changes in social norms to new literary forms.
- engage with the idea of the postmodern and the rise of postmodernist aesthetics in poetry, prose, and drama.
- appreciate the importance of location in understanding the self and the other.

DCE 4:

- demonstrate an awareness of the emergence of Realism and related literary movements in Europe in the Nineteenth Century by engaging with key texts of European Realism.
- gain a deeper understanding of the social, economic and political conditions which gave rise to this movement.
- recognize the diversity within this broad literary movement while discerning underlying affinities and patterns.

- examine modern reassessments of the central novels of European Realism.
- show an awareness of rich and complex legacy of Nineteenth Century European Realism, identify the cultural responses to such writing, and explore the causes of its decline in the Twentieth Century.

DCE 6:

- understand the historical and philosophical contexts that led to the development of literary criticism and its practice in different traditions and periods.
- understand fundamental literary and critical concepts and underlying distinctions amongst them (e.g.., difference between literary criticism and literary theory).
- grasp a wide range of literary philosophers and critics whose works have informed and shaped the discourse of literary theory.
- Gain knowledge about major, critical movements and critics in the English critical traditions.
- identify theoretical and critical concepts with critics/texts/movements with which they are associated and understand them in their contexts.
- apply various theoretical frameworks and concepts to literary and cultural texts, and so strengthen and deepen their interpretative skills.
- evaluate and analyze strengths and limitations of critical/theoretical frameworks and arguments.

DCE 7:

- write critically about the two genres of Science Fiction and Detective Literature.
- engage with the philosophical and psychological and social issues that are an intrinsic part of genre fiction.
- engage with the social and historical construction of crime, across different stages in the history of detective fiction, and authors from Wilkie Collins to Raymond Chandler.
- analyze individual or multiple popular texts in terms of key concepts including genre, implied audience, plot construction, linguistic texture, authorial identity, publication context, and sociocultural context.

Semester VI:

(xiii) **Modern European Drama**
(xiv) **Postcolonial Literatures**

Discipline Centric Electives:
Paper 5: **Literary Theory**
Paper 8: **Literature and Cinema**
Paper 9: **World Literatures**
Paper 10: **Partition Literature**
Paper 12: **Travel Writing**
Paper 13: **Autobiography and Life Writing**

Course Outcomes:

Paper (xiii)

- understand the role of theatre and drama in the introduction and shaping of modernity.
- understand and engage with concepts like realism, naturalism, symbolism, expressionism, the Avant Garde, the epic theatre, the theatre of the absurd, etc.
- understand how meaning is created in theatre and be able to write about innovations introduced into theatrical practice in the late nineteenth and the twentieth century.
- provide students with an overview of how modernity was introduced in the twentieth century through drama;
- help students understand the dynamic relationship between actors and audience, and to observe the transition from passive spectatorship to a more active and vital participatory process visible in newer forms in the 1970s
- examine Ionesco's play Rhinoceros in the light of his prose writings, Present Past, Past Present.

Paper (xiv)

- understand the social-historical-political-economic contexts of colonialism and postcolonialism in India and other countries affected by colonial rule.
- understand the scope of postcolonial literatures in India and elsewhere, primarily as a response to the long shadow of colonialism, not just of colonial occupation.
- see through a corpus of representative postcolonial texts from different colonial locations: the effects of colonial rule on the language, culture, economy and habitat of specific groups of people affected by it.
- appreciate and analyze the growing spectres of inequality arising out of colonial occupation and the role played by postcolonial literatures to resist it in India and similar locations.
- critically engage with issues of racism and imperialism during and after colonial occupation.

- appreciate the changing role and status of English in postcolonial literatures.
- link colonialism to the broader project of modernity.

DCE 5:

- shape and study a historical overview of major literary theorists, particularly of the 20th century.
- show an understanding of historical and philosophical contexts that led to the development of literary theory and its practices.
- develop awareness of various literary theories and the way they enrich and change our thinking about language, literature and society.
- historically situate literary theorists whose works had informed and shaped various literary theoretical discourses.
- identify theoretical concepts with theorists and movements with which they are associated and in the process understand their contexts.
- apply various theoretical frameworks and concepts to literary and cultural texts.
- evaluate and analyze strengths and limitations of theoretical frameworks and arguments.
- sharpen interpretative skills in the light of various theoretical frameworks.

DCE 8:

- demonstrate a systematic and historically-grounded knowledge of literature and cinema as expressive arts.
- identify and illustrate the distinction between literary and cinematic arts of storytelling.
- identify and describe the difference between cinematic and literary images.
- examine different theories of adaptation and link then to contexts of expression and reception.
- organize different sets of activities to identify and make use of skills that distinguish the medium of cinema from that of literature.
- present a coherent view of the relationship between written and cinematic texts.
- communicate the role of location in adaptation.

DCE 9:

- explain the concept of World Literature and its evolution in relation to other related concepts e.g. national literature, general literature, comparative literature and Vishwa Sahitya.
- learn the critical approaches and reading practices that have been developed under the rubric of World Literature.
- appreciate the connectedness and diversity of human experiences and literary responses to them in different parts of the world.
- analyze and appreciate literary texts from different parts of the world and receive them in the light of one's own literary traditions.
- analyze and interpret literary texts in their contexts and locate them.

DCE 10:

- explain historical and socio-cultural factors responsible for the Partition of the Indian Subcontinent.
- demonstrate critical understanding of manifestations of the experience of the partition in various art forms.
- link and analyze the eco-socio-historical-cultural contexts and dimensions related to the Partition of India e.g. nation, nationalism, communication, violence, exile, homelessness, refugee, rehabilitation, resettlement, border and border lands (colonialism and post colonialism), literary responses to the partition in different parts of the Indian continent and interpret them.
- interpret texts and experience and relate it to one's personal contexts and experiences.

DCE 12:

- map the social-historical-political-economic contexts of Travel Writing from regional, national and global perspectives.
- explain the origin and reception of Travel Writing in chosen locations.
- appreciate and analyze the relationship of Travel Writing to colonialism.
- study the link between Travel Writing and history writing, in order to understand travel Writing as an alternative history or supplement to historical writing.
- study the relationship between travel writing and translation.
- analyze travel writing in relation to colonial and postcolonial positions.
- appreciate the role of travel in shaping selfhood and otherness and relate the growth of Travel Writing to regional national and global identities.
- critically engage with the accounts of places visited by foreigners and how their impressions change local perspectives of these places.

DSE 13:

- demonstrate a familiarity with kinds of writing which seek to represent and make sense of the experiences of the individual.
- understand the relationship between self and history, truth, claims and fiction in private and public spheres.
- explain the working of memory, politics of memory and its role in constructing identity.
- explain and analyze how life writing provides alternatives to existing ways of writing history.
- examine the status of life writing as a literary form and the history of its reception.
- Appreciate and analyse the emergence of life writing in non-western contexts.

8. Department of Hindi

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9. Department of History

B.A. (H) History Courses:

- The duration of the BA History Honours Programme is three academic years. Each academic year is divided into two semesters. The History Honours Programme therefore spans six semesters. Each semester is for the duration of sixteen weeks.
- The teaching and learning modalities in the Honours Programme will involve theory classes (lectures) of one hour each and tutorial classes. The curriculum will be taught through formal lectures with the aid, wherever the teacher feels the need, of power-point presentations, audio and video tools. There are additional requirements in certain courses for documentaries, cinema, field and archival work, visits to museums, class reports, discussions and project work. These are built into the teaching and assessment of many courses.
- Students will be regularly assessed for their grasp on themes through debates and discussions covered in class. Two written assignments and at least one presentation will be used for final grading of the students. Students will be assessed on their ability to engage with a sizeable corpus of readings assigned to the theme for written submissions, i.e. being able to explain important historical trends and trace historiographical changes reflected in the assigned readings. Internal Assessment: 25 Marks Written Exam: 75 Marks Total: 100 Marks
- At a general level, our courses are structured with the objective of giving requisite information about different aspects of the past to students, to teach them how to parse this information, instruct them on how historians research, frame an argument and debate details that have significance to how we understand the past and the present. The expected outcome is to provide students with a sense of how interconnected our present is with the past and how learning about the past provides them with the skills to understand the present. To facilitate this understanding, our courses, class room instruction and assignments give students the ability to think and reach their own conclusions. Our tutorial discussions, written assignments, class room presentations, field-work projects, consolidate their ability to analyses, research and process information.

Semester-I:

(i) Core course 1: History of India – I

(ii) Core course 2: Social Formations and Cultural Patterns of the Ancient World –I

Program outcomes:

History of India- I

- Being the first paper of the History Honors course, it intends to provide an extensive survey of early Indian history to the students and familiarize them with the tools of studying ancient Indian history. The inter-disciplinary approach of the course provides the students a point of beginning from where they can build an understanding of the discipline of history. Spanning a very long period of India's ancient past – from pre-historic times to the end of Vedic cultures in India – the course dwells upon major landmarks of ancient Indian history from the beginning of early human hunter gatherers to food producers. This course will equip the students with adequate expertise to analyses the further development of Indian culture which resulted in an advanced Harappan civilization. In course of time students will learn about the processes of cultural development and regional variations.
- Learning Outcomes

Learning Outcomes:

- After completing the course the students will be able to: Discuss the landscape and environmental variations in Indian subcontinent and their impact on the making of India's history.
- Describe main features of prehistoric and proto-historic cultures. List the sources and evidence for reconstructing the history of Ancient India.
- Analyse the way earlier historians interpreted the history of India and while doing so they can write the alternative ways of looking at the past.
- List the main tools made by prehistoric and proto- historic humans in India along with their find spots. Interpret the prehistoric art and mortuary practices. Discuss the beginning and the significance of food production. Analyse the factors responsible for the origins and decline of Harappan Civilization.
- Discuss various aspects of society, economy, polity and religious practices that are reflected in the Early Vedic and Later Vedic texts. Describe the main features of the megalithic cultures of the Central India, Deccan and South India.

Social Formations and Cultural Patterns of the Ancient World –I

Program outcomes:

- The Course aims to introduce students to significant developments in world history that have shaped the complexity of human existence. To begin with, it offers a historical survey of human evolution. It details the transition from the hunting-gathering subsistence pattern to a more advanced adaptations to a sedentary farming economy. The course content is based on the premise that the pace and nature of change differed in different parts of the world. Further, changes in social formations that facilitated the emergence of socially stratified and

state-ordered societies are explained through a study of some of the early Bronze Age Civilizations. The impact of specific ecological conditions on different trajectories of growth, higher population density and social complexity, the emergence of the city and newer crafts and trade and the unfolding of cultural patterns in the early civilizations are concerns that are central to this course. This therefore, provides a sound foundation in the historical discipline, and helps in engaging in a variety of subject matters of history – social relations, economics, political formations, religion, and culture from a global perspective. Understanding the dissimilar but interlinked history of humanity is therefore the prime objective of this Course.

Learning Outcomes:

- Upon completion of this course the student shall be able to: Trace long term changes in the relationship of humans to their landscapes, to resources and to social groups.
- Discuss that human history is the consequence of choices made in ecological and biological contexts, and that these choices are not only forced by external forces like environmental change but are also enabled by changes in technology and systems of cultural cognition.
- Delineate the significance of early food production and the beginning of social complexity.
- Analyse the process of state formation and urbanism in the early Bronze Age Civilizations. Correlate the ancient past and its connected histories, the ways in which it is reconstructed, and begin to understand the fundamentals of historical methods and approaches.

Semester-II:

(i) Core Course III: History of India- II

(ii) Core Course IV: Social Formations and Cultural Patterns of the Ancient and Medieval World-II

History of India- II

Program outcomes:

- This course is about early historical and early medieval periods of Indian history. It explores the transition from proto-historical to early medieval phase highlighting major changes that shaped the character of the Indian civilization. Highlighting the features of early historic times, the course tries to trace the emergence of state system from tribal stage to 'early-state' stage and at the same time seeks to underline the important developments in the arena of economy, society and culture. The purpose of this course is to familiarize the students with the ways in which historians work with the sources of various kinds and reach at conclusions.

Learning Outcomes: After completing this course, the students will be able to

- Discuss various kinds of sources that the historians utilize to write the history of early historical and early medieval India.
- Analyse the processes and the stages of development of various types of state systems like monarchy, republican and centralized states as well as the formation of large empires.
- Discuss the ways in which historians have questioned the characterization of the Mauryan state.
- Delineate the changes in the fields of agriculture, technology, trade, urbanization and society and the major points of changes during the entire period.
- Describe the factors responsible for the rise of a good number of heterodox religious systems and adjustments and readjustments by various belief systems.
- Trace the processes of urbanization and de-urbanization & monetization and monetary crisis in early India.
- Analyse critically the changes in the *varna*/caste systems and changing nature of gender relations and property rights.

Social Formations and Cultural Patterns of the Ancient and Medieval World-II

Program outcomes:

- The Course seeks to develop a historical understanding of the major developments in some parts of the Ancient and Medieval world. These include the process of colonization undertaken by the Greek city-states (polis) and by Rome and the far-reaching political experiments undertaken here. The Course provides a scope for understanding the subject of slavery in its varied dimensions in the ancient world and this in turn prepares the students to understand historically the concepts of freedom and bondage as also the larger process of ordering and reordering of society through coercion, consent and revolts. One of the objectives of the course is to highlight the interconnectedness of Greek and Roman religion, culture and society. We discuss the Medieval world in the Course by analyzing the nature of European 'feudal' society and economy of the 8th to the 14th centuries. As different sections of society forged newer military and economic ties, the medieval institutions, particularly the Church played an important role in the confirmation of these ties. The European social world shaped into an intricate structure comprising powerful institutions like monarchy and the Church. The Course provides a scope to understand the medieval economy of Western Europe, particularly through its agrarian dimensions and relatively newer labour systems like serfdom. And finally, the Course allows an undergraduate student to reflect on questions related to the emergence and spread of Islam. An enquiry into the role that it played in the transformation of a tribal identity to a Caliphal State in West Asia from the 7th to the 9th centuries widens the quest for 'training' students to understand the long-term historical processes.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Identify the main historical developments in Ancient Greece and Rome.
- Gain an understanding of the restructuring of state and society from tribe-based polities to those based on territorial identity and citizenship.
- Trace the emergence and institutionalisation of social hierarchies and marginalisation of dissent.
- Explain the trends in the medieval economy. Analyse the rise of Islam and the move towards state formation in West Asia.
- Understand the role of religion and other cultural practices in community organisation.

Semester-III:

(i) Core Course V History of India- III (c. 750-1200)
(ii) Core Course VI Rise of the Modern West- I
(iii) Core Course VII History of India- IV (c. 1200–1500)

Program outcomes:

History of India- III (c. 750-1200)

- This course is designed to make students trace the patterns of change and continuities in the economic, political, social and cultural aspects of life during the 'early medieval period' (c. A.D. 750 – A.D. 1200) of Indian history. With its focus on multiple historiographical approaches to various issues of historical significance during this period, the course will also apprise students of the divergent ways in which historians approach, read and interpret their sources.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Critically assess the major debates among scholars about various changes that took place with the onset of early medieval period in India.
- Explain, in an interconnected manner, the processes of state formation, agrarian expansion, proliferation of caste and urban as well as commercial processes.
- Discuss the major currents of development in the cultural sphere, namely bhakti movement, Puranic Hinduism, Tantricism, architecture and art as well as the emergence of a number 'regional' languages.

Core Course VI Rise of the Modern West- I

Program outcomes

- The focus of the course is on transition from feudalism to capitalism in Europe. The paper familiarizes the student with important transitions and transformations in the economy, polity, and socio- cultural life from late medieval period to 1600 in various parts of Europe. The course shall critically examine the dynamics of economic and political power within Europe, and contact with the New World. The processes by which Europe's economy benefited from colonial expansion and exploitation of indigenous and slave labour will be explained. Students shall also engage with continuities and changes in intellectual and artistic realms; the social and economic milieu which influenced developments in religion; trends in state formation; and the relationship between state and religion. Students will be introduced to the concept of Eurocentrism in our understanding of the Rise of the Modern West.

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Outline important changes that took place in Europe from the medieval period.
- Acquire an integrated approach to the study of economic, social, political and cultural developments in Europe.
- Explain the processes by which major transitions unfolded in Europe's economy, state forms, social structure and cultural life. Examine elements of early modernity in these spheres.
- Critically analyse linkages between Europe's state system and trade and empire.

History of India- IV (c. 1200–1500)

Course Objective:

- This course seeks to engage students in an analytical understanding of the varied perspectives from which historians study the three centuries between the thirteenth and the fifteenth centuries. It provides them with a basic understanding of the political, economic and socio-cultural processes of the time especially with reference to Rajput polities, Gujarat sultanate, Vijayanagara state as well as the Delhi Sultanate. Sufism and major trends in bhakti 'movement' are explained to the students. Learners are also encouraged to engage with diverse corpus of sources available to historians for the period under study.

Learning Outcomes: On completion of this course, the students shall be able to:

- Discuss different kinds of sources available for writing histories of various aspects of life during the thirteenth to the fifteenth centuries.
- Critically evaluate the multiple perspectives from which historians have studied the politics, cultural developments and economic trends in India during the period of study.
- Appreciate the ways in which technological changes, commercial developments and challenges to patriarchy by certain women shaped the times.

Semester-IV:

(i) Core Course VIII Rise of the Modern West- II

(ii) Core Course IX History of India V (c. 1500-1600)

(iii) Core Course X History of India- VI (c. 1750-1857)

Rise of the Modern West- II

Course Objectives:

- This paper offers an in-depth historical analysis of economic, political and social transformations in Europe during the 17th and 18th centuries. Cyclical and secular trends in history, important political shifts, modern scientific views, and intellectual developments of the 17th and 18th centuries will be analysed closely. The paper will trace the development of socio-economic and technological forces which went into the making of the Industrial Revolution in late 18th century Britain. The role of trade and empire, colonial networks, and slavery will be examined to emphasize their contribution to industrial capitalism. The divergence debate will further help draw parallels and subsequent differences between Europe and Asia, and broaden our understanding of early modern Europe.

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Explain major economic, social, political and intellectual developments in Europe during the 17th and 18th centuries.
- Contextualize elements of modernity in these realms.
- Discuss the features of Europe's economy and origins of the Industrial Revolution.
- Analyse the relationship between trade, empire, and slavery and industrial capitalism. Examine the divergence debate.

History of India V (c. 1500-1600)

Course Objectives:

- The course is intended to engage students into a critical discussion of political, institutional and cultural processes that led to the establishment and consolidation of the Mughal state in India. It also provides a basic understanding of major developments in other areas of the Indian subcontinent that were not ruled by the Mughals in the sixteenth century. The students would familiarize themselves with the nature and variety of sources as well as the diverse and uneven ways in which historians have treated and interpreted them.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Critically evaluate major sources available in Persian and vernacular languages for the period under study
- Compare, discuss and examine the varied scholarly perspectives on the issues of the establishment, consolidation and nature of the Mughal state.
- Explain the changes and continuities in agrarian relations, land revenue regimes, Bhakti and Sufi traditions
- Discuss how different means such as visual culture was used to articulate authority by the Rulers. Discern the nuances of the process of state formation in the areas beyond the direct control of the Mughal state.

History of India- VI (c. 1750-1857)

Course Objectives:

- The paper introduces students to key features of the 18th century in the Indian subcontinent. It analyses the interface between the 18th century kingdoms and the early colonial state. The paper also discusses the processes by which the British East India Company transformed itself into a state and gradually consolidated its position over a vast expanse. Apart from the evolution of colonial institutions of governance and developing forms of colonial exploitation, the paper also highlights the interface between Company Raj and indigenous elite on various social issues. The paper concludes with a critical survey of peasant resistance to colonial agrarian policies, and the 1857 revolt against the Company Raj.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Outline key developments of the 18th century in the Indian subcontinent.
- Explain the establishment of Company rule and important features of the early colonial regime.
- Explain the peculiarities of evolving colonial institutions and their impact.
- Elucidate the impact of colonial rule on the economy.
- Discuss the social churning on questions of tradition, reform, etc. during first century of British colonial rule.
- Assess the issues of landed elite, and those of struggling peasants, tribals and artisans during the Company Raj.

Semester V:

(i) Core Course XI History of Modern Europe – I

(ii) Core Course XII History of India- VII (c. 1600-1750

History of Modern Europe – I

Course Objectives

- Thi s paper shall provide a critical overview of the French Revolution, and acquaint the students with the repercussions of the revolution, both within and beyond France. It shall also trace the patterns and outcomes of

social upheaval throughout Europe in the first half of 19th century. The debates on the development and impact of industrial capitalism shall be discussed. The birth of new social movements, political ideas and structures shall be contextualised within developing capitalism of the nineteenth century.

Learning Outcomes: On completing this course, the students will be able to:

- Identify what is meant by the French Revolution.
- Trace short-term and long-term repercussions of revolutionary regimes and Empire-building by France.
- Explain features of revolutionary actions and reactionary politics of threatened monarchical regimes.
- Delineate diverse patterns of industrialization in Europe and assess the social impact of capitalist industrialization.
- Analyse patterns of resistance to industrial capital and the emerging political assertions by new social classes.

History of India- VII (c. 1600-1750)

Course Objectives:

- The course draws students into a discussion of the multiple historiographical narratives available for the history of India in the period between the early seventeenth and the mid-eighteenth centuries. It intends to familiarise them with internal as well as external problems and challenges that the Mughal state faced in the process of territorial expansion. Students also get to explore state sponsored art and architecture as part of the courtly cultures. Further they are encouraged to critically examine the major strides that were made in trade, technologies and artisanal activities during this period. In addition, the course aims to introduce students to contrasting religious ideologies of the time besides developing a critical insight into the historiographical debate on interpreting the eighteenth century in Indian history.

Learning Outcomes: On completion of this course, the students shall be able to::

(i) Critically evaluate the gamut of contemporaneous literature available in Persian and non-Persian languages for the period under study

(ii) Describe the major social, economic, political and cultural developments of the times

(iii) Explain the intellectual ferment of the seventeenth and eighteenth centuries and its relation to state policies.

(iv) Discern the larger motives behind the Imperial patronage of art and architecture

(v) Appreciate and express the continued expansion and dynamism of agriculture, crafts and maritime trade in India.

Semster VI

(i) Core Course XIII History of India VIII (c.1857 - 1950)

(ii) Core Course XIV History of Modern Europe- II

History of India VIII (c.1857 - 1950)

Course Objectives:

- This paper deals with the broad socio-economic and political trends in colonial India from the latter half of the 19th century. It also critically analyses the various trends in the national liberation movement and other aspects of politics which were foundational for the modern Indian state. The aim is to develop interdisciplinary analytical skills at the undergraduate level.

Learning Outcomes: After successful completion of the course, the students will be able to:

- Identify how different regional, religious, linguistic and gender identities developed in the late 19th and early 20th centuries.
- Outline the social and economic facets of colonial India and their influence on the national movement.
- Explain the various trends of anti-colonial struggles in colonial India. Analyse the complex developments leading to communal violence and Partition.
- Discuss the negotiations for independence, the key debates on the Constitution and need for socio-economic restructuring soon after independence.

History of Modern Europe- II

Course Objectives:

- This paper offers a historical overview of the development of nationalities and nation-states in the 19th and 20th centuries. Among the various case studies discussed, the paper traces the buildup to a revolution in the disintegrating Russian empire. It also introduces students to the concept of imperialism. In this light, the paper discusses the varied historical writings on World War One and on the nature of developments during the inter-war period. It familiarises students with the intellectual and art movements that were linked to the changes in the socio-economic and political milieu of 19th and early 20th century Europe.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Trace varieties of nationalists and the processes by which new nation-states were carved out.
- Discuss the peculiarities of the disintegration of large empires and remaking of Europe's map.
- Deliberate on the meaning of imperialism and the manifestations of imperialist rivalry and expansion in the 19th and early 20th century.
- Analyse the conflict between radical and conservative forces, and the gradual consolidation of ultra-nationalist and authoritarian regimes in Europe.
- Contextualise major currents in the intellectual sphere and arts.

Discipline Specific Elective

Semester V

DSE-I

(i) History of the USA: Independence to Civil War or

(ii) History of the USSR: From Revolution to World War II (c. 1917-1945) or

(iii) History of Africa, c.1500-1960s or

(iv) Gender in Indian History up to 1500 CE or

DSE-II

(i) History of Modern China (C. 1840-1950s) or

(ii) The Making of Pre-Colonial Southeast Asia or

(iii) Global Ecological Histories

DSI- I History of the USA: Independence to Civil War

Course Objective

- The course attempts to study the beginnings of the 'New World' and its diverse demography. It facilitates the understanding of the invaluable contributions of the marginalized social groups that contributed to the development of USA. It focuses on the evolution of American democracy, capitalism and its limitations along with USA's quest for dominance in world politics.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Explain the evolving and changing contours of USA and its position in world politics.
- Examine the limits of American democracy in its formative stages.
- Analyse the character of early capitalism in USA and resultant inequities.
- Describe the economics of slavery in USA along with details of slave life and culture.
- Explain the main issues related with the Civil War in USA and its various interpretations.

DSE-II History of the USSR: From Revolution to World War II (c. 1917-1945)

Course objective:

- The course introduces students to the history of the USSR from the two revolutions of 1917 to the end of the Second World War. Students study the various challenges faced by the Bolsheviks and the steps taken to resolve these issues. Students will also trace the evolution of new institutions and ways of organizing production both in the factory and at the farm. They will also evaluate important foreign policy issues like the setting up of the Comintern, Soviet foreign policy and the Soviet Union's involvement and role in the World War.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Demonstrate a nuanced understanding of the major issues in the History of the USSR between 1917 to 1945.
- Explain how USSR emerged out of Imperial Russia.
- Summarize the steps in the consolidation of Bolshevik power.
- Explain the new organization of production in the fields and in the factory.
- Identify linkages between ideology, purges and propaganda.
- Examine Soviet policies for the period of the course in relation to nationalities and gender questions and literature and art forms. Outline Soviet foreign policy issues.

DSE_III History of Africa, c.1500-1960s

Course Objectives:

- This paper offers a historical overview of the African continent. It traces major long-term continuities and changes in Africa's socio-economic structures, cultural life and political formations from the 16th century to the mid-twentieth century. The paper closely examines colonial trade and rule, as well as anti-colonial resistance. It offers a critical analysis of the immediate post-independence years, and situates the specific positioning of Africa in connected histories of a globalizing world.

Learning Outcomes:

On completion of this course the student shall be able to

- Critique stereotypes on the African continent and outline major shifts in African history.
- Explain elements of change and continuity in the African political experience, political regimes and national formations, economy, society and cultural milieu from the 16th to 20th centuries.
- Contextualize the impact of colonialism on the African continent.
- Explain social protest and anti-colonial resistance in Africa, as well as practices of 'transculturation'.
- Discuss the dilemmas and contradictions emerging from the post-independence economic, social, political and cultural milieu.

DSE-IV Gender in Indian History up to 1500 CE

Course Objectives:

- The course teaches how 'Gender' is not an innocent term denoting biological differences but a social and culturally constructed unequal relationship that needs careful historical analysis in the context of Indian history. The focus is not merely on studying 'women's history' but to go beyond and explore aspects of masculinities as well as alternative sexualities, spanning temporal frames from prehistory to 1500 CE. There is an added emphasis

on learning inter-disciplinary analytical tools and frames of analysis concerning familiar topics such as class, caste, and environment that enriches an understanding of historical processes.

Learning Outcomes: On completion of this course students shall be able to

- Explain critical concepts such as gender and patriarchy and demonstrate their use as tools for historical analysis
- Examine the role and functioning of power equations within social contexts in Indian history
- during the ancient period, in the construction of gender identities
- Critically examine representations of gender in literature, focusing on ideas of love, manliness and religiosity
- Examine the role of social and political patronage of art and literature in perpetuating gendered Inequalities.

DSE-II

DSE IX:- HISTORY OF MODERN CHINA (c. 1840s-1950s)

Course Objectives:

- The course studies the transformation of China from an imperial power into a modern nation taking its place among a constellation of world powers. This transition has been studied in the context of the impact of a specific form of western imperialism on China and the country's numerous internal fissures and contradictions. This paper seeks to focus on a range of responses to the tumultuous changes taking place: various strands of reform (from liberal to authoritarian), popular movements, and revolutionary struggles. It facilitates an understanding of the multiple trajectories of China's political and cultural transition from a late imperial state, to a flawed Republic, to the Communist Revolution led by Mao Tse Tung. The paper shall expose students to historiographical debates pertaining to each of these themes, keeping in mind historical and contemporary concerns centered on such issues.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Develop an in-depth understanding of China's engagement with the challenges posed by imperialism, and the trajectories of transition from feudalism to a bourgeois/ capitalist modernity.
- To locate these historical transitions in light of other contemporaneous trajectories into a global modernity, especially that of Japan.
- Analyse significant historiographical shifts in Chinese history, especially with reference to the discourses of nationalism, imperialism, and communism.
- Investigate the political, economic, social and cultural disruptions caused by the breakdown of the centuries old Chinese institutions and ideas, and the recasting of tradition to meet modernist challenges.
- Comprehend the genesis and unique trajectories of the Chinese Communist Revolution.
- Locate the rise of China and Japan in the spheres of Asian and world politics respectively.

DSE X: The Making of pre-Colonial Southeast Asia

Course Objectives:

(i) This course offers an overview of pre-colonial Southeast Asian history. It seeks to familiarize students with historiographical debates involving the construction of Southeast Asia as a region. It analyses processes of state formations, the impact of maritime activity on society and polity in the mainland and the archipelago. It focuses on the development and localization of religious traditions across a linguistically and culturally diverse region. The paper will require students to engage with recent developments in the historiography especially with recent research on aspects of social and political history, external influences on the region, architecture, urban history and its local histories. Through this the student will develop a clear and comprehensive understanding of different aspects of pre modern Southeast Asian history.

Learning Outcomes: Upon completion of this course the student shall be able to:

(ii) Explain the processes of state formation, the localization and spread of religious traditions like Islam and Buddhism

(iii) Analyse the impact of the European presence on local society

(iv) Examine the impact of maritime activity of local society and polity and the developments in the economic and architectural history of the region.

(v) Discern the history of Populist and Progressive movements along with introduction of New Deal in response to the Great Depression.

(vi) Describe the historiographical trends to study history of Southeast Asia

DSE XI: Global Ecological Histories

Course Objectives:

- This course will examine the relationship between society and nature from prehistoric times to the present. Drawing on environmental, political ecology, historical geography and gender studies perspectives, the course will introduce students to the concepts, methods and ideas of global ecological histories. Moving beyond regional and national scales of analysing historical processes, the following units elaborate the global interconnectedness of socio-ecological histories. With a long-term perspective on the overlapping nature of historical and geological time, the course provides critical perspectives on how social differences including class, gender, caste, ethnicity and nationality were articulated ecologically.

Learning Outcomes:- Upon completion of this course the student shall be able to:

- Critique an understanding of environmental concerns based on a narrow scientific/technological perspective

- Discuss environmental issues within a social- political framework
- Examine the role of social inequality, i.e. unequal distribution of and unequal access to environmental resources. This is critical in gaining an understanding of the environmental crisis of the world - from the global to the local
- Examine the complexities of resource distribution and inequalities of resource use, locating these within specific social contexts, with reference to case studies regarding water rights and forest rights
- Locate solutions to environmental problems within a framework of greater democratisation of resource use
- Problematise (or *critique?*) the notion of a pristine past - of perfect balance between human societies and nature in pre-modern times.

Semester-VI

DSE-III

(i) History of the USA: Reconstruction to New Age Politics

(ii) History of the USSR: The Soviet Experience (c. 1945-1991)

(iii) History of Latin America, c.1500-1960s

DSE-IV

(i) GENDER IN INDIAN HISTORY, c.1500-1950

(ii) HISTORY OF MODERN JAPAN (c. 1868-1950s)

(iii) History of Southeast Asia: Colonial to the Post Colonial

(iv) The Making of Contemporary India (c. 1950-1990s)

DSE-V: History of the USA: Reconstruction to New Age Politics

Course Objective

- The course attempts to understand the changing political culture of USA following the Civil War and Reconstruction. It focuses on the gender roles and mobilization of the African-Americans in the long duration, charting the processes that marked the eventual beginnings of the Civil Rights Movement and the Feminist Movement. It studies worker's culture, labour unions and movements, agrarian and urban reform even as it understands the strengthening and consolidation of American capitalism and imperialism and its impact on the global environment.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Explain the reasons for the implementation of 'Reconstruction' and the causes for its limited success.
- Analyse the growth of capitalism in USA especially in terms of big business, Monopolosim, etc.
- Examine the features of Labour Union movements.
- Discern the history of Populist and Progressive movements along with introduction of New Deal in response to the Great Depression.
- Describe the nature of Women's Liberation movement and also explain the 'Pastoralization' of Housework
- Illustrate the significance of Civil Rights Movements and Martin Luther King Jr.

DSE VI: History of the USSR: The Soviet Experience (c. 1945-1991)

Course Objectives:

- The course studies the most dramatic years in the history of the USSR .i.e. the period between 1945 to 1991. During these years the Soviet Union acquired the status of a super-power. The extent of major economic and political changes between 1956 and 1991 will be examined. Students will also study the origins of the Cold War and Khrushchev's foreign policy and relations with Eastern European and other socialist countries. The students will be acquainted with trends in literature and culture during this period. The reforms of the Gorbachov era and the question of nuclear disarmament will provide some of the contexts for the study of the larger [global] processes that led to the dissolution of the Soviet Union.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Outline and explain key developments in the history of the USSR between 1945 and 1991.
- Critically analyse the Soviet political system and its global impact
- Co-relate the various developments to culture and literary growth.
- Explain the origins, developments and the end of the Cold War.
- Analyse the factors leading to economic slowdown, disintegration of the Soviet Union and the formation of Confederation of Independent States.

DSE VII: History of Latin America, c.1500-1960s

Course Objectives:

- This paper offers a historical overview of Latin America. It traces major long-term continuities and changes in Latin America's socio-economic structures, cultural life and political formations from the 16th century to the mid-twentieth century. The paper closely examines colonial trade and rule, as well as anti-colonial resistance. It offers a critical analysis of the immediate years post-independence, and situates the specific positioning of Latin America in connected histories of a globalising world.

Learning Outcomes: On completion of this course the student shall be able to

- Critique stereotypes on Latin America and outline major shifts in Latin American history.

- Explain elements of change and continuity in Latin American polities, economy, society and cultural milieu from the 16th to 20th centuries.
- Contextualise the impact of colonialism on Latin America.
- Explain social protest and anti-colonial resistance in Latin America, as well as practices of 'transculturation'.
- Discuss the dilemmas and contradictions emerging from the post-independence economic, social, political and cultural milieu.

DSE-VIII: GENDER IN INDIAN HISTORY, c.1500-1950

Course Objectives:

- The module will delineate gendered constructs in Mughal and Modern India. It contextualizes the participation and contribution of women in imperial spaces, political and legal processes, which had male predominance. While examining questions and debates on social reforms, caste, religious identities, popular culture and partition, it questions patriarchy and the nuances of historical gender dynamics. The course tries to historicize and analyse institutions of harem, household and norms of masculinity, through cultural expressions in music, literature and paintings. The course also tries to give students a critical overview of the tangled historiographical paradigm that labels women as 'victims and agents' and 'objects and subjects'.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Explain critical concepts such as gender and demonstrate its use as a tool for historical analysis, through a historiographical engagement
- Critically assess popularly held notions about women in Islamic empires
- Examine critical issues of gender and power in the context of medieval and early Modern Indian history
- Examine the social reforms around the 'women's question' in the modern period of Indian history.
- Explore the popular culture of the modern period to study the dynamics of class and caste in the context of marriage and society
- Discuss issues of gender in the context of partition and the post-partition period of the construction of the independent state

DSE XII: HISTORY OF MODERN JAPAN (c. 1868-1950s)

Course Objectives:

- The course studies the transition of Japan from quasi-feudalism to a modern industrialised capitalist nation. It focuses on the political and economic strategies adopted by Japan to meet the challenges posed by western imperialistic intrusions. It facilitates an understanding of Japan's emergence as a major non-European power within an international order dominated by western imperial powers. It studies the trajectory of Japan towards ultra-nationalism and militarism in the context of a failed parliamentary democracy, eventually leading to disaster in the Second World War. The course aims to pay close attention to historiographical shifts in all topics, contextualizing these against the backdrop of their contemporary history and politics. Adequate attention is given to the study of social and cultural aspects with a special emphasis on the role of women in late 19th and early 20th century Japan.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Explain Japan's attempts to create new institutional structures and recast traditions to encounter challenges of the west.
- Analyse historiographical shifts in Japanese history in the context of global politics.
- Examine the divergent pathways to modernity followed by Japan.
- Examine distinct perspectives on imperialism and nationalism in East Asia, and understand how historiographical approaches are shaped by their contexts.
- Conceptualise how these distinct histories can be rooted in common cultural traditions.
- Locate and contextualise the history of Japan in world politics.
- Critically discuss contemporary international studies with much greater clarity based on the knowledge of history and culture of Japan.

DSE XIII: History of Southeast Asia: Colonial to the Post Colonial

Course Objectives:

- This paper offers an overview of modern Southeast Asian history to students who could be familiar or unfamiliar with the region. A study of the social, economic, and political transformations in Southeast Asia during the colonial period will enable students to develop a critical and comparative approach, given their in-depth study of South Asian history. In this paper students will learn how to engage with recent historiographical developments, especially on themes of education, gender, race, historical anthropology, and maritime history. The paper offers analysis of impact of colonialism and the process of de-colonisation on the region. The student shall analyse the establishment and changing character of the European presence from a commercial enterprise to a colonial state; the transformation of local society and the emergence of anti-colonial movements; and the transformations in the region since the Second World War.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Explain the character and functioning of colonial state and society.

- Analyse the impact of the European presence on maritime and agrarian economy of the region.
- Examine the impact of maritime activity of local society and polity and the developments in the economic and architectural history of the region.
- Discern the influences of new forms of knowledge, Euro-centric notions of modernity and how ideas of race defined local religion.
- Illustrate the transformation of the local agrarian and labour economy.
- Interpret the history of popular movements and peasant revolts
- Describe the historiographical trends to study history of Southeast Asia.

DSE XIV: The Making of Contemporary India (c. 1950-1990s)

Course Objectives:

- This course introduces the students to various perspectives on India's evolving political, economic and cultural situations from the 1950s to the 1990s. The course intends to familiarise the students with the dynamic transformation of Indian society and its political expressions. Students will study the transformation of political organizations, the emergence of new forms of political mobilization and emerging challenges to Indian democracy.

Learning Outcomes: On completion of this course the student shall be able to

- Draw a broad outline of the history and politics of the early years of Independence, including the framing of the constitution and the linguistic reorganisation of states.
- Examine critically issues of economic development in the early years of Independence, particularly the problems of development
- Summarize critical issues pertaining to the history of Non-Alignment and Panchsheel
- Trace the significant developments in the history of India, since 1947, including the history of the Congress party, the Naxalbari and the JP Movement, as well as political developments in the regional context
- Examine issues of critical relevance in the history of India from 1970s to 1990s, with special emphasis on caste assertion and mobilisation in politics and right-wing nationalism
- Outline and examine the major developments in the history of social reform around the question of 'Women and law'
- Evaluate the history of Environmental movements in India since Independence
- Examine the formation of a 'civil society' and the emergence of popular movements in North East India
- Trace the history of Judiciary in Independent India with special focus on Public Interest Litigation
- Construct a history of Media in modern India, a history of Modern Indian Art and one of Sports as well as evaluate the significance of these in the making of a Modern Nation

GE PAPERS

Semester I

GE I-

(i) Delhi Through the Ages: The Making of its early Modern History

(ii) Science, Technologies and Humans: Contested Histories

GE I Delhi Through the Ages: The Making of its early Modern History

Course Objective:

- The objective of the paper is to teach students about the changes in the city of Delhi from its early inception to the eighteenth century. The course teaches how the city grew into one of the largest cities in the world and was the capital of some of the great empires of its time. As the capital of these empires, Delhi profited from continuous immigration, state patronage and a vibrant cultural life. But the course also wants students to learn that the city was not merely dependent upon its rulers for cultural and political sustenance. It focuses on Sufis, litterateurs and merchants who also gave the city its unique character and resilience in the face of political turbulence. Other than recourse to readings the course tries to acquaint students with Delhi through project work and introspection of Delhi's presence and its uneasy relationship with its past.

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Analyse different kinds of sources -- archaeological, architectural and a variety of textual materials.
- Use these materials and correlate their sometimes discordant information.
- Analyse processes of urbanization and state formation.
- Describe the difficulties in appropriating narratives of the state with the history of particular localities.

GE II Science, Technologies and Humans: Contested Histories

Course Objective

- This course proposes to examine the histories of science and technology with respect to social acceptance, economic viability and politics associated with it. While dealing with the history of science and technology this

paper challenges the notion of 'modern origins of science in western societies. Human instinct to understand unknown and need to predict future which often venture into providence has been explored through case study of astronomy and astrology. Paper ana-lyses impact of hegemony of colonial science on traditional knowledge systems. Paper proposes two case studies to highlight the highly contested heritage of science. The thin line between military and peaceful use of technology in the capitalist economy also constitute important component of paper. A brief discussion on science and nation making has been introduced to highlight the role of important figures that shaped the nature of Scientific development in India.

Learning Outcomes:

- After completing this course, students should be able to:
- Critique the prevalent dominant understanding of science and technology.
- Discuss the complex relations between science, technology and society.
- Examine the role of politics associated with scientific and technological developments and its
- economics in the capitalist economy
- Examine the character of 'dual use' technologies.
- Define various initiatives taken by government for promotion of science and technology.

Semester II

GE II

(i) Delhi Through the Ages: From Colonial to Contemporary Times
(ii) The World After 1945
(iii) History and Culture: Representations in Texts, Objects & Performance

GE IX: Delhi through the Ages: From Colonial to Contemporary Times
Course Objectives:

This course examines physical and social transformation of Delhi from the colonial to the con-temporary times. Focusing on the echoes of political developments on urban form and social
experience, it aims to explore the historical antecedents of some of the capital's contemporary dilemmas.

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Contextualize contemporary questions with regard to the city in the light of its colonial past and lived present.
- Analyse the political developments and their legacy for the shaping of the city.
- Discern importance of 'local' social, ecological and cultural processes that shape and reshape
- the city
- Explain the historical roots of the problems of sustainable urbanization with regards to Delhi.

GE III: The World After 1945
Course objectives

- This course seeks to familiarize students with broad trends in politics, society and culture in the latter half of the twentieth century and the early part of the twenty first century. It seeks to familiarize the student to the historical processes that led to the dismantling of older powers and Thermatron of new political and cultural regimes. The emergence of the new social movements challenging these regimes and the move towards unipolarity by the end of the 20th century constitute important themes of study for students. In the end the course seeks to develop a critical understanding of globalization with its diverse implications across continents. It does so by encouraging students to critically engage with selected themes such as environment, social movements, art, digital media, etc.

Learning Outcomes:

- Upon completion of this course the student shall be able to:
- Analyse the evolving polities, societies and cultures of an increasingly global world.
- Analyse diverse social movements and cultural trends.
- Analyse processes of Decolonization and politics during Cold War era.
- Draw inferences to explain the inter-connectedness of various facets of culture; sports, music, cinema, etc.

GE IV History and Culture: Representations in Texts, Objects & Performance
Course Objective:

- The objective of the course is to teach culture through its intangible and tangible attributes that are discussed in four themes including traditions of kingship and courtly culture; inter-cultural perceptions of 'other' religious communities and gender; performing ritual devotions by recitation of songs and processions; and exploring performance of narrative traditions using inanimate objects like, masks, puppets and cloth/paper scrolls. This course requires students to explore the continuity of cultural patterns, iconic representations, and styles of performance into our present times. For example, the iconic raja (king) of the pre-modern times continues to perform royal ritual and sacrificial ceremonies, into contemporary times when India is a republic. The court

jester of the past lingers on into the present as represented by Hajari Bhand. The complex natureof inter-cultural discourse between the Hindus and Muslims continues into the present and we know that neither community represents monolithic form. What shall we make of these multifaceted representations? How do performative traditions evolve over time? The pedagogy of an interdisciplinary approach is thus inbuilt into the structure of this course. Readings and audio-visual material have been knitted into themes to encourage active participation and discussion in the classroom.

Learning Outcomes: Upon completion of this course the student shall be able to:

- Identify complex nature of kingship in medieval times through the case study of Krishnadevaraya of Vijayanagara.
- Discuss the nature of identities and interactions between different groups of people in thepast and the present.
- Examine the complex nature of religious communities in the past and their fluid participationin ritual and culture. Illustrate how culture is communicated through narrative strategies and performative acts.
- Distinguish that textuality and performativity are not binary opposites and are mutually interactive.
- Develop analytical skills that are necessary for students of literature, sociology, anthropology,religion, psychology, political science and South Asian studies.

Semester III

GE III

(i) Politics of Nature

(ii) Making of Post Colonial India

GE V: Politics of Nature

Course Objective:

- This introductory course familiarises students with the major themes in the history of human organization of nature -- for food, energy and raw materials. It studies the long-term transformations in the organization of Nature by the state and to manage energy production, plant and animal transfers, circulation of commodities and people, urbanization and industrialization of production. This will help students understand the ecological articulation of social inequalities including class, gender, ethnicity, caste, and nationality. By focusing on the planetary scale of ecological interconnectedness students will learn how to situate the politics of Nature that integrates extremes: poverty in the fertile plains, the development of cities and related environmental degradation elsewhere, scarcity of energy where dams and mines exists, and inequalities produced by carbon-energy regimes. Unit 5 will introduce the students to the issues and debates related to the ecological predicaments of the twenty-first century in a historical perspective.

Learning Outcomes

Upon completion of this course the student shall be able to:

- Critique an understanding of environmental concerns based on a narrow scientific/ technological per- spective
- Discuss environmental issues within a social and political (or social scientific? framework Examine the role of social inequality. How does unequal distribution of and unequal access
- to environmental resources help understand the environmental crisis of the world - from the
- global to the local
- Examine the complexities of resource distribution and inequalities of resource use, locating
- these within specific social contexts, with reference to case studies regarding water rights and forest rights
- Locate solutions to environmental problems within a framework of greater democratization of resource use Problematise (or critique?) the notion of a pristine past - of perfect balance between human societies and nature in pre-modern times.

GE – VI: Making of Post-Colonial India

Course Objectives:

- The course provides various perspectives on India's evolving political, economic and cultural situations from 1950-1990s and tracks a dynamic trajectory of contemporary India. The course seeks to familiarise students with the trajectory of growth of the Indian state, politics and eco-nomy and the shaping of the Indian public following the country's independence in 1947.

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Explain the complexities involved in the making of constitution.
- Analyse the reasons behind the linguistic reorganisation of states.
- Analyse foreign policy of India during formative stages of independent India.
- Draw inferences to explain the functioning of different political parties.
- Explain the character of emergency and its consequences.

- Discern the nuances of Indian judicial system.

Semester IV
GE IV
GE-VII: Religion and Religiosity
Course Objectives:
This course seeks to provide an understanding of (a) multiple religious traditions that flourished through the ages in the Indian subcontinent; (b) how each religious tradition is dynamic and changing in relation to each other and in relation to its own past; (c) the ways in which each expanded or contracted; (d) how the modern Indian state and its constitution dealt with the issue of multiplicity of beliefs; and (e) to understand the varied scholarly approaches to each of the issues outlined above.
Learning Outcomes:
Upon completion of this course the student shall be able to:

- Describe the basic chronological, spatial and substantive contours of each of the religioustraditions as well as certain intellectual currents that questioned them.
- Analyse and articulate the long-term changes that each religious tradition undergoes in a dynamic relationship with its own past, with non-religious aspects of life, and with other religious traditions.
- Identify and describe the formation of religious boundaries, identities and the scope for the liminal spaces in between Appreciate, examine and relate to the debates on the ways in which modern Indian state and its constitution must deal with the issue of plurality of religious beliefs .

GE-VIII: Inequality and Difference
Course Objective

- Even as India evolved a composite culture within a notion of civilizational unity, differences persisted and were maintained. Using a variety of primary and secondary texts, key issues in ancient Indian social history such as varna, jati, class caste, gender and perceptions of cultural difference are explored. In the Middle ages, with the formation of authoritarian regimes, the expansion of agrarian societies, and the emergence of pan-regional market economics, rather unique ways of articulating individual and collective identities, noting differences, formulating, displaying and reproducing social and economic inequalities came into being. In the modern period, under the impact of colonialism and a renewed engagement with tradition by indigenous intellectuals as well as the conscious attempt to frame the history of India in terms of equality and justice, differences were negotiated and transformed. The course looks at the persisting search for equality and for a politics that engages with the idea of difference within evolving political frameworks. Paper makes a conscious attempt to convey historical process through which 'categories' emerge and thereby emphasis the fluid character of categories. Paper critically engages with the political mo-bilization on the basis of inequalities/'identity politics' in an era of participatory form of government.

Learning Outcomes:
After completing this course, students should be able to:

- Critique the prevalent dominant understanding of Caste, Gender, and Tribe.
- Discuss the complex relations between differences and inequalities.
- Examine the inherent politics in the creation of inequalities and differences.
- Outline various initiatives taken by government to prohibit caste-gender atrocities and uplift
- of deprived sections of society and its limitations.

Skill Enhancement Course
SEMESTER III
SEC-I

(i) Understanding Heritage
(ii) Archives and Museums
(iii) Historian's Craft

SEC I: Understanding Heritage
Course Objectives:

- The aim of this paper is to make students familiar with the concept of heritage and its numerous forms. It will develop the contested character of heritage and why and it needs to be conserved. Paper will also acquaint students with the evolution of heritage legislation and the ways in which its institutional framework developed. Accessing monumental or cultural heritage can be a very difficult task and economic and commercial consideration play an important role. The paper will be of particular value to those who are interested in seeking a career in the travel industry and art and cultural studies.

Learning Outcomes:
Upon completion of this course the student shall be able to**:**

- Explain the complex character of heritage.

- Analyse the historical processes which result into the making of heritage.
- Describe the significance of cultural diversity in the creation of heritage.
- Illustrate how heritage can be a medium to generate revenue
- Discern the nuances of heritage and will appreciate its importance.

SEC-II: Archives and Museums

Course Objective:

- The aim of this course is to make students familiar with the structure and functioning of archives and museums with a view to understand how history is written. The special focus of the paper will be India and it will enlarge on the relationship between the reading, writing and interpretation of history and the preservation and display of its manuscripts, art objects and heritage. It will show how carefully archives and museums organize their materials to create particular interpretations of the past. The paper will be of particular value to those who are interested in seeking careers as archivists or working in museums, art galleries and keepers of private and public collections.

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Examine these two repositories of history from close quarters.
- Discuss the role of Colonialism in the growth of Archives and Museums.
- Explain how the documents and artefacts are preserved and the difficulties faced in the process.
- Demonstrate the way in which museums are organized and managed.
- Examine the considerations which govern the way exhibitions in museums are managed.

SEC-III: Indian Art and Architecture

Course Objective

- This course aims to provide an understanding of Indian art forms from ancient to contemporary times, fostering appreciation of its diversity and plurality of aesthetic richness. The course begins with how Indian art was perceived in the west and the construction of the orientalist canon, laying stress on the primacy of religion and race in Indian art and superiority of Western aesthetics. It also explores the nationalist response, underlining the transcendental and metaphysical aspects of Indian art, which gave it its 'Indianess' and reviews new concerns in Indian art studies regarding its social context. The course studies three vital manifestations of Indian art, keeping in view the transitions in terms of style, material, historical contexts, regional variations, elite/popular art, patterns of patronage, representation of gender and the study of iconography of different works of art.

Learning Outcomes:

At the end of the course, the student should be able to:

- Explain how Indian art was perceived and received in the west under colonial rule and its changing perspectives. This will set the template for examining its various manifestations.
- Through specific examples the student will be able to identify the historical context, socio-economic processes that went in the formation of art and architectural forms.
- Identify the stylistic features of different genres of art.
- Discuss the iconography of art forms.
- Differentiate between high/courtly art, popular art/folk, and tribal art.
- Point out the continuity in patterns and regional variations.
- Elaborate patronage patterns, artist-patron relations and representation of gender.

Semester-IV

SEC II

(i) Understanding Popular Culture
(ii) Historian's Craft
(iii) History, Sociology and Anthropology

SEC-IV: Understanding Popular Culture

Course Objective:

- The course aims to provide an overview of the various forms of the subcontinent's popular cultural practices, expressed through oral, visual and other mediums. Exploring the interface between various forms of popular culture and their historical evolution, the objective would be to sensitize learners to the rapidly evolving domain of popular culture. The course will enable students to grasp significant differences in cultural types as well as assess the impact of different types of cultural expressions on society**.**

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Discuss the range of theoretical perspectives that define popular culture, Describe the methodological issues involved in a historical study of popular culture.
- Identify the relevant archives necessary for undertaking a study of popular culture, while pointing out the problems with conventional archives and the need to move beyond them. Interpret these theoretical concerns through a case study.
- Examine the role of orality and memory in popular literary traditions,
- Demonstrate the evolution of theatre and dance within the popular performative traditions,
- Analyze the role of technology in the transformation of music from elite to popular forms,
- Examine the relationship between recipes/recipe books and the construction of national/regional identities,
- Discuss the history of the cultures of food consumption and its relationship with the constitution of a modern bourgeoisie. With specific reference to art, media and cinema, Examine the processes through which a pattern of 'public cultural consumption' emerged in contemporary times.

Skill Enhancement Paper V:Historian's Craft

Course Objective:

- This course aims to familiarise students with what it means to historicize human activities. It seeks to equip students with an understanding of what historians do, i.e. exploring causation, contingency, understanding human experiences, comprehending factors affecting human life and its surroundings, identifying structuring social forces. It examines how historians choose a historical frame, contextualize, and use different social categories like class, caste, gender, race, region, religion when producing a historical narrative. The course also discusses how to locate a source for history writing, check the credibility of sources, and distinguish between different kinds of sources. By familiarising the students with the essential tools of historical analysis, the course shall enable them to examine primary sources and their application to address a historical issue, problem or interpretation.

Learning outcomes:

On successful completion of this course, the students shall be able to:

- Outline / illustrate the need for historical perspective
- Explain the historical nature of all human activities and social sphere
- Distinguish essential features of historical inquiry
- Identify a social phenomenon and use a historical perspective to contextualize the concerned phenomenon, i.e. trace its changing nature / dynamics.
- Delineate sources that can be used to describe and interpret a social issue, an event, a given time period, or a wider social development.
- Differentiate between sources and assess their credibility in defining a historical development
- Demonstrate the ability to interpret sources, and to identify biases and blind spots in a historical narrative.

SEC-VI: History, Sociology and Anthropology

Course Objective

- The purpose of this course is to introduce students to the interdisciplinary field of Sociological-Anthropological History. Through this course students will (a) explore the historical relationship between History, and Sociology-Anthropology, and (b) familiarise themselves with the challenges of archival and field-work for historical research. The course will equip students to undertake historical study that is sensitive to the underlying structures and meanings of texts, practices/performances and oral traditions of historical value.

Learning Outcomes:

Upon completion of this course the student shall be able to:

- Analyse the cultural meanings of texts and undertake field-work relating to oral and social
- practices
- Distinguish between the history, theory and practice of Sociological-Anthropological History.
- Discuss the relevance of historical ethnography applicable to a variety of vocational areas.
- Describe the significance of Sociological-Anthropological History to examine the questions
- of gender, religion and environment.

B.A (Prog.) Course:

- The duration of the BA History Honours Programme is three academic years. Each academic year is divided into two semesters. The History Honours Programme therefore spans six semesters. Each semester is for the duration of sixteen weeks. The teaching and learning modalities in the Honours programme will involve theory classes (lectures) of one hour each and tutorial classes. The curriculum will be taught through formal lectures with the aid, wherever the teacher feels the need, of power-point presentations, audio and video tools. There are additional

requirements in certain courses for documentaries, cinema, field and archival work, visits to museums, class reports, discussions and project work. These are built into the teaching and assessment of many courses.

- The B.A. History Programme is organised to provide the greatest flexibility to its students. There are Core Disciplinary papers that provide the fundamental knowledge in the discipline of history and in the study of the History of India and the World. The programme is otherwise envisaged to provide a large amount of choice so that students can tailor their education on the basis of their interests. These provide not just skills in history but also a vital skill in other disciplines as well. The B.A. History Programme course is interdisciplinary keeping in mind that specialisation in History is the key to access cognate skills from other disciplines. With its mix of Core, Discipline Specific Electives and Skill Enhancement Courses it provides multiple points where students can participate in inter-disciplinary reflections on cross-cutting themes.
- At a general level, our courses are structured with the objective of giving requisite information about different aspects of the past to students, to teach them how to parse this information, instruct them on how historians research, frame an argument and debate details that have significance to how we understand the past and the present. The expected outcome is to provide students with a sense of how interconnected our present is with the past and how learning about the past provides them with the skills to understand the present. To facilitate this understanding, our courses, class room instruction and assignments give students the ability to think and reach their own conclusions. Our tutorial discussions, written assignments, class room presentations, field-work projects, consolidate their ability to analyse, research and process information.
- Graded assessment of all papers is broadly carried out in two forms: a) There is an end of semester [theory] examination which covers the entire syllabus. Students are asked ten questions and are required to answer five in three hours. The end of semester examination comprises 75% of the final grade. b) The second assessment is through internal evaluation of term papers, presentations, exams, and project work which is carried out throughout the term and comprises 25% of the final grade.

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Semester-I:

- **Core course 1 - History of India from earliest times up to c. 300 CE**
- **Program outcomes:**

History of India from earliest times up to c.300 CE

- This course explores various stages and processes of Indian history from prehistoric period to early historic centuries. It examines the historiographical shifts pertaining to what is termed as 'Ancient/early' India. Underlining the pan-Indian historical changes, it also focuses on regional diversities. The varied experiences in the Indian subcontinent can be seen in archaeological cultures and questions concerning literacy, nature of state formation and attendant cultural growth.

Learning Outcomes

- On successful completion of this course, students will be able to:
- Delineate changing perceptions on 'Ancient/early' India.
- Explain the importance of archaeological sources for study of proto-history and recognize the belated growth of literacy.
- Distinguish between civilization and culture, particularly in the context of first ever civilization in the Indian subcontinent.
- Outline the key features of the first ever empire under the Mauryas.
- Locate the shift of historical focus from Gangetic belt to newer areas.
- Discuss the processes of assimilations of people and ruling houses from outside the Indian subcontinent in to the mainstream.

Semester-II:

Core Course II- History of India, c. 300 to 1200

Core Course II- History of India, c. 300 to 1200

- **Program outcomes:**

  This course broadly covers from the last phase of early historic centuries to the early medieval. Considered as a watershed, Gupta period was known for beginnings of some historical changes that were likely to dominate the next five-six centuries. This course aims to underline and analyze how these changes in the all Indian provide important bases understanding transition to medieval period. This period of transition, called 'early medieval' seeks to examine regional manifestations.

Learning Outcomes

On successful completion of this Course, the students will be able to:

- Identify the historical importance of the accelerated practice of land grants issued by ruling houses.
- Delineate changes in the realm of polity and culture; puranic religion; the growth of vernacular languages and newer forms of art and architecture.

- Contextualize the evolution and growth of regional styles of temple architecture and the evolving role of these temples as centers of socio-economic and political activities.
- the capitalist-dominated world market via case studies of certain commodities.
- Describe the significance of the American Revolution.

Semester III
Core Course III: History of India, c. 1200-1700
SEC I: Heritage and Tourism

Core Course III: History of India, c. 1200-1700
Program outcomes:
This course provides an analytical study of the history of India from 1200 to 1700 CE. It introduces students to a thematic study of the main aspects of the period, delineating major transitions, changes and developments that include the establishment of the Delhi Sultanate, the Mughal state, Vijayanagara and Rajput polities, encompassing political, administrative, cultural and economic aspects. Through select regional case studies the course also underlines the interconnectedness of the subcontinental region in its transition to the Early Modern period.

Learning Outcomes: After the successful completion of this Course, the students will be able to:
- Identify the major political developments in the History of India during the period between the thirteenth and the seventeenth century.
- Outline the changes and continuities in the field of culture, especially with regard to art, architecture, bhakti movement and Sufi movement.
- Discuss the economic history of the period under study in India especially, where agrarian production and its implications are concerned.

SEC I: Heritage and Tourism
Program outcomes:
The objective of this course is to enable the students to understand the social, historic, scientific, aesthetic and economic values that are inherent in a cultural heritage. The template is set with practices of visual representation in colonial India and the institutionalizing of colonial archaeology. In the last quarter of the 19th century, Indian artefacts get museumized with the coming of exhibitions, fairs, collections, setting up of museums and botanical gardens. This making of Indian heritage through the rhetoric of spectacle in the colonial period forms part of the first unit. Moving to the contemporary times, to make the course more conducive to employment opportunities, present day practices of marketing heritage are explored in the next unit. Religious tourism, commercialization of nature tourism, nostalgia tourism and the lived experience of heritage walks as cultural representations are studied here. While there are obvious advantages of Tourism as being economically viable, the last unit deals with the impact of overkill tourism practices. Case studies of three different socio-ecological spaces, as also issues of conservation of heritage sites, making a case for sustainable tourism, are studied in the last unit. The objective of the course, strengthened with project work and field trips, is to equip the students to appreciate the nature of industries associated with heritage and tourism.
Learning Outcomes Upon successful completion of course students will have knowledge and skills to:
- Enhance his/her ability to discern the nature of the cultural heritage of the nation.
- Contextualize his/her country's history of heritage representation, to effectively comprehend the present.
- Draw inference from different aspects of tourism, its varieties and be sensitive to the impact of overkill tourism in different geographical areas with specific local sensibilities, thus making a case for sustainable tourism.
- Equip himself / herself with theoretical knowledge of heritage and tourism.

Semester IV
Core Course IV: History of India, c. 1700-1950
SEC - History and Archaeology
Program outcomes:
- This paper provides a thematically arranged overview of the history of India from the beginning of the eighteenth-century to the making of the republic in 1950. The first two units examine the British colonial expansion in the eighteenth-century and proceed to discuss the consolidation of the colonial state power in the political settings of nineteenth-century India. The third unit critically situates the links between land revenue administration, export-oriented commercialization of agricultural production and deindustrialization and the rampant famine in colonial India. With a long-term perspective on the ideological, institutional and political formations, the last four units introduce the major tendencies in the anti-colonial nationalist and popular movements in colonial and immediate post-colonial India.

Learning Outcomes After the successful completion of this Course, the students will be able to:
- Trace the British colonial expansion in the political contexts of eighteenth-century India and the gradual consolidation of the colonial state power in the nineteenth century.
- Identify the key historiographical debates around the colonial economic policies, including the land revenue collection, commercialization of agricultural production, trade policies and deindustrialization.

- Delineate and explain the ideological, institutional, and political formations of the anti-colonial nationalist movement.
- Discuss the colonial context of the emergence of communal politics in India and the subsequent partition of India.

SEC - History and Archaeology
Program outcomes:
- This course is about acquainting students with some basic concepts and methods of archaeological research such as excavation, survey, analysis of artefacts and various dating methods. This course will also make them aware of the contributions of key archaeologists and institutions in the evolution of archaeology as a discipline in India. Students will learn an integrative approach to the theoretical perspectives and praxis of archaeology in this paper. The main pedagogical tools for achieving these objectives would be case studies and project work in the context of the Indian subcontinent.

Learning Outcomes: Upon successful completion of course, students will have knowledge and skills to:

- Describe various stages of development of archaeology as a discipline.
- Discuss the methods of excavations.
- Explain various dating methods employed by the archaeologists.
- Identify and contextualize the past objects found during explorations and excavations of sites.
- Interpret aspects of past societies.
- Analyze the role of institutions and individuals in the development of Indian archaeology.
- Undertake projects related to the search of places related to the epics, Sangama texts and the Buddhist tradition.

Semester V
DSE III: Issues in Twentieth Century World History -I
SEC- Archives and Museum
GE I: Women in Indian History

DSE III: Issues in Twentieth Century World History -I
Program outcomes:
- This course aims to provide an understanding of 20thcentury world history not as a history of parts, individual nations but as an interconnected world history. The paper focuses on how the world changed in the first half of the twentieth century, from the World Wars to new radical and social movements. The course discusses how this world, ridden with conflict and violence, also witnessed growing desires for peace by through an organisation such as the United Nations. The emphasis is on taking up case studies to illustrate the processes and trends in society and culture.

Learning Outcomes: On completion of this course, the student will be able to:
- Define world history and explain the evolving polities.
- Categorise the economies and cultures of the twentieth century world.
- Define the making of the geopolitical order and 'North-South' distinctions.
- Delineate the complex character of modernity and its differences.
- Demonstrate critical skills to discuss and analyze diverse social movements and cultural trends.

SEC- Archives and Museum
Program outcomes:
- The aim of this course is to make the students familiar with the structure and functioning of both, archives and museums in India. This subject will also be taught with a view to give an insight into the aspects of employability in these institutions.

Learning Outcomes: Upon successful completion of course students will be able to:
- Examine these two repositories of history from close quarters.
- Contextualize how the heritage is preserved and kept alive here and the difficulties faced in the process.
- Demonstrate the way in which museums are organized and managed.
- Examine the considerations which govern the way exhibitions in museums are managed
- Assessment will be based on assignments and projects involving visits to the archives and museum, which is an essential component of this course.

GE I: Women in Indian History
Program outcomes:
- The paper introduces learners to a historical analysis of the lived experiences of women at specific historical moments in the Indian subcontinent. It explores the concerned issues within an interdisciplinary framework. The students will also be familiarized with the theoretical reflections on the study of women's issues with reference to

latest researches in the field. The course seeks to make students reflect on the specificity of women's issues in different times and contexts. At the same time, it also traces deeper continuities from a gender perspective.

Learning Outcomes: After successful completion of the course, students will be able to:

- Provide an elementary outline of gender as a concept and patriarchy as a historically constituted system of power.
- Explore women's experiences within specific contexts at specific historical moments.
- Appreciate the contradictions that marked the 'rise' of powerful and 'exceptional' women like Razia, Nur Jahan or Mirabai.
- To discuss the material basis of women's experiences with reference to specific issues like ownership of property.

Semester VI-
DSE VI: Issues in Twentieth Century World History – II
SEC- Popular Culture
GE -Delhi through the Ages

DSE VI: Issues in Twentieth Century World History – II
Program outcomes:

- This course aims to provide an understanding of 20th century world history not as history of parts, individual nations but as interconnected world history. Through events focus is on how the world evolved from the Wars of Nations to new radical and social movements. World ridden with conflict and violence also witness growing desires for Peace by forming United Nations. The emphasis is on taking up case studies to illustrate the processes and trends in society and culture.

Learning Outcomes:

- Define world history.
- Discuss and explain the evolving polities, economies and cultures of the twentieth century world.
- Analyze the interconnectedness in world history.
- Demonstrate critical skills to discuss diverse social movements and cultural trends.

SEC- Popular Culture
Program outcomes:

- One of the purposes of learning History is to be able to evolve a critical lens with which one can make sense of one's immediate and lived experience. Popular culture happens to be a major component of that experience, surrounding us at all times, particularly since it is easy to access. This course aims to provide students with a critical understanding of popular culture. One of the objectives of the course is to help the student attempt to define popular culture through a study of the complex theoretical discussion on the subject. This theoretical engagement is expected to enable learners to comprehend various aspects of popular culture both in non-Indian and Indian contexts focussing particularly on themes pertaining to religion, performative traditions, food cultures as well as the constitution of a 'new public' with regard to its patterns of consumption of culture, in contemporary times.

Learning Outcomes: Upon successful completion of course, students will be able to:

- Engage with a range of theoretical perspectives in an attempt to define popular culture,
- Describe the methodological issues involved in a historical study of popular culture,
- Identify the relevant archives necessary for undertaking a study of popular culture, while pointing out the problems with conventional archives and the need to move beyond it,
- Interpret the above theoretical concerns to actual historical studies, through a case study,
- Estimate the popular aspects of everyday experience of religion and religiosity, through a wide range of case studies relating to festivals and rituals, healing practices as well as pilgrimage and pilgrim practices,
- Examine the role of orality and memory in popular literary traditions,
- Demonstrate the evolution of theatre and dance within the popular performative traditions,
- Analyze the role of technology in the transformation of music from elite to popular forms,
- Examine the relationship between recipes/recipe books and the construction of national/ regional identities,
- Identify the history of the cultures of food consumption and its relationship with the constitution of a modern bourgeoisie,
- Examine the process of emergence of a pattern of 'public consumption' of culture in contemporary times, with specific reference to art, media and cinema.

GE -Delhi through the Ages
Program outcomes:

- The aim of this paper is to acquaint the students with the historical evolution of Delhi. Students are introduced to significant archaeological sites and cities of Delhi from the prehistoric to the contemporary period. The paper focuses on how ecological and historical aspects of Delhi contributed to the gradual growth of the city's hybrid cultural milieu.

Learning Outcomes: After the completion of this Course, the students will be able to:
- Analyze the historical contexts of tangible and intangible heritage of Delhi.
- Discuss the Ecology of Delhi and outline changes in it through the ages.
- Describe the archaeological cultures that flourished in and around Delhi.
- Analyze the processes leading to the establishment of urban settlements of Delhi
- Outline the importance of Shahjahanabad and its importance in the development of the great imperial city of Delhi.
- Trace the role of Delhi College in the political and literary culture of Delhi.
- Discuss various aspects of the Revolt of 1857 and its consequences for the future development of Delhi.
- Delineate the processes leading to the making of the New Imperial Capital under the British.
- Analyze the impact of Partition on the structure and settlement pattern of Delhi.
- Describe Delhi's importance as economic and cultural center.

Discipline Specific Electives:
DSE I: Europe from the Middle Ages to the Renaissance (7th to the 16th century)
DSE II: Economy and Politics: Histories of Capitalism and Colonialism -I
DSE IV: History of Europe 1500-1848
DSE V: Economy and Politics: Histories of Capitalism and Colonialism-II

DSE I: Europe from the Middle Ages to the Renaissance (7th to the 16th century)
Program outcomes:
- The objective of this course is to make the students familiar with the history of modern Europe. The purpose is to enable them to understand the linkages between themes in Indian history papers and those of European history. The idea is to give them a European perspective of themes involved.

Learning Outcomes: After completing this Course, students will be able to:
- Interpret the importance and implications of periodization.
- Explain the development of what are conventionally called modern sensibilities in politics and the arts
- Discuss the development of important institutions such as the Church and political formations such as the city-states
- Point out the category of the 'Renaissance'.

DSE II: Economy and Politics: Histories of Capitalism and Colonialism -I
Program outcomes:
- The paper familiarizes the students with the basic concepts of Capitalism, Imperialism and Colonialism. It also introduces the strategies of European capitalism and the importance of slave trade, plantation economies in the emergence of Capitalism. It provides the student with an opportunity to analyze capitalism and the global economy.

Learning Outcomes: On completion of this course, the student will be able to:
- Define what is meant by capitalism, colonialism and imperialism.
- Delineate the crucial linkages between Atlantic slavery and European capitalism,
- Explain the global interconnectedness of capital.
- Examine the process of colonial expansion via trade.
- Discuss the linking of the non-European economies with the capitalist-dominated world market via case studies of certain commodities.
- Describe the significance of the American Revolution.

DSE IV: History of Europe 1500-1848
Program outcomes:
- The objective of this course is to make the students familiar with the history of modern Europe. The purpose is to enable them to understand the linkages between themes in Indian history papers and to give them a European perspective of themes involved.

Learning Outcomes: On completion of this course, the student will be able to:
- Define the role of Europe in the world during the period under study.
- Describe Reformation.
- Explain the scientific 'discoveries.
- Outline the contemporary state and politics.

DSE V: Economy and Politics: Histories of Capitalism and Colonialism-II

Program outcomes:

- The course familiarizes the students understand the process of transformation and the uniqueness of Capitalism and Imperialism. It will introduce the student to the impact of imperialist economic policies in China, South Africa and Southeast Asia. The student will also study the impact of the Imperialist interventions in Africa and West Asia. The students will also study the development of capitalism outside the Atlantic economy and examine the rise of Japan as an important economic power.

Learning Outcomes:

- Demonstrate the implications of capitalist developments and their socio-economic impacts in the colonial world.
- Distinguish the nature of imperialist expansion and exploitation of weaker nations.
- Explain the impact of imperialism on various colonies.

Generic Electives:
GE II: Gender in the Modern World
GE III: Culture and Everyday Life in India
GE IV: Nature in Human History
GE V: Investigating Inequalities

GE II: Gender in the Modern World
Program outcomes:

- The course seeks to introduce to learners, location of Gender in historical past of modern world. The focus is on specific processes across regions. Through analysis of rubrics, complexities of historical issues involving women and state will be unfolded.

Learning Outcomes: After the completion of the course, the students will be able to:
• Discuss the issues related to gender in world history in a comparative frame.
• Analyze gender realities in larger international context.
• Describe the main facets of Suffrage movement in Britain or in the USA.
• Delineate the role of women in anti-apartheid movement in South Africa.
• Trace the role of women in the Russian revolutions.
• Critically discuss the women's participation in Chinese revolution

GE III: Culture and Everyday Life in India
Program outcomes:

- Our everyday lives are filled with activities so routine and mundane that it hardly seems worth talking about them—getting up, doing daily ablutions, drinking a cup of tea or coffee, performing daily prayers and rituals, getting dressed for work place, boarding the metro to work, returning home, finding leisure in watching TV, shopping and even planning a holiday. All these sorts of activities are part of our everyday lives and most people have the same sort of everyday experiences. At the same time, however, different people across the world have different sorts of everyday lives that are defined by their society. Further, society itself is defined by peoples' ideas, values customs, beliefs and ways of thinking. All these things may be explained as 'culture'. While there are several definitions of culture, in this module we will take culture to mean the 'whole way of life' of a given group of people who form the urban populace in India. This course explores the everyday life of people in India through mundane aspects like food, beverage and masticatory habits; manner of conduct in the domestic and public sphere; responses to globalization in localized spheres; and defining leisure in cinema or recreational outings. In reading these themes we hope to stimulate discussion about particularities of cultural forms that have evolved and continue to change in response to historical circumstance.

Learning Outcomes: With the completion of this course, the students will be able to:
• Identify the complex nature of relationship between the everyday life and society in urban India.
• Discuss human response to specific historical circumstance.
• Describe the role of Tea, Coffee and betel leave chewing in everyday cultural life and interactions.
• Delineate human interactions with each other in a shrine complex or on the streets.
• Analyze the importance of new avenues of interaction such as Metros, malls or pilgrim centers.
• Discuss the leisurely activities of social groups and resultant spread of ideas

GE IV: Nature in Human History
Program outcomes:

- This course proposes to examine the history of change in human-nature interactions. It unpacks standard environmental narratives which reduce environmental concerns to pollution and global warming, on the one hand, and human-nature harmony in pre-colonial era on the other. This will help students understand the usually invisible interplay of political, economic and ideological factors on questions of nature and natural resources. In what ways were environmental concerns mitigated by the class imprint of aspirational consumerism? This course also draws attention to the call of 'national interest' while addressing contemporary environmental concerns, often designated by specialists as Anthropocene.

Learning Outcomes: After the completion of this Course, the students will be able to:

- Critique an understanding of environmental concerns based on a narrow scientific/ technological perspective.
- Discuss environmental issues within a social- political framework.
- Examine the role of social inequality, i.e., unequal distribution of and unequal access to environmental resources, in an understanding of the environmental crisis of the world - from the global to the local.
- Examine the complexities of resource distribution and inequalities of resource use, locating these within specific social contexts, with reference to case studies regarding water rights and forest rights.
- Locate solutions to environmental problems within a framework of greater democratization of resource use
- Problematize the notion of a pristine past - of perfect balance between human societies and nature in pre-modern times.

GE V: Investigating Inequalities

Program outcomes:

- This course proposes to examine the meaning, definition and types of inequality, types of inequality. The paper conveys that difference need not necessarily lead to inequalities; differences are often historical and may result in inequalities. The paper shows that inequalities generate sub-ordination and exploitation. The paper examines inequalities in the larger context of socio-politico-economic-legal structures. It makes a conscious attempt to convey historical processes though which differences and inequalities emerge and change; thereby . Paper critically engages with the political-social mobilization on the basis of 'identity politics', which are linked to issues of inequalities, in an era of electoral politics.

Learning Outcomes: After completing this course, students should be able to:

- Critique the prevalent dominant understanding of Caste, Gender, and Tribe.
- Discuss the complex relations between differences and inequalities.
- Examine the inherent politics in the creation of inequalities and differences.
- Critically engage with various initiatives taken by the state to prohibit caste-gender atrocities and upliftment of deprived sections of society.

Skill Enhancement Courses

SEC II: Introduction to Art in the Indian Subcontinent
SEC VI: Language, Literature and Region in Early Modern Times SEC VII: Understanding Text, Rituals and Orality in Indian History SEC VIII: Radio and Cinema in India: A Social History

SEC II: Introduction to Art in the Indian Subcontinent

Program outcomes:

- The paper provides a glimpse of the art of India from ancient to contemporary times. Starting with a historiographical enquiry of Indian art, it tries to touch upon the broader aspects and examples of sculpture (stone, metal and terracotta), architecture (temples, mosques, mausoleums and forts) and paintings (ancient to contemporary). The purpose of the paper is to familiarize the students with the basic features of the various art forms of India with the details of representative examples to enhance their skills. This course will familiarize the students with the nuances of various aspects of art like sculpture, architecture and paintings. This will help them in understanding various forms of art and art appreciation.

Learning Outcome: Upon successful completion of course, students shall be able to:

- Identify the diversity of Indian art including sculpture, architecture and paintings cutting across time and space.
- Examine the development in architecture in India with reference to temples, mosques, forts and colonial buildings. The ideological underpinning of architecture is also introduced.
- Explain the traditions of painting in India with reference to Mural, miniature; Mughal and Rajputs.
- Demonstrate the major trends in painting during the national movement and in contemporary India.
- Outline the nuances and intricacies of various forms of art.

SEC VI: Language, Literature and Region in Early Modern Times

Program outcomes:

- This course provides students with an understanding of complex historical relationships between development of languages, formation of identities and the politics of region, community and nation. These relationships changed over a period of time and the course attempts to apprise students of the diverse ways in which scholars explain the process of the emergence of regional/ vernacular languages as literary media. It also attempts to equip students with the ability to analyses the politics of language as it is implicated in the politics of regional pride, as well as communal and national identities.

Learning Outcomes: Upon successful completion of course, students will have knowledge and skills to:

- Describe the chronology of the emergence and literalization of major languages in India.
- Analyze and articulate the various ways in which scholars have attempted to examine the histories and politics of languages, especially vis-à-vis the formation of regional, communal and national pride and identities.

- Identify and analyses the larger socio-political implications of the choice of a language, or a particular register of a given language, especially in literature and cinema.
- Justify that language function at multiple levels and in multiple facets of life.
- Examine the differences and why and how these are created has will be identified.

SEC VII: Understanding Text, Rituals and Orality in Indian History

Program outcomes:

- This course will seek to provide students with skills in using a variety of archives, namely documents, ritual practice and performance, and oral materials. The course will familiarize them with the ways in which historians regard the underlying structures and meanings of documents, rituals and oral expressions as historically significant. Here students will be invited to study critical research that deals with these issues and undertake case that draws out the value of these archives.

Learning Outcomes: Upon successful completion of course students shall able to:

- Organize archival or field work relating to historical research.
- Contextualize sources in a meaningful and critical manner.
- Analyze texts, point out ethnography of ritual practices and performances, and use oral narratives for historical purposes.
- Demonstrate a variety of vocational areas like administration, development, culture and art, economy and environmental work.

SEC VIII: Radio and Cinema in India: A Social History

Program outcomes:

- The course will apprise students with the elementary outlines of the history of radio and cinema in India from its beginnings till the 1980s. It will familiarize them with the varied ways in which the Indian state attempted to regulate and conduct radio broadcasting during and after the colonial period. It will also impart an understanding of the basic trends in the development of cinema as a narrative medium that drew from diverse traditions of story-telling already present in the subcontinent. The material as well as the generic contexts of these developments would also be made comprehensible to the students.

Learning Outcomes: Upon successful completion of course, students shall be able to:

- Delineate the historical context within which the beginnings of cinema and radio might be understood.
- Analyze the state's attempt to control and deploy radio as a medium that carried forward the state agenda.
- Explain how cinema reflected and engaged with the larger ideological and material tensions of society even as it was also subject to technological changes that helped mediate these developments.
- Identify how Indian cinema engaged with social and ideological issues of its time, especially in the three decades after independence.

10. Department of Geography

B.A. (H) Course:

- The B.A. (Hons.) Geography is a programme that will be of three years duration. Each year will be called an academic year and will be divided into two semesters. Thus there will be a total of six semesters. Each semester will consist of sixteen weeks.
- The programme includes Core Courses (CC) and Elective Courses (EC). The core courses are all compulsory courses. There are three kinds of elective courses that include Discipline-Specific Elective (DSE), Generic Elective (GE), and Skill Enhancement Course (SEC). In addition, there are compulsory Ability Enhancement Courses (AEC).
- Students will be encouraged to carry out short-term projects and participate in field visits, seminars, and workshops. Assessment will be based on continuous evaluation (class test, presentation, group discussion, quiz, assignment etc.) and end semester examination. Each theory paper will be 100 marks, out of which 25% marks are for internal assessment, while a practical paper will be of 50 marks comprising 50% internal assessment.
- The B.A. (Hons.) Geography is curriculum also focuses on the understanding of core and fundamental branches of the discipline. These papers are specially designed to cater to the foundation building of the students by imparting knowledge about the pillars of geography. It encompasses the evolution of the subject right from the experiences and understanding of travelers and explorers regarding space, place, and people to the progression towards the establishment of the discipline of geography in social sciences. Care has been taken to cover all basic themes in geography. The classic and contemporary theories/models of the subject are incorporated in most papers. These core branches cover the two broad spectrums of physical and human geography and the interface branch of environmental studies.

Semester-I: Name of the Papers

(xv) Geomorphology
(xvi) Cartographic Techniques (Practical)

Program outcomes:

- The students will understand the functioning of Earth systems in real-time and analyze how the natural and anthropogenic operating factors affect the development of landforms. To distinguish between the mechanisms that control these processes, and assess the roles of structure, stage, and time in shaping the landforms, interpretation of geomorphological maps, and applies the knowledge in geographical research.
- Explanations of maps work conceptually and technically and will be able to understand science and the art of cartography. Recognize and learn the benefits and limitations of some standard map projections and their use.

Semester-II: Name of the Papers

(i) Human Geography
(ii) Thematic Cartography (Practical)

Program outcomes:

- A detailed exposure of contemporary relevance of cultural landscape. In-depth knowledge of space and society of cultural regions. It will provide an understanding of the settlement pattern and population resource relationship.
- This will give an insight into the application of theories and techniques of map-making and how maps work, conceptually and technically and will be able to understand science and art of cartography.
- Recognize the benefits and limitations of Diagrammatic Data Presentation.
- Understand and perform interpretation of thematic maps.

Semester-III: Name of the Papers

(i) Climatology
(ii) Statistical Methods in Geography (Practical)
(iii) Geography of India
(iv) Remote Sensing (SEC-Practical)

Program outcomes:

- This will give a detailed exposure to climatology and atmospheric process. They will understand the weather and climatic system and its relevance to human beings.
- In-depth knowledge of upper atmospheric conditions, cyclonic features, and understanding of the characteristics of climatic regions will be included.
- To differentiate between qualitative and quantitative information and know the nature of various data, different sources, and data collection methods.
- Detailed exposure to the human and physical features of India. In-depth knowledge of different resource bases of India. The understanding socio-cultural base of India.
- Introduction to modern technologies and their role for data acquisition, processing, and analysis for the preparations of maps and analysis.

Semester-IV: Name of the Papers

(i) Economic Geography
(ii) Environmental Geography
(iii) Fieldwork and Research Methodology (Practical)
(iv) Geographic Information System(SEC-Practical)

Program outcomes:

- Detailed discussion of economic activities and theories. Distinguish to different types of economic activities and their utilities. Appreciate the factors responsible for the location and distribution of activities. Examine the significance and relevance of theories in relation to the location of different economic activities.
- A detailed exposure of human-environment relationship. In-depth knowledge of environmental issues in tropical, temperate and polar ecosystems. Understanding the environmental programmes and policies at local as well as global level.
- A detailed exposure of new geographical landscape as study area. In-depth knowledge of different field techniques. Understanding the field ethics and different tools of field study.
- Introduction to modern cartographic techniques that establish the subject as a spatial science. It will help create interactive maps, monitoring systems, and an essential tool for the decision-support system for the geographical domain.

Semester-V: Name of the Papers

(i) Regional Planning and Development
(ii) Remote Sensing and GIS (Practical)
(iii) Population Geography (DSE 1)
(iv) Resource Geography (DSE 2)
(v) Urban Geography (DSE 3)
(vi) Agricultural Geography (DSE 4)

Program outcomes:

- Conceptualize Regional Planning and its theories. Get an overview of Sustainable Regional Development. Have sound knowledge of Sustainable Development Policies and Programmes.
- Explain principles of remote sensing, different satellite systems, and sensors; Perform image pre-processing, enhancement and classification and interpretation of satellite images; apply Image preprocessing for land use land cover and urban studies.
- Understanding the population dynamics and its relationship with the resources, human settlement, and development paradigms. This would bring an understanding of Population Geography along with the relevance of Demographic data. The students would get an understanding of distribution and trends of population growth in the developed and less developed countries, along with population theories. The students would get an understanding of the dynamics of the population. An understanding of the implications of population composition in different regions of the world. An appreciation of the contemporary issues in the field of population studies.
- Understand the fundamentals and patterns of the urbanization process learn the functional classification of cities and central place theories. Know contemporary problems of Delhi, Mumbai, Kolkata, and Chennai.
- Conceptualize agriculture and its determinants. Get an overview of Indian and World agriculture regions and systems. Have sound knowledge of agriculture revolutions and food security.
- A detailed exposure of health geography and environment. In-depth knowledge of health risks and exposure. Understanding the impact of climate change and human health.

Semester-VI: Name of the Papers

(i) Evolution of Geographical Thought
(ii) Disaster Management based Project Work (Practical)
(iii) Geography of Health and Wellbeing (DSE 1)
(iv) Political Geography (DSE 2)
(v) Hydrology and Oceanography (DSE 3)
(vi) Social Geography (DSE 4)

Program outcomes:

- In-depth understanding of the evolution of geographical thought. Detailed knowledge about the paradigms and debates in geographical studies. Understanding of recent traditions in geography.
- In-depth understanding about the various disasters in the country, will provide a thorough understanding of the human responses to the disasters; it will give an in-depth knowledge about the disasterscapes through fieldwork.
- Detailed exposure of health, human well-being and geographic environment. This will give an insight of the geographical perspective of human health and the prevalence of the disease.

- Learn the concept of nation and state and geopolitical theories. Understand the different dimensions of electoral geography and resource conflicts. Have sound knowledge of the politics of displacement, focusing on dams and SEZ.
- Understand the basic components of the hydrological cycle and learn best practices of integrated watershed management, explain various water balance components and management of river basins, Identify different types of soil, distribution, and management of soil resources.
- Get Knowledge of the geography of social well-being and social diversity. Appraise the fundamental concepts of social geography in a regional context; geographic factors are underlying social well-being and inclusive development patterns. Explain the social problems and the welfare programs and policies.

11. Department of Mathematics

B.Sc. (H) Course:

- B.Sc. (Hons) Mathematics Course is a six-semester course spread over three academic years. The teaching learning process involves theory, practical and tutorial classes. The assessment is based on continuous evaluation which includes class tests, home assignments, paper presentations and the semester endexamination. Students are encouraged to organize and participate in group discussions, quizzes and seminars toenhance their knowledge and skills in mathematics.
- The program is designed to develop in students in depthknowledge of the core concepts and principles that are central to the understanding of this core science discipline. It develops their qualitative and quantitative skills, provides them opportunities for critical thinking and team work and exposes them to techniques useful for applied areas of scientific study.
- This program aims at developing the ability to think critically, logically and analytically and hence use mathematical reasoning in every-day life.
- Pursuing a degree in mathematics will help studentschoose carrier in education, research, governmentsector, corporate sector and industry.

Semester-I:

(i) Calculus (including practical)

(ii) Algebra

Program outcomes:

- Students are able to use basic tools and geometric properties of different conic sections which are helpful in understanding their applications in planetary motion,design of telescope and to the real-world problems.
- They learn to test maxima and minima and apply the knowledge to problems in business, economics and life sciences.
- They learn to compute area of surfaces of revolution andvolume of solids by integrating over cross-sectional areas.
- They learn calculus of vector functions and its use to develop the basic principles of planetary motion.

They learn to recognize consistent and inconsistent system of linear equations and find their solutions wherever possible.

- They learn to find eigen values and corresponding eigenvectors for square matrices.
- They learn to find rational powers of complex numbers using De Moivre's theorem and apply it to solve variousnumerical problems.
- They learn about equivalence class and cardinality of a set.

Semester-II:

(i) Real Analysis

(ii) Differential Equations (including practical)

Program outcomes:

- These courses develop a deep and rigorous understanding of real line $\mathbb{R}$.
- Students learn many properties of real numbers including completeness and Archimedean property.
- They learn real sequences in terms of functions from $\mathbb{N}$ to a subset of $\mathbb{R}$.
- They learn bounded sequences, convergent and divergent sequences, Cauchy sequences and monotonic sequences.
- They learn to calculate limit superior, limit inferior and limit of a bounded sequences.
- They learn series of real numbers alternating series, convergence, conditional convergence and absolute convergence of series of real numbers.
- They learn to test convergence of a series using Cauchy root test, comparison test, ratio test and Leibniz's test.
- They learn basis of differential equations and formulate differential equations for various Mathematical Models.
- They learn to solve first order nonlinear differential equations and linear differential equations of higherorder using various techniques and apply them to analyze various Mathematical models.

Semester-III:

(i) Theory of Real functions

(ii) Group Theory-I
(iii) Multivariate Calculus (including practical)
(iv) SEC-1 LaTeX and HTML

Program outcomes:
Students learn the concepts of limit, continuity, uniformcontinuity and geometrical properties of continuous functions on closed and bounded intervals

- They learn the concept of differentiability, mean value theorem, Taylor's theorem and their applications.
- Students learn the structure of a group, abelian group, subgroup, normal subgroup, cyclic group, permutation group and their properties. They learn to link fundamental concepts of groups and symmetrical figures.
- They learn about Lagrange's theorem, Fermat's Little theorem, homomorphisms and isomorphisms of groups.
- They learn to maximize and minimize multivariate functions subject to the given constraints on variables.
- They learn Green's theorem, Stroke's and Gauss theorems to inter-relate line integral, double integral and triple integral formulations.
- They learn to create and typeset a LaTeX document, create a beamer presentation, create Web page using HTML.
- They learn to typeset a Mathematical document using LaTeX.

Semester-IV:
(i) Partial Differential Equations (including practical)
(ii) Riemann Integration & Series of Functions
(iii) Ring Theory & Linear Algebra-I
(iv) SEC-2 Computer Algebra Systems and Related Softwares

Program outcomes:

- Students learn to formulate, classify and transform first order partial differential equations into canonical form. They also learn to solve these equations by method of characteristics and by separation of variables.
- They learn to classify and solve second order partial differential equations, homogeneous and nonhomogeneous wave equations.
- Students learn Riemann integrable functions and their properties, Improper integrals including Beta and Gamma functions and Uniform convergence of sequences and series of functions.
- They learn about the fundamental concept of rings, integral domains, fields and their properties.
- They learn the concept of linear independence of vectors, bases and dimension of a vector space.

They learn basic concepts of linear transformation, matrix representation of a linear transformation andchange of coordinate matrix

- They learn to use computer algebra systems as calculator for plotting functions and animations and also for solving systems of equations and finding eigen valuesand eigen vectors for matrix.
- They learn to use the statistical software R and its use insummary calculation, pictorial representation of data and exploring relationship between data.
- This helps them to analyze, test and interpret technical arguments on the basis of geometry.

Semester-V:
(i) Metric Spaces
(ii) Group Theory II
(iii) DSE-1 (including practical)
(i) Numerical MethodsOR
(ii) Mathematical Modeling and Graph Theory
(iv) DSE-2
(i) Mathematical Finance
OR
(ii) Discrete Mathematics

Program outcomes:

- Students learn various natural and abstract formulations of distance on the sets leading to definition of metric

spaces, the concept of neighbourhoods, opens sets, closed sets, limit points, interior points and boundary points etc.

- They learn some very important properties of metric spaces like, completeness, compactness and connectedness.
- They learn about automorphisms for constructing new groups from the given group.
- They learn group actions, conjugacy in S_n, Sylow's theorems and their applications in checking non-simplicity.

DSE-1:

- Students learn numerical methods to find the zeroes of nonlinear functions of a single variable and solve systemof linear equations using methods such as Gauss-Jacobi,Gauss-Seidel and SOR method.
- They learn interpolation techniques to compute the values for tabulated functions at a point not in the table.
- They learn the applications of numerical differentiation and integration to convert differential equations into

difference equations for the numerical solutions.

- Students learn power series solution of a differential equation, Legendre's and Bessel's equations, use of Laplace transform and inverse transform for solving initial value problems.
- They learn basics of graph theory, social networks, Eulerian and Hamiltonian graphs, diagram tracing puzzles and Knight's tour problem.

DSE-2:

- Students learn the basics of financial markets and derivatives including options and futures, types of options, pricing and hedging of options as well as interest rate swaps.
- They learn stochastic analysis, the Black-Scholes model, the concept of trading strategies and valuations of currency swaps.
- Students learn about ordered sets, maps between ordered sets, lattices, modular and distributive lattices, sublattices and homomorphisms between lattices.
- They become familiar with Boolean Algebra, Boolean homomorphism, Karnaugh diagrams, switching circuits and their applications.
- They learn the basics of graph theory including Eulerian and Hamiltonian graphs and application of graph theoryin the study of shortest path algorithms.

Semester-VI:

(i) Complex Analysis (including practical)
(ii) Ring Theory and Linear Algebra II
(iii) DSE-3: Probability theory & Statistics
(iv) DSE-4: Linear Programming and Theory of Games

Program outcomes:

- Students learn differentiability of functions of complex variable, Cauchy Riemann equations and elementary functions.
- They learn to evaluate contour integrals, use of Cauchy Goursat theorem and Cauchy integral formula.
- They learn to obtain Taylor and Laurent series expansions, singular points and residues of simple functions and hence evaluate integrals using CauchyResidue theorem.
- Students learn the significance of unique factorization inrings and integral domains.

They learn to compute characteristic polynomials, eigenvalues, eigen vectors and geometric and algebraic multiplicities of and eigen values.

- They learn to compute inner products, obtain ortho- normal basis using Gram-Schmidt orthogonalization, find the adjoint, normal, Unitary and orthogonal operators.

DSE-3:

- Students learn various univariate distributions such as Bernoulli, Binomial, Poisson, Gamma and Exponential distribution.
- They learn correlation and regression to measure the scale of association between two variables and to measure the scale of association between two variables and to establish a formulation helping to predict one variable in terms of the other. They also learn central limit theorem.

DSE-4:

- Students learn about the graphical solutions of a linear programming problem with two variables and relation between basic feasible solutions and extreme points.

- They learn Simplex method, two-phase and big-M methods. They learn to apply linear programming methods to solve two-person zero sum game problems.

They learn about the relationships between the primal and dual problems. They also learn to solve transportation and assignment problems.

B.Sc. (Prog.)Physical Science:

A well-structured Mathematical component in B.Sc. (Programme) Physical Sciences aims to empowerstudents to solve problems, to understand experimental observations and predict outcomes usingbroad range of significant mathematical techniques. It enables them to analyse quantitative data usingStatistical analysis techniques. It helps them to combine the principles of Physics and Chemistrysupported by Mathematics to collaborate with other multidisciplinary groups to solve scientific problemsand to recognize ethical issues in each respective profession.

Semester-I:

- Calculus and Matrices

Program outcomes:

- Students learn fundamental concepts of Calculus including limits, continuity and differentiability.
- students learn to solve system of linear equations using matrices, to find eigen values and corresponding eigen vectors for a square matrix and check its diagonalizability.
- They learn to solve application problems in variety of settings ranging from Chemistry and Physics to Business and Economics.

Semester-II:

- Calculus and Geometry

Program outcomes:

- Students learn to sketch curves in a plane usingits mathematical properties in different co- ordinate systems of reference.
- They learn to compute areas of surfaces of revolution and the volume of solids by integrating over cross-sectional areas. Thishelps them in many real-world problems.

They get well-versed with conics and quadratic surfaces which allows them to relate the shapesof real-life objects with the curves and conics

Semester-III:

(i) Algebra

(ii) SEC-1 Mathematical Typesetting system:LaTeX

Program outcomes:

- Students learn the structure of a group, abeliangroup, subgroup, normal subgroup, cyclic group, permutation group and their properties.They learn to link fundamental concepts of groups and symmetric figures.
- They learn the fundamental concept of rings, fields and integral domains and their properties.
- They learn about Vector Spaces over a field, linear independence of vectors, linear transformations and their matrix representations.
- They learn to create and typeset a LaTeX document, create a beamer presentation, create web-page using HTML.
- They learn about pictures and graphics in LaTeXand typesetting a mathematical documentusing LaTeX.

Semester-IV:

(i) Real- Analysis

(ii) SEC-2 Computer Algebra Systems andRelated Softwares

Program outcomes:

- Students learn sequences in terms of functions from $\mathbb{N}$ to a subset of $\mathbb{R}$. They learn bounded sequence, monotonic sequence, Cauchy sequence, convergent and divergent sequences.
- They learn to test convergence and divergent of series using comparison test, ratio test, Cauchy roottest and Leibnitz test.
- They learn the concepts of pointwise and uniform convergence and also Riemann Integrability of continuous and monotonic functions.
- They learn to use computer algebra systems as calculator for plotting functions.

They learn to use Computer Algebra Systems to findroots of polynomials, limits, derivatives, definite andindefinite integrals of functions.

- They learn to use Computer Algebra Systems to understand matrix operations and to find eigenvalues of matrices.

Semester-V:

(i) **DSE-1:** Differential Equations

(ii) **SEC-3** Statistical Software: R

Program outcomes:

- Students learn to solve first order differential equations, exact, Linear and Bernoulli equations.
- They learn to solve second order differential equations by reducing the order, and by variation of parameters methods.
- They learn to formulate and solve various typesof first and second order partial differential equations.
- They learn to solve higher order differential equations with constant coefficients, Cauchy Euler equation simultaneously and total differential equations.
- Students learn to use R as a Calculator. They learn to combine and scan commands in R and to save work in R.
- They learn to manipulate vectors, data frames, matrices and lists. They also learn Summary commands, Summary Statistics for vectors, dataframes, matrices and lists.
- They learn plotting in R, Box-Whisker Plots, Scatter Plot, Pairs Plots, line Charts, Pie Charts, Cleveland Dot Charts, Bar Charts.

Semester-VI:

(i) **DSE-2:** Numerical Methods

(ii) **SEC-4:** Transportation and Network FlowProblems.

Program outcomes:

- Students learn to find consequences of finite precision and the inherent limits of numerical methods.

They learn appropriate numerical methods to solve algebraic and transcendental equations.

- They learn to solve first order initial value problems of ordinary differential equations numerically using Euler method.
- Students are able to solve transportation problem and its mathematical formulation, northwest-corner method test, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation.
- They learn Hungarian method for solving assignment problem.

They learn to solve network models, minimum spanning tree problem, maximum flow problemand minimum cost flow problem.

B.Sc. (Programme)Analytical Chemistry

In B.Sc. (Prog) Analytical Chemistry, Mathematics isoffered only in semester-II, semester-III and semester-VI. It aims to empower students to analyse quantitative data and solve problems using broad range of significant mathematical techniques. It helps them to understand experimental observations and predict outcomes. It enables them to collaborate with other multidisciplinary groups to solve scientific andenvironmental problems.

Semester-II:

- Calculus and Matrices

Program outcomes:

- Students learn fundamental concepts of Calculus including limits, continuity and differentiability.
- students learn to solve system of linear equations using matrices, to find eigen values and corresponding eigen vectors for a square matrix and check its diagonalizability.
- They learn to solve application problems in variety of settings ranging form Chemistry and Physics to Business and Economics.

Semester-III:

- Abstract Algebra

Program outcomes:

- Students learn the structure of a group, abeliangroup, subgroup, normal subgroup, cyclic group, permutation group and their properties.They learn to link fundamental concepts of groups and symmetric figures.

- They learn the fundamental concept of rings, fields and integral domains and their properties.

They learn about Vector Spaces over a field, linear independence of vectors, linear transformations and their matrix representations.

Semester-VI:

- Calculus and Geometry

Program outcomes:

- Students learn to sketch curves in a plane usingits mathematical properties in different co- ordinate systems of reference.
- They learn to compute areas of surfaces of revolution and the volume of solids by integrating over cross-sectional areas. Thishelps them in many real-world problems.

They get well-versed with conics and quadratic surfaces which allows them to relate the shapesof real-life objects with the curves and conics.

Generic Elective (GE)CoursesforHonours
Courses (For studentsother thanB.Sc. (Hons.) Mathematics)

These are the courses that Mathematics department offers to the students of Honours courses other than Mathematics. These are spread over first four semesterof their program.

Semester-I:
GE1-Calculus
Program outcomes:

- Students learn to sketch curves and conics in cartesian and Polar co-ordinates.
- They learn to calculate volumes and surfaces areas of three-dimensional figures.
- They learn the concepts of limits, continuity anddifferentiability of functions of several variablesand vector valued functions.

Semester-II:
GE2- Linear Algebra
Program outcomes:

- Students learn the interrelation of vectors with matrices and their application to computer graphics.
- They learn the concepts of basis, dimension andminimal spanning sets of vector spaces.
- They learn about linear transformation, transitionmatrix and similarity.
- They learn to find approximate solution ofinconsistent system of linear equations.

Semester-III:

- GE3- Differential Equations

Program outcomes:

- Students learn to solve exact, linear and Bernoulliequations and find orthogonal trajectories.
- They learn to use variation of parameters to solvesecond order differential equations. They also learn to solve higher order linear differential equations with constant coefficients and Cauchy Euler equation.
  They learn to formulate and solve various types of first and second order partial differential equations

Semester-IV:

- GE 4: Numerical Methods

Or

Elements of Analysis

Program outcomes:

- Students are able to find the consequences of finite precision and the inherent limits of numerical methods.
- They are able to use appropriate numerical methods to solve algebraic and transcendental equations.
- They learn to solve first order initial valueproblems of ODE's numerically using Euler methods.
- They learn the basic properties of real numbers.
- They learn about bounded, convergent, divergent, Cauchy and monotone sequences.

They learn to test the convergence anddivergence of a series using comparison test, ratiotest, Cauchy root test and Leibnitz test.

12. Department of Physics

B.Sc. (H) Physics Course:

GE2 – Mechanics & Lab

Upon completion of this course, students are expected to

- Understand the role of vectors and coordinate systems in Physics.
- Learn to solve Ordinary Differential Equations: First order, Second order Differential Equations with constant coefficients.
- Understand laws of motion and their application to various dynamical situations.
- Learn the concept of inertial reference frames and Galilean transformations. Also, the concept of conservation of energy, momentum, angular momentum and apply them to basic problems.
- Understand translational and rotational dynamics of a system of particles.
- Apply Kepler's laws to describe the motion of planets and satellite in circular orbit.
- Understand concept of Geosynchronous orbits
- Explain the phenomenon of simple harmonic motion.
- Understand special theory of relativity - special relativistic effects and their effects on the mass and energy of a moving object.
- In the laboratory course, the student shall perform experiments related to mechanics: compound pendulum, rotational dynamics (Flywheel), elastic properties (Young Modulus and Modulus of Rigidity), fluid dynamics, estimation of random errors in the observations etc.

Semester III	
Core course-V	**Mathematical Physics-II**
Core Course-V Practical/Tutorial*	**Mathematical Physics-II Lab**
Core course-VI	**Thermal Physics**
Core Course-VI Practical/Tutorial*	**Thermal Physics Lab**
Core course-VII	**Digital Systems and Applications**
Core Course-VII Practical/Tutorial*	**Digital Systems & Applications Lab**
Skill Enhancement Course -1	**SEC-1: 1. Computational Physics Skills** **2. Renewable Energy and Energy Harvesting** **3. Numerical Analysis**
Generic Elective -3	**GE-3 Waves and Optics**
Generic Elective -3 Practical/Tutorial*	**Waves and Optics LAB**

Course Learning Outcomes

Mathematical Physics -II & Lab

On successfully completing this course, the students will be able to

- Represent a periodic function by a sum of harmonics using Fourier series and their applications in physical problems such as vibrating strings etc.
- Obtain power series solution of differential equation of second order with variable coefficient using Frobenius method.
- Understand properties and applications of special functions like Legendre polynomials, Bessel functions and their differential equations and apply these to various physical problems such as in quantum mechanics.
- Learn about gamma and beta functions and their applications.
- Solve linear partial differential equations of second order with separation of variable method.
- In the laboratory course, the students will learn the basics of the Scilab software/Python interpreter and apply appropriate numerical method to solve selected physics problems both using user defined and inbuilt functions from Scilab/Python. They will also learn to generate and plot Legendre polynomials and Bessel functions and verify their recurrence relation.

Course Learning Outcomes

Thermal Physics & Lab

At the end of the course, students will be able to:

- Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics.

- Understand the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.
- Know about reversible and Irreversible processes.
- Learn about Maxwell's relations and use them for solving many problems in Thermodynamics
- Understand the concept and behavior of ideal and real gases.
- Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.
- In the laboratory course, the students are expected to do some basic experiments in thermal Physics, viz., determination of Mechanical Equivalent of Heat (J), coefficient of thermal conductivity of good and bad conductor, temperature coefficient of resistance, variation of thermo-emf of a thermocouple with temperature difference at its two junctions and calibration of a thermocouple.

Course Learning Outcomes
Digital Systems and Applications & Lab
This course lays the foundation for understanding the digital logic circuits and their use in combinational and sequential logic circuit design. It also imparts information about the basic architecture, memory and input/output organization in a microprocessor system. The students also learn the working of CRO.

- Course learning begins with the basic understanding of active and passive components. It then builds the concept of Integrated Chips (IC): its classification and uses.
- Differentiating the Analog and Digital circuits, the concepts of number systems like Binary,BCD, Octal and hexadecimal are developed to elaborate and focus on the digital systems.
- Sequential Circuits: Basic memory elements Flips-Flops, shift registers and 4-bits counters leading to the concept of RAM, ROM and memory organization.
- Timer circuits using IC 555 providing clock pulses to sequential circuits and develop multivibrators.
- Introduces to basic architecture of processing in an Intel 8085 microprocessor and to Assembly Language.
- Also impart understanding of working of CRO and its usage in measurements of voltage, current, frequency and phase measurement.
- In the laboratory students will learn to construct both combinational and sequential circuits by employing NAND as building blocks and demonstrate Adders, Subtractors, Shift Registers, and multivibrators using 555 ICs. They are also expected to use μP 8085 to demonstrate the same simple programme using assembly language and execute the programme using a μP kit.

Course Learning Outcomes
Computational Physics and Skills
Students will be able to

- Use computers for solving problems in Physics.
- Prepare algorithms and flowcharts for solving a problem.
- Use Linux commands on terminal
- Use an unformatted editor to write sources codes.
- Learn "Scientific Word Processing", in particular, using LaTeX for preparing articles, papers etc. which include mathematical equations, picture and tables.
- Learn the basic commands of Gnuplot.

Course Learning Outcomes
Renewable Energy and Energy Harvesting
At the end of this course, students will be able to achieve the following learning outcomes:
• Knowledge of various sources of energy for harvesting
• Understand the need of energy conversion and the various methods of energy storage
• A good understanding of various renewable energy systems, and its components.
• Knowledge about renewable energy technologies, different storage technologies, distribution grid, smart grid including sensors, regulation and their control.
• Design the model for sending the wind energy or solar energy plant.
• The students will gain hand on experience of:
(i) different kinds of alternative energy sources,
(ii) conversion of vibration into voltage using piezoelectric materials,
(iii) conversion of thermal energy into voltage using thermoelectric modules.

Course Learning Outcomes

Numerical Analysis

Theory:

After completing this course, student will be able to:

- approximate single and multi-variable function by Taylor's Theorem.
- Solve first order differential equations and apply it to physics problems.
- solve linear second order homogeneous and non-homogeneous differential equations with constant coefficients.
- Calculate partial derivatives of function of several variables
- Understand the concept of gradient of scalar field and divergence and curl of vector fields. perform line, surface and volume integration
- Use Green's, Stokes' and Gauss's Theorems to compute integrals

Practical:

After completing this course, student will be able to :

- design, code and test simple programs in C++ learn Monte Carlo techniques,
- fit a given data to linear function using method of least squares find roots of a given non-linear function
- Use above computational techniques to solve physics problems

Course Learning Outcomes

GE3 – Waves and Optics & Lab

On successfully completing the requirements of this course, the students will have the skill and knowledge to:

- Understand Simple harmonic oscillation and superposition principle.
- Understand different types of waves and their velocities: Plane, Spherical, Transverse, Longitudinal.
- Understand Concept of normal modes in transverse and longitudinal waves: their frequencies and configurations.
- Understand Interference as superposition of waves from coherent sources derived from same parent source.
- Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from aperture, understand Fraunhoffer and Fresnel Diffraction.
- In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. Resolving power of optical equipment can be learnt first hand.The motion of coupled oscillators, study of Lissajous figures and behaviour of transverse, longitudinal waves can be learnt in this laboratory course.

Semester IV

Core course-VIII	**Mathematical Physics III**
Course-VIII Practical/Tutorial*	**Mathematical Physics-IIILab**
Core course-IX	**Elements of Modern Physics**
Course-IX Practical/Tutorial*	**Elements of Modern Physics Lab**
Core course-X	**Analog Systems and Applications**
Course- X Practical/Tutorial*	**Analog Systems & Applications Lab**
Skill Enhancement Course -2	**SEC -2 : 1. Computational Physics Skills** **2. Renewable Energy and Energy Harvesting** **3. Numerical Analysis**
Generic Elective -4	**GE-4 Thermal Physics and Statistical Mechanics**
Generic Elective-4 Practical/Tutorial*	Thermal Physics and Statistical Mechanics LAB

Course Learning Outcomes

Mathematical Physics – III & Lab

After completing this course, student will be able to

- Determine continuity, differentiability and analyticity of a complex function, find the derivative of a function and understand the properties of elementary complex functions.
- Work with multi-valued functions (logarithmic, complex power, inverse trigonometric function) and determine branches of these functions

- Evaluate a contour integral using parametrization, fundamental theorem of calculus and Cauchy's integral formula.
- Find the Taylor series of a function and determine its radius of convergence.
- Determine the Laurent series expansion of a function in different regions, find the residues and use the residue theory to evaluate a contour integral and real integral.
- Understand the properties of Fourier and Laplace transforms and use these to solve boundary value problems.
- In the laboratory course, the students will learn the basics of the Scilab software/Python interpreter and apply appropriate numerical method to solve selected physics problems both using user defined and inbuilt functions from Scilab/Python.

Course Learning Outcomes
Elements of Modern Physics & Lab
After getting exposure to this course, the following topics would be learnt:

- Main aspects of the inadequacies of classical mechanics as well as understanding of the historical development of quantum mechanics.
- Formulation of Schrodinger equation and the idea of probability interpretation associated with wave-functions.
- The spontaneous and stimulated emission of radiation, optical pumping and population inversion. Three level and four level lasers. Ruby laser and He-Ne laser in details. Basic lasing
- The properties of nuclei like density, size, binding energy, nuclear forces and structure of atomic nucleus, liquid drop model and nuclear shell model and
- mass formula. Decay rates and lifetime of radioactive decays like alpha, beta, gamma decay. Neutrino, its properties and its role in theory of beta decay.
- Fission and fusion: Nuclear processes to produce nuclear energy in nuclear reactor and stellar energy in stars.
- In the laboratory course, the students will get opportunity to measure Planck's constant, verify photoelectric effect, determine e/m of electron, Ionization potential of atoms, study emission and absorption line spectra. They will also find wavelength of Laser sources by single and Double slit experiment, wavelength and angular spread of He-Ne Laser using plane diffraction grating.

Course Learning Outcomes
Analog Systems and Applications & Lab
At the end of this course, the following concepts will be learnt

- Characteristics and working of pn junction.
- Two terminal devices: Rectifier diodes, Zener diode, photodiode etc
- NPN and PNP transistors: Characteristics of different configurations, biasing, stabilization and their applications.
- CE and two stage RC coupled transistor amplifier using h-parameter model of the transistor.
- Designing of different types of oscillators and their stabilities.
- Ideal and practical op-amps: Characteristics and applications.
- In the laboratory course, the students will be able to study characteristics of various diodes and BJT. They will be able to design amplifiers, oscillators and DACs. Also different applications using Op-Amp will be designed.

Course Learning Outcomes
Computational Physics and Skills
Students will be able to

- Use computers for solving problems in Physics.
- Prepare algorithms and flowcharts for solving a problem.
- Use Linux commands on terminal
- Use an unformatted editor to write sources codes.
- Learn "Scientific Word Processing", in particular, using LaTeX for preparing articles, papers etc. which include mathematical equations, picture and tables.
- Learn the basic commands of Gnuplot.

Course Learning Outcomes
Renewable Energy and Energy Harvesting
At the end of this course, students will be able to achieve the following learning outcomes:
• Knowledge of various sources of energy for harvesting
• Understand the need of energy conversion and the various methods of energy storage
• A good understanding of various renewable energy systems, and its components.
• Knowledge about renewable energy technologies, different storage technologies, distribution grid, smart grid including sensors, regulation and their control.

• Design the model for sending the wind energy or solar energy plant.
• The students will gain hand on experience of:
(i) different kinds of alternative energy sources,
(ii) conversion of vibration into voltage using piezoelectric materials,
(iii) conversion of thermal energy into voltage using thermoelectric modules.

Course Learning Outcomes
Numerical Analysis
Theory:
After completing this course, student will be able to:

- approximate single and multi-variable function by Taylor's Theorem.
- Solve first order differential equations and apply it to physics problems.
- solve linear second order homogeneous and non-homogeneous differential equations with constant coefficients.
- Calculate partial derivatives of function of several variables
- Understand the concept of gradient of scalar field and divergence and curl of vector fields. perform line, surface and volume integration
- Use Green's, Stokes' and Gauss's Theorems to compute integrals

Practical:
After completing this course, student will be able to :

- design, code and test simple programs in C++ learn Monte Carlo techniques,
- fit a given data to linear function using method of least squares find roots of a given non-linear function
- Use above computational techniques to solve physics problems

Course Learning Outcomes
GE4 – Thermal Physics and Statistical Mechanics & Lab
At the end of this course, students will
• Learn the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations. They are also expected to learn Maxwell's thermodynamic relations.
• Know the fundamentals of the kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.
• Learn about the black body radiations, Stefan- Boltzmann's law, Rayleigh-Jean's law and Planck's law and their significances.
• Learn the quantum statistical distributions, viz., the Bose-Einstein statistics and the Fermi-Dirac statistics.
• In the laboratory course, the students are expected to: Measure of Planck's constant using black body radiation, determine Stefan's Constant, coefficient of thermal conductivity of a bad conductor and a good conductor, determine the temperature co-efficient of resistance, study variation of thermo emf across two junctions of a thermocouple with temperature etc

Semester V

Core course-XI	**Quantum Mechanics & Applications**
Core Course-XI Practical/Tutorial*	**Quantum Mechanics Lab**
Core course-XII	**Solid State Physics**
Core Course-XII Practical/Tutorial*	**Solid State Physics Lab**
Discipline Specific Elective -1	**DSE-1 : Advanced Mathematical Physics-I**
Discipline Specific Elective -1 Practical/Tutorial*	**DSE-1 Lab: Advanced Mathematical Physics-I LAB**
Discipline Specific Elective -2	**DSE-2 : 1. Nuclear and Particle Physics 2. Astronomy and Astrophysics**
Discipline Specific Elective- 2 Practical/Tutorial*	**DSE-2 1. Nuclear and Particle Physics Tutorial 2. Astronomy and Astrophysics Tutorial**

Course Learning Outcomes
Quantum Mechanics & Lab
The Students will be able to learn the following from this course:

- Methods to solve time-dependent and time-independent Schrodinger equation.
- Quantum mechanics of simple harmonic oscillator.
- Non-relativistic hydrogen atom: spectrum and eigenfunctions.
- Angular momentum: Orbital angular momentum and spin angular momentum.
- Bosons and fermions - symmetric and anti-symmetric wave functions.
- Application to atomic systems
- In the laboratory course, with the exposure in computational programming in the computer lab, the student will be in a position to solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical one- dimensional and three dimensional potentials.
- Understand the elementary lattice dynamics and its influence on the properties of materials.
- Describe the main features of the physics of electrons in solids: origin of energy bands, and their influence electronic behaviour.
- Explain the origin of dia-, para-, and ferro-magnetic properties of solids.
- Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability.
- Understand the basics of phase transitions and the preliminary concept and experiments related to superconductivity in solid.
- In the laboratory students will carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.

Course Learning Outcomes
Advanced Mathematical Physics - I
At the end of this course, students will be able to

- Understand algebraic structures in n-dimension and basic properties of the linear vector spaces.
- Represent Linear Transformations as matrices and understand basic properties of matrices.
- Apply vector spaces and matrices in the quantum world.
- Learn basic properties of Cartesian and general tensors with physical examples such as moment of inertia tensor, energy momentum tensor, stress tensor, strain tensor etc.
- Learn how to express the mathematical equations for the Laws of Physics in their co-variant forms.
- In the laboratory course, the students are expected to solve the problems using the Scilab/C++/Python computer language: Eigenvalues and Eigenvectors of given matrix, determination of wave functions for stationary states as eigenfunctions, eigen energy values of Hermitian differential operators, Lagrangian formulation in classical dynamics etc.

Course Learning Outcomes
Nuclear And Particle Physics

- To be able to understand the basic properties of nuclei as well as knowledge of experimental determination of the same, the concept of binding energy, its various dependent parameters, N-Z curves and their significance
- To appreciate the formulations and contrasts between different nuclear models such as Liquid drop model, Fermi gas model and Shell Model and evidences in support.
- Knowledge of radioactivity and decay laws. A detailed analysis, comparison and energy kinematics of alpha, beta and gamma decays.
- Familiarization with different types of nuclear reactions, Q- values, compound and direct reactions.
- To know about energy losses due to ionizing radiations, energy losses of electrons, gamma ray interactions through matter and neutron interaction with matter. Through the section on accelerators students will acquire knowledge about Accelerator facilities in India along with a comparative study of a range of detectors and accelerators which are building blocks of modern day science.

Course Learning Outcomes
Astronomy and Astrophysics
Students completing this course will gain an understanding of

- Different types of telescopes, diurnal and yearly motion of astronomical objects, and astronomical coordinate systems and their transformations.
- Brightness scale for stars, types of stars, their structure and evolution on HR diagram.
- Components of Solar System and its evolution
- The large scale structure of the Universe and its history

- Distribution of chemical compounds in the interstellar medium and astrophysical conditions necessary for the emergence and existence of life.

Semester VI

Core course-XIII	**Electro-magnetic Theory**
Core Course-XIII Practical/Tutorial*	**Electro-magnetic Theory Lab**
Core course-XIV	**Statistical Mechanics**
Core Course-XIV Practical/Tutorial*	**Statistical Mechanics Lab**
Discipline Specific Elective -3	**DSE-3:** Advanced Mathematical Physics II
Discipline Specific Elective -3 Practical/Tutorial*	**DSE-3** Advanced Mathematical Physics II Tutorial
Discipline Specific Elective-4	**DSE-4** Classical Dynamics
Discipline Specific Elective -4	**DSE-4** Classical Dynamics Tutorial

Course Learning Outcomes
Electromagnetic Theory & Lab
At the end of this course the student will be able to:

- Apply Maxwell's equations to deduce wave equation, electromagnetic field energy, momentum and angular momentum density.
- Understand electromagnetic wave propagation in unbounded media: Vacuum, dielectric medium, conducting medium, plasma.
- Understand electromagnetic wave propagation in bounded media: reflection and transmission coefficients at plane interface in bounded media.
- Understand polarization of Electromagnetic Waves: Linear, Circular and Elliptical Polarization. Production as well as detection of waves in laboratory.
- Learn the features of planar optical wave guide.
- Understand the fundamentals of propagation of electromagnetic waves through optical fibres.

Course Learning Outcomes
Statistical Physics & Lab
By the end of the course, students will be able to:

- Understand the concepts of microstate, macrostate, phase space, thermodynamic probability and partition function.
- Understand the use of Thermodynamic probability and Partition function for calculation of thermodynamic variables for physical system (Ideal gas, finite level system).
- Difference between the classical and quantum statistics.
- Understand the properties and Laws associated with thermal radiation.
- Apply the Fermi- Dirac distribution to model problems such as electrons in solids and white dwarf stars
- Apply the Bose-Einstein distribution to model problems such as blackbody radiation and Helium gas.
- In the laboratory course, with the exposure in computer programming and computational techniques, the student will be in a position to perform numerical simulations for solving the problems based on Statistical Mechanics.

Course Learning Outcomes
Advanced Mathematical Physics - II
After the successful completion of the course, the students shall be able to
• Understand variational principle and its applications: Geodesics in two and three dimensions, Euler Lagrange Equation and simple problems in one and two dimensions.
• Acquire basic concept of Hamiltonian, Hamilton's principle and Hamiltonian equation of motion, Poisson and Lagrange brackets.
• Learn elementary group theory: definition and properties of groups, subgroups, Homomorphism, isomorphism, normal and conjugate groups, representation of groups, Reducible and Irreducible groups.
• Learn the theory of probability: Random variables and probability distributions, Expectation values and variance.

Course Learning Outcomes
Classical Dynamics
At the end of this course, students will be able to:

- Understand the physical principle behind the derivation of Lagrange and Hamilton equations, and the advantages of these formulations.
- Understand small amplitude oscillations.

- Understand the intricacies of motion of particle in central force field. Critical thinking and problem-solving skills
- Recapitulate and learn the special theory of relativity extending to Four – vectors.
- Learn the basics of fluid dynamics, streamline and turbulent flow, Reynolds's number, coefficient of viscosity and Poiseuille's equation.

13. Department of Political Science

B.A. (Hons.) Course:

- B.A. Political Science (Honours) Programme is offered for a duration of threeacademic years. Each academic year is divided into two semesters. The Political Science (Honours) Programme, therefore, spans six semesters altogether. Each semester is for the duration of sixteen weeks.
- The teaching and learning modalities in the Honours programme will involvetheory classes (lectures) of one hour each and tutorial classes, along with hands-on experiences of various practical academic activities.
- With a mix of choices – Core, Discipline Specific Electives (DSEs), Generic Elective (GE) and Skill Enhancement Courses (SECs), it provides multiple points where students can participate in debates and discussions with inter- disciplinary reflections. Core Disciplinary papers feed the fundamental knowledge of Political Science and Politics in India and the Comparative Politics. The programme, thus, allows students to tailor their learning on the basis of their interests. The choices inculcate not just the understanding of Political Science but also a vital skill to students of other academic disciplines. It keeps in mind the flexibility and strength of the B.A. Political Science (Hons.)Programme to impart an interdisciplinary-oriented study with a specialisation in Political Science for students of other academic disciplines, and helps them learn a basic political understanding of our society, state and governments.
- The curriculum will be taught through formal lectures with the aid, wherever the teacher feels the need, of power-point presentations, audio and video tools.
- The outcomes also include submission of class reports, discussions and project works. The Department organises activities for electoral studies, research activities, and other activities such as tours or visits to parliament.These are built into the teaching and assessment framework of different courses.
- Graded assessment of all papers is broadly carried out in two forms:
  a) End-semester [theory] examination which covers the entire syllabus. Students are asked eight questions and are required to answer any fourquestions in three hours. The end of semester examination comprises 75% of the final grade.
  b) The second assessment is through internal evaluation of assignments, term papers, presentations, class test and project work which is carried out throughout the term and comprises 25% of the final grade.

ProgrammeSpecific Outcomes:

- The Programme revolves around the principle of student-centred approach, which encourages students for an active participation in various activities, andexposes to critical thinking.
- The Department brings its students together through its association called *La Politique* in various tours, annual fests, welcoming freshers, competitions, andso on.
- *La Politique*, under the supervision of the Department, organises academic visits to political institutions such as the Parliament of India for an educationalpurpose in order to make a sense of their theoretical knowledge about Indian political system and appreciate the constitutional government and democracyin India.
- *La Politique* organises academic workshops, seminars (for example, on theoccasion of the Frank Thakur Das Memorial), conferences after inviting bureaucrats, prominent academicians, journalists, activists, etc.
- Through annual election of the members of the *La Politique*, the students canexperience the actual organisation and functioning of election and electoral process. The entire process capacitates the students with organisational skillsand human resource management.
- It offers opportunities for the students to indulge in academic writing throughits Annual Magazine, '*Awaaz'* with the help of the experienced faculties of theDepartment where they can express their ideas and reflect on issues of publicconcerns.
- Besides, students through *La Politique* along with faculties of the Department maintain the website of the Department which is the first for a department in the KMC family where all the departmental activities and events are uploadedfor students and faculties.

Semester-I:

Understanding Political Theory (Core-Paper I)

Program outcomes:

- The Paper builds up the ideas of political theory in order to make sense of what 'political science' is; and, then, familiarizes them with a practical understanding of political and social principles in a democracy through the following course outcomes:
  - Various approaches, ranging from traditional tocontemporary, to the study of political theory enable in understanding how political theory can be attempted at with different units of analysis for explaining political

and social events.

- It paves the way for understanding the significances of political theorizing and itsapplication in a democratic society.
- An important method is using primary sourcesof various classical and modern texts which

helps students in interpreting such 'key' texts for a strong foundation of an understanding of politics, and social and political principles in theorising political theory.

Constitutional Government and Democracy in India(Core- Paper II)

- Use of empirical knowledge and scholarly literature on constitutional design, state structures and institutions to:
  - Familiarise students with the debates around theorigin, and evolution of the Constitution of India.
  - Make students understand functions ofgovernment through its various organs.

Make students understand the division of powerbetween branches of government.

Understanding Ambedkar (Generic Elective Paper- GE5)

- Grasp the original writings and ideas of Ambedkar on diverse issues beyond caste and that will equip them to critically engage with the ideas, interpretations.
- By engaging with the original sources as well as secondary writings on Ambedkar's ideas that cover, caste, class, gender, religion, state, democracy and constitution, the students will understand a thinker in the context and contemporaneity.
- Equip students with the method of understanding the ideas, philosophy and relevance of a particular thinker.
- Assist them to develop and reflect on the method ofthe thinker's engagement with the context, issues and concepts.
- Facilitate them with an advance the conceptual and philosophical diversity, situatedness and significance of Ambedkar beyond his contribution in the sphere of social justice and drafting the Indian Constitution.
- Provide opportunity to the students to understand Ambedkar for his several important contributions inthe field of religion, state, democracy, gender, economy and history.

B.A.(Programme):

Introduction to Political Theory (Core-Paper I)

- The course helps students understand the nature andrelevance of Political Theory.
- Concretize different concepts like rights, liberty,equality, and justice.
- Facilitate students with critical skills for reflection and participation in important debates in Political Theory.

Political Theory- Concepts and Debates(Core-Paper III)

- Having studied approaches to political theory, the course in the second semester introduces concepts such as rights, liberty, equality, and justice through interpretation of these concepts by various thinkers and philosophers from ancient to modern times for an advance understanding of political theory and prepare students for major political debates.
- Help students understand various dimensions of shared living through these political values and concepts.
- Appreciate how these values and concepts enrich thediscourses of political life, sharpening their analyticalskills in the process.

Political Process in India (Core- Paper IV)

- Impart students with insights into the interconnections between social and economic relations and the political process in India.
- Help them understand the challenges arising due to caste, class, gender and religious diversities and alsoanalyse the changing nature of the Indian state in thelight of these diversities
- Make sense of the specificities of the political processes in India in the light of changes of the state practices, electoral system, representational forms and electoral behaviour.

Gandhi and the Contemporary World(GE4)

- Help students to understand Gandhian philosophy ina critical and analytical manner.
- Demonstrate students with the impact of Gandhian thought on Indian and global politics.
- Help students identify and explain the selected approaches and methods that historians have used to study the history of anti-colonial Indian politics.
- Enable students in understanding the contemporaryrelevance of Gandhi's legacy, for examples, *gandhigiri*, in the light of vibrant socio-economic andpolitical activism prevalent in India and across the world.

B.A.(Programme):

Indian Governmentand Politics (Core- Paper II)

- Inculcate students towards an understanding of the different viewpoints on Indian politics and the natureof Indian state.
- Impart them with the knowledge of the text of the Indian Constitution and an awareness of constitutional and legal rights.
- Apprise them with the structure of society in India and how social inequalities have an impact on political institutions and processes
- Expose the students with the awareness of the party system in India and the development policies adopted by various governments.
- Impart them with knowledge of social movements and their implications on political processes.

14. Department of Sanskrit

B.A. (H) Course:

- The B.A (Hons.) Sanskrit course is a six semester course spread over three academic years. The teaching – learning process involves theory and tutorial classes will be student centered.
- Students will be encouraged to participate in institutional visits, seminars, workshops and webinars for depth knowledge of course core concept. Assessment will be based on continuous evaluation (class test, assignment, presentation, G.D., Citrapratiyogita Shlokpratiyogita prashnamancha etc.) and after that semester examination. Each theory paper will be 100 marks out of which 25% marks are for internal assessment.
- The achievement by students of course-level learningoutcomes lead to the attainment of the programme learning outcomes. At the course level, each course may well have links to some but not all graduate attributes as these are developed through the totality of student learning experiences across the years of their study.

Semester-I:

- SANSKRIT - C I: Poetry - I Course Title: Classical Sanskrit Literature
- SANSKRIT - C II: Sanskrit Literature - I Course Title: Critical Survey of Sanskrit Literature

Program outcomes:

- **This course will help the students develop a fair idea of the works of great Sanskrit poets. They will be able to appreciate the styles and thoughts of individual poets focusing on the poetical, artistic, cultural and historical aspects of their works. This course will enhance competence in chaste classical Sanskrit and give them skills in translation and interpretation of poetic works.**
- Critical Survey of Sanskrit Literature: This course will help the students develop a fair idea of the works of great Sanskrit seers. They will be able to improve their knowledge about philosophy, socio-religious life, polity as depicted in the prescribed areas of study. This course will also introduce them to three important śāstras.

Semester-II:

- SANSKRIT – C-III: Sanskrit Prose - I Course Title: Classical Sanskrit Literature (Prose)
- SANSKRIT – C- IV: **Gītā** - II Course Title: **Self-Management in the Gītā**
- SANSKRIT – **AECC** - III Course Title: **- Upanishad and Bhagawad Gītā**
- SANSKRIT – **GE** - IV Course Title: **- Basic Principles of Indian Medicine System (Ayurveda)**

Program outcomes:

- The course will enable students to familiarize themselves with some leading classical prose works and the individual literary styles of their authors. After the completion of this course the learner will be exposed to the socio-cultural conditions of the Indian society as reflected in the prescribed texts. They will acquire skills in advanced Sanskrit communication.
- This course will help students to learn to read the Gītā as a multipolar text which is open to several alternative interpretations. This course will equip them with the practical skills to negotiate conflicts and emotional disturbances and define and pursue their goals with clarity and dedication. The course will instill leadership qualities in learners and also help them to grow as balanced and successful human beings who can face the challenges of life successfully.
- The Ishopanishad teaches the art of harmonising materialism and spiritualism. The subject matter of the Bhagawad Gita 2nd chapter will enable learners to attain a proper balance between intellectual and emotional faculties.
- Āyurveda is the most ancient but alive traditional healthcare system in India. Through the classroom lectures and discussions, this course will introduce students to the theory of Āyurveda. The major objective is to make them understand the basic principles and concepts of preventative and curative medicines, health maintenance, diet and nutrition, usage of commonly used spices and herbs and therapeutic procedures in Āyurveda.

Semester-III:

- SANSKRIT – C-V: Sanskrit Drama - I Course Title: **Classical Sanskrit Literature (Drama):**
- SANSKRIT – C- VI: Poetics - II Course Title: **Poetics and Literary Criticism**
- SANSKRIT – C- VII: Indian Social Polity -III Course Title: **Indian Social Institutions and Polity**
- SANSKRIT – **AECC** - IV Course Title: **- Sanskrit Meters and Music**
- SANSKRIT – **GE** - V Course Title: **- Nationalism and Indian Literature**

Program outcomes:

- After completion of this course the students will be aware about the beauty and richness of classical Sanskrit dramatic tradition. This course will enhance the ability for critical thinking on issues of culture, polity, morality, religion etc as reflected in the prescribed texts The course will make the students aware of the formal structures of Sanskrit drama in the tradition of Bharata's natya Shastra.
- This course will make students aware of with the skills to assess the merits or demerits of works on poetry, prose and drama. They will be able recognize the various genres of poetry, appreciate the objectives of poetry and also

analyze the structure of a work in terms of the essential ingredients of poetry as propounded. Students will be inspired and encouraged to compose.

- After the completion of this course students will be able to connect the theoretical model propounded by the prescribed texts in the forms of saptanga theory, shadguna theories and mandala theories with contemporary governance issues . The learners will be able to see Dharma as dynamic institution. This will free them from the traces of fundamentalism and they should become more open minded and liberal. Learning and developing a critical approach about the institution of caste and women's issues will make the participants sensitive to discriminating practices.
- The Students will be able to appreciate their lyrics while reciting them. Their feelings in to metrical Sanskrit writings.
- The Students will have admiration for their Nation and will like to know more and more about the National heritage.

Semester-IV:

- SANSKRIT – C-VIII: I Course Title: **Indian Epigraphy, Paleography and Chronology**
- SANSKRIT – C- IX: Modern Sanskrit- II Course Title: **Modern Sanskrit Literature**
- SANSKRIT – C- X: -III Course Title: Sanskrit World Literature
- SANSKRIT – **AECC** - IV Course Title: **- Reading skills in Brāhmī Scripts**
- SANSKRIT – **GE** - V Course Title: **- Basic Sanskrit**

Program outcomes:

- This course will equip students with the necessary tools for the study of Indian inscriptions. They will learn ancient scripts and use their knowledge in studying more inscriptions later. Students will be able to read, collate and interpret inscriptions to reconstruct history. Thus, it will be useful for students who are interested in pursuing advance study in archaeology.
- This course will enable the students to appreciate the Mahākāvya and Charitakāvya, Gadyakāvya , Rūpaka, GītiKāvya and Other genres and General Survey of Modern Sanskrit Literature. It will create an awareness of the modern historicity of the modern Sanskrit literature.
- Scholars who pursue this course will learn about the cultural contacts between India on the one hand and Europe, West Asia and South East Asia on the other during different phases of history. They will also see how colonialism distorted India's achievements in knowledge production. They will become aware of Indo European linguistic and cultural affinities, spread of Indian fables, the Upanishads, the Gita and Kalidasa's works in the west. They will be able to appreciate the close relation between Upanishadic thought and Sufism. They will study how Sanskrit literature has impacted India's cultural ties with South East Asian countries.
- After acquiring knowledge of Brahmi script variation, it will certainly be helpful in ascertaining to understand period of an inscription.
- The Students will be able to communicate in simple Sanskrit. They will develop an interest in Sanskrit.

Semester-V:

- SANSKRIT – C-XI: VED - I Course Title: **Vedic Literature**
- SANSKRIT – C- XII: Grammar: - II Course Title: **Sanskrit Grammar**
- SANSKRIT – DSE-1: III Course Title: **Sanskrit Linguistics**
- SANSKRIT – **DSE-2** - IV Course Title: **- Fundamentals of Āyurveda**
- **Program outcomes:**
- By reading these texts, students will have an impression of the depth of Vedic knowledge and will be able to realize that ideas of Vedic seers are based on philosophical, moral, and scientific principles. By understanding them, students will be able to know and achieve some higher attributes from Vedic heritage about our culture, morals, and thoughts. Thus they may develop curiosity to know more about other Vedic texts and concepts as well. After completing this course students will surely be able to communicate about some important Vedic verses with their meaning and teaching, and thus fundamentals of religious life of India will be revealed to them in its true form. Students will understand the strength of Unity, power of mind, and will realize the importance of earth in their life. From the study of Upaniṣad they will know about philosophical and Psychological insights of our ancestors and can develop this learning further for the benefit of themselves in particular and society in general.
- Laghusiddhāntkaumudī: After completion of this course students will understand the basic structural nuances of Panini's grammar. They will become familiar with fundamental samdhi and compounding patterns. They will also understand some most important primary and secondary suffixes of Sanskrit. The practice of the application of the rules learnt from the reading of the texts will further enhance their knowledge of the structural patterns of Sanskrit language.
- The Students will become aeare of the linguistic structure of Sanskrit and see its close relation with the Avestan and Prakrits.

- Fundamentals of Ayurveda: Graduates who read this course should be able to know the ancient tradition of Indian Medicine system, which has focused not only to the physical health but a healthy lifestyle. After reading this paper students will know the history of Āyurveda through original sources of ancient medicine system enshrined in Sanskrit texts like Charaka Saṁhitā, Śuśruta Saṁhitā, Aṣtānṅga Hridaya etc. and they will also get the basic knowledge of eight departments of Āyurveda. Second section of this paper is related to ancient physiology. In this section students will get acquainted with the basic concept of Triguṇa, Pancamahābhūtas , Tridoṣas, Saptadhātus, Trayodosāgni, Trimalas, SvasthaVṛtta etc. which will help students to develop Āyurvedic understanding of lifestyle and concepts of preventive medicine. Āyurveda prescribes different food habits in different seasons. After reading this section students will be able to understand seasonal regimen & social conduct and its effect on health. It will develop their understanding of Health and Disease as explained in Āyurveda, and the way of diagnosing the illness. Taittirīyopaniṣad - Bhriguvalli will be taught in the third section of this paper. Our Ṛṣis were not only concerned about the physical health of individuals but also about the holistic health i.e. including mental, social and spiritual well being. By reading this portion of Upaniṣad student would develop a more balanced approach towards life.

Semester-VI:

- SANSKRIT – C-XIII: VED - I Course Title: **Indian Ontology and Epistemology:**
- SANSKRIT – C- XIV: Grammar: - II Course Title: **Sanskrit Composition and Communication:**
- SANSKRIT – DSE-3: III Course Title: **Art of Balanced Living**
- SANSKRIT – DSE-4 - IV Course Title: **- Fundamentals of Āyurveda**
- **Program outcomes:**
- Students will become familiar with primary and one of the most important and influential school of Indian Philosophy i.e. Nyaya-Vaisesika through its basic text the Tarkasangraha. They will also be introduced to essential problems in philosophy - Causation, Ontology and Epistemology. This will enable them to engage with other texts in Indian philosophy with some ease.
- This course will help the learners develop a critical, linguistic and scientific approach towards Sanskrit language. The practice of essay writing will make the students form ideas and express them in Sanskrit. This practice will also familiarise them with various shastric theories.
- Graduates who read this course will acquire the necessary tools for a balanced life. They will know the true essence of listening (acquisition of information) manana (reflection) and nididhyasana (unflinching commitment). In this segment students can learn how to improve concentration. They will be able to identify the causes for indecisiveness and confusion and will learn how emotional stability can lead to clearer thinking. This section will help students to understand the importance of Ashtang yoga and Kriyayoga for the purification of mind. Team work and social cohesion require inter personal skills. Here students will know how to improve their behaviour through jnana, dhyan, karma and bhakti yoga. Students will also understand how active engagement with action is most conducive to healthy and successful living.
- The course-level learning outcomes that a student of this course is required to demonstrate are indicated below:
  - Learn the basic concept of Sanskrit Phonology, Sanskrit Morphology, Syntax, Semantics, Lexicon and Corpora.
  - Learn the origin and Development of Language Computing.
  - Basic Introduction of Computing Sanskrit Language.
  - Various methodologies used on Language Technology. Various tools developed for Sanskrit Language.
  - Survey of Language Computing
  - Evaluation and Challenges in Machine Translation

15. Department of Statistics

B.Sc. (H) Course:

- B.Sc. (Hons.) Statistics course is a six-semester course spread over three academic years. The teaching – learning process involves a combination of classroom teaching, practical classes, project-based learning, group discussions, presentations, home assignments, industry interactions and internships. The programme has a unique and innovative course structure which encourages creative out of the box thinking.
- B.Sc. (Hons.) Statistics programme is designed in such a way that students will be exposed to the real-world data related to industries and society, identifying the problems and working towards their solutions through various analytical and statistical techniques. The course is designed to imbibe strong foundation of statistics in students.
- The programme also fosters interdisciplinary approach to the study of Statistics, Mathematics, and Computers, aiming to promote holistic education useful in handling social, economics, engineering, physical and bio-sciences problems. Introduction to computer software help the students in analysis of data by making optimum usage of time and resources and gives them the necessary support and an edge when progressing to their professional careers.
- Having practical component with every paper invokes their exploratory side and fine-tunes the interpretation abilities. Such a pedagogy goes a long way in giving them the required impetus and confidence for consultancy, startups and jobs in near future. The structure of the course also motivates the students to pursue careers in related disciplines, especially the data sciences, financial statistics and actuarial sciences.
- Assessment is based on continuous evaluation (class test, presentation, group discussion, quiz, assignment etc.) and end of semester examination. Each theory paper is of 100 marks out of which 25% marks are for internal assessment while a practical paper will be of 50 marks comprising 50% internal assessment.

Semester-I:

Core Courses:

- STAT-C-101**:** DESCRIPTIVE STATISTICS
- STAT-C-102: CALCULUS

Program Outcomes:

- Understanding the concepts of probability and its applications.
- Understanding the concept of random variables, probability distributions and expectation.
- Learning the fundamentals of differential calculus/Integral calculus/Differential Equation/Partial differential equation.
- Understanding the concepts of discrete and continuous data, measures of central tendency, variation, skewness, kurtosis, correlation, fitting of curve and regression.

Semester-II:

Core Courses:

- STAT-C-201:PROBABILITY AND PROBABILITY DISTRIBUTIONS
- STAT-C-202: ALGEBRA

Program Outcomes:

- Understanding the basic concepts of Probability theory, their applications in mathematical Statistics, Descriptive Statistics and solving numerical problems.
- Understanding the fundamental concept of expectation for univariate and bivariate random variables with their distributions and properties.
- Understanding the different types of probability distributions (discrete and continuous) and obtaining estimates of probability that a certain event may occur or estimating variability of occurrence.
- Understanding the concept of matrix algebra and determinants, and applying them, for the solving numerical problems, in the statistical analysis of data., and also to various disciplines of statistics such as linear models, econometrics, etc.
- Understanding the concept of polynomial functions, their roots and transformation of equations.
- Understanding the concept of vectors with their properties and operations
- Applying vector theory in pure and applied mathematics and in physical and engineering sciences

Semester-III:

Core Courses:

- STAT-C-301: SAMPLING DISTRIBUTIONS
- STAT-C-302: SURVEY SAMPLING AND INDIAN OFFICIAL STATISTICS
- STAT-C-303: MATHEMATICAL ANALYSIS

Program Outcomes:

- Understanding the concepts of Laws of convergence, relationship between them and applications. Central Limit Theorem and its applications, Order statistics.
- Understanding the concepts of sampling distribution of a statistic and their applications.
- Concepts of hypothesis testing, p-value, framing of null and alternative hypothesis, confidence intervals. Hypotheses testing based on single sample and two samples using classical and p-value approach. Applications of normal distribution, chi-square distribution, t-distribution and F-distribution in hypothesis testing.
- Understanding the basic concepts of sample survey, principles of sample survey, steps involved in selecting a sample and different sampling techniques.
- Drawing a sample using different sampling techniques and estimating the population characteristics.
- Indian Official Statistics
- Developing a clear understanding of real numbers, real valued functions, analytical properties of sequences, infinite series, different tests, Limits, continuity, differentiability and mean value theorems.
- Concepts of numerical approximation to the problems of mathematical analysis. Fundamentals of numerical analysis, interpolation, numerical integration and difference equations.

Semester-IV:

Core Courses:

- STAT-C-401: STATISTICAL INFERENCE
- STAT-C-402: LINEAR MODELS
- STAT-C-403: STATISTICAL QUALITY CONTROL

Program Outcomes:

- Understanding the concepts of estimation, properties of good estimator, Cramer-Rao inequality, Rao-Blackwell theorem,Lehmann-Scheffe theorem, Methods of estimation and Confidence intervals
- Developing most powerful statistical tests for testing the hypotheses about unknown population parameters (Using Neyman-Pearson Lemma and Likelihood Ratio tests).
- Understanding the concepts of Linear Models, Gauss-Markov theorem, distribution of quadratic forms, simple and multiple linear regression models and their applications and techniques of analysis of variance and covariance under fixed effects model.
- Understanding the concepts of Statistical process control, Statistical product control, Six sigma limits and Control charts for variables and attributes for improving the product quality.
- Understanding the concepts of index numbers and their construction,, Criteria of good index numbers, Base shifting, splicing and deflating of index numbers.

Semester-V:

Core Courses:

- STAT-C-501: STOCHASTIC PROCESSES AND QUEUING THEORY
- STAT-C-502: STATISTICAL COMPUTING USING C/C++ PROGRAMMING

Program Outcomes:

- Understanding the fundamentals of stochastic processes and its application with Poisson process and queuing theory.
- Understanding the concept of Markov process and Markov chains under discrete case and its application in the medical and finance where transitions take place. Understanding of classical ruin theory under gambler's game theory.
- Fundamentals of probability generating functions and different application under discrete random variable which is very important for the understanding of Statistics.
- Concept of simulation is introduced to understand the standard results of theorems.
- Understanding basic concept of data types, operators, library functions, Input/output operations, decision making, branching.
- Fundamentals of looping, arrays, character, strings, user- defined functions, storage class of Variables, pointers, structure, dynamic memory allocation functions.
- Learning the basic data structures and develops logics which will help them to create well-structured programs using C language.

Discipline Specific Electives:

- STAT-DSE-1(A): TIME SERIES ANALYSIS
- STAT-DSE-2(A): OPERATIONS RESEARCH
- STAT-DSE-2(B): ECONOMETRICS

Program Outcomes:

- Fundamentals of times series data its components; Seasonal, Cyclic and random component and estimating these components with different methods.
- Understanding of some special Moving-average process and Autoregressive processes. Estimation of the parameters of Autoregressive processes.
- Fundamentals of Forecasting by the methods of Exponential smoothing, applying ARMA and ARIMA models.
- Understanding fundamentals of Operations Research with mathematical formulation with techniques like Simplex method , Charne's M-technique of solving Linear Programming Problem.
- Understanding to handle Transportation Problem and Assignment problem and its solution with its application.
- Fundamentals concepts of Game theory and its solutions.
- Basic understanding of Networking using Shortest route and minimal spanning tree problem.
- Understanding the basic concepts associated with Inventory Management by studying ABC inventory system, characteristics of inventory system. EOQ Model and its variations, with and without shortages, Quantity Discount Model with price breaks.
- Understanding the Objective behind building econometric models and role of econometric in Statistics.
- Understanding the fundamentals of General linear model and its estimation under linear restrictions.
- Understanding the importance of assumptions of General Linear models and its violations leading to Multicollinearity, Autocorrelation and Heteroscedasticity.
- Introduction of basic concept of LAG variables

Semester-VI:
Core Courses:
- STAT-C-601: DESIGN OF EXPERIMENTS
- STAT-C-602: MULTIVARIATE ANALYSIS AND NON-PARAMETRIC METHODS

Program Outcomes:
- Understanding the fundamental concepts of design of experiments and planning valid and economical experiments within given resources through complete and incomplete block designs
- Comprehending the difference between full and confounded factorial experiments in two and three levels and using them for planning experiments and applying fractional factorial designs in product development and quality improvement in industries.
- Generating data through designed experiments, its collection and analysis of data.
- Understanding the basic concepts associated with Multivariate Normal Distributions and their properties with special emphasis on Bivariate Normal Distribution and analysing multivariate data using data reduction techniques like Principal Component Analysis, Factor Analysis.
- Applying of Wald's SPRT for testing simple null hypothesis vs simple alternative hypothesis along with the study of the O.C. function and the ASN function for various underlying continuous and discrete distributions.
- Testing of hypothesis using Non-Parametric tests like Median test, Runs test, U test, Kruskal Wallis test etc. and ability to use them judiciously for the testing of given data.

Discipline Specific Electives:
- STAT-DSE-3(A): ACTUARIAL STATISTICS
- STAT-DSE-3(B): BIOSTATISTICS AND SURVIVAL ANALYSIS
- STAT-DSE-4(A): FINANCIAL STATISTICS

Program Outcomes:
- Learning advanced techniques in Actuarial Science with practical applications in daily life.
- Applying actuarial methods in phenomena for financial research and insurance including computation of premiums and settlement of claims.
- Understanding fundamental concepts of censored data and its applications to public health.
- Learning the use of competing risk theory in cause-specific mortality study and understanding need of clinical drug trials.
- Understanding fundamental concepts of investments and products of financial markets particularly derivative markets.
- Applying the techniques of stochastic calculus to price the products of derivative markets.

GE (OTHER THAN STATISTICS DEPARTMENT)
Semester-I
Course:
STATISTICAL METHODS
Program Outcomes:
- Introduction to Statistics, definitions and data classification, types of studies and types of samples.

- Graphical displays of data, frequency distributions, analyzing graphs, numerical descriptions of data, measures of center tendency, measures of dispersion, skewness and kurtosis
- Correlation and regression, theory of attributes

Semester-II
Course:
INTRODUCTORY PROBABILITY
Program Outcomes:

- Understanding the basic concepts of Probability theory, random variables and their convergences at weak and strong levels.
- Applying theory of probability to solve probabilistic problems.
- Understanding the different types of probability distributions (discrete and continuous) and applying different probability distributions to realistic models.

Semester-III
Course:
BASICS OF STATISTICAL INFERENCE
Program Outcomes:

- Understanding the fundamental concepts of estimation, properties of a good point estimator, confidence intervals testing of hypothesis based on the sampling distribution of a statistic, parametric and nonparametric tests, fundamentals and analysis of basic designs and bioassay.

Semester-IV
Course:
APPLIED STATISTICS
Program Outcomes:

- Understanding the basic concepts of time series data, components of time series data, identification and measurement of various components of time series data.
- The fundamental concepts of Index Numbers, Construction of price and quantity Index numbers, Construction of Wholesale and Consumer price Index and its significance
- Understanding the concepts of Statistical Quality Control, Use of Statistical methods in industrial research and practices, Control charts for variables and attributes.
- Learning about different demographic methods. Measurement of mortality and fertility rates, reproduction and population growth measures. Construction and importance of Life Table.

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16. Department of Urdu

B.A. (H) Course:

- The B.A. (Hons.) Urdu course is a six semester course spread over three academic years. The teaching – learning process involves theory and viva voce classes and will be student centered.
- Students will be encouraged to carry out short term projects and participate in academic and educational visits, seminars and workshops. Assessment will be based on continuous evaluation (class test, presentation, group discussion, quiz, assignment etc.) and end of semester examination. Each theory paper will be of 100 marks out of which 25% marks are for internal assessment while a viva voce paper will be of 50 marks comprising 50% internal assessment and short term projects
- The B.A. (Hons.) programme in Urdu is designed to develop in students in depth knowledge of the core concepts and principles that are central to the understanding of this core humanities discipline.

Semester-I:

1. Study of Non Fiction Urdu (12141102) Core Course - (CC)Credit: 6.

Program outcomes:

To Give a Glimpse of Non Fiction Prose Writing which Include Essay, Light Essay and Sketch and also to Give an Idea of Evolution of Urdu Prose ThroughVarious form.

2. Study of Urdu Fiction (12141101) Core Course - (CC) Credit: 6.

Program outcomes:

To give a glimpses of classical writing with special reference to Urdu Fiction andalso to give a variety of Different short stories and novels. so students can get a profound knowledge of contemporary modern India.

3. Study of Urdu Poetry-1 (12145901) Generic Elective - (GE)Credit: 6.

Program outcomes:

To Give Glimpses of Urdu Poetry of Early 20th Century and also to Make themappreciated Urdu Poetry through popular genres.

4. Urdu-C Urdu Nisab -I (62141117) Core Course - (CC) Credit:6

Program outcomes:

To Give Glimpses of Modern Urdu Prose and poetry to thestudents who have studied Urdu upto Class VIII and also to inculcate best human values and give a outlook of secular and diverse India

Semester-III:

5. Study of Prose Writer Shibli (12141301) Core Course - (CC)Credit:6.

Program outcomes:

To give a perspective of evolution of Urdu Prose in late 19th century with special reference to Shibli and also to give glimpses of introduction of criticism and travelough in Urdu.

6. Special Study of Hali (12141302) Core Course - (CC) Credit:6.

Program outcomes:

To give a perspective of evolution of Urdu Prose in late 19th century with special reference to Hali and also to give glimpses of introduction of criticism and biographies in Urdu.

7. Study of Classical Ghazal (12141303) Core Course - (CC)Credit:6.

Program outcomes:

Ghazal has been always have a favorite genre of Urdu Poetry. It gives an outlook towards life and also to give glimpses of different varieties of expression associated with Ghazal.

8. Learning Skill of Afsana in Urdu (12143902) Skill-Enhancement Elective Course - (SEC) Credit:4.

Program outcomes:

Through this course students will get a chance to know about art of expression in short story and also students will have a chance to write one or two afsana so they can practice short story writing.

9. Study of Medival Prose & Poetry (Urdu B) (62141903) CoreCourse - (CC) Credit:6.

Program outcomes:

This course introduce different realities of life. This course also reflects the aesthetic perspective of Urdu poetry

Urdu-C Urdu Nisab -I (52141226) Core Course - (CC) Credit:6

Program outcomes:

To Give Glimpses of Modern Urdu Prose and poetry to thestudents who have studied Urdu upto Class VIII and also to inculcate best human values and give a outlook of secular and diverse India

Semester-V:

10. Study of Poet Mirza Ghalib (12141501) Core Course - (CC) Credit:6.

Program outcomes:

To give a chance to thorough study of a poet of high caliber- Mirza Ghalib andalso to make them understand why Ghalib is Different from other poets.

11. Study of Literary Movements (12141502) Core Course - (CC) Credit:6.

Program outcomes:

To give them an outlook of different literary movements in Urdu including Sir Syed Movement, Romantic movement, Progressive movement and modernism and also to give them a chance to study evolution of Urdu in light of literary movements.

12. Study Of Urdu Novel (12147901) Discipline Specific Elective - (DSE)Credit:6.

Program outcomes:

To give a perspective of evolution of Urdu novel in 20th Century and also tomake them understand versatile and varied scenario of rural India.

13. Study Of Urdu Drama (12147903) Discipline Specific Elective - (DSE)Credit:6.

Program outcomes:

To give a perspective of evolution of Urdu Drama in 19th & 20th Century andalso to make them understand of evolution of Urdu Drama from Inder sabha to20th century best drama writers in Urdu.

Semester-II:

14. Study of Modern Nazm (12141201) Core Course - (CC)Credit:6.

Program outcomes:

To give them a chance to appreciate modern Nazm in Urdu in the era of freedomstruggle and also to make them understand how a poet can express his thoughts in poetic forms.

Study of Modern Ghazhal (12141202) Core Course - (CC)Credit:6.

Program outcomes:

To give glimpses of different variety of expression associated with ghazal including philosophy, romance and progressive thinking and also to make them appreciated modern ghazal in early 20th century.

Semester-IV:

16. Study of classical Prose (12141401) Core Course - (CC) Credit:6.

Program outcomes:

To give a perspective of classical prose including establishment of Fort William College and also to give a realistic view of the situation prevailed in 1857 with reference to letters of Ghalib.

17. Urdu Tanz-O-Mezah (12141402) Core Course - (CC) Credit:6.

Program outcomes:

To make them appreciate of Urdu humor and satire appearing in the form of prose and poetry and also to give a subtl nuances of evolution of Urdu Humorand satire.

18. Study of Qasida, Marsia & Masnavi (12141403) Core Course - (CC)Credit:6.

Program outcomes:

To give a perspective of classical poetry forms in Urdu with special reference to Qasida, Marsiya and Masnavi and also to make them appreciate of varied expression in the form of poetry

19. Learning Skills For Media Writing (12143904) Skill-EnhancementElective Course - (SEC) Credit:4.

Program outcomes:

Media writing has very good scope in Urdu and also Through this paper students will get a chance to practice of writing diffrent genres associated with radio and television.

Semester-VI:

20. History of Urdu Language and Literature (12141601) Core Course - (CC)Credit: 6

Program outcomes:

To give the students a chance to study of Urdu language and literature and also tomake them understand the historical scenario of evolution of Urdu language and literature.

21. Study of Poet Iqbal (12141602) Core Course - (CC) Credit:6.

Program outcomes:

To give a chance of though study of poet of high caliber allama Iqbal and also tomake them understand art and thought of Allama Iqbal.

22. Study Of Urdu Marsiya (12147905) Discipline Specific Elective - (DSE)Credit:6.

Program outcomes:

To give a perspective of classical poetry forms in Urdu with special reference to Marsiya and also to make them appreciate of varied expression in the form of poetry.

23. Study of Urdu Masnavi (12147906) Discipline Specific Elective - (DSE) Credit:6.

Program outcomes:

To give a perspective of classical poetry forms in Urdu with special reference to Masnavi and also to make them appreciate of varied expression in the form of poetry

24. Study of short Story Writer Prem Chand (12145902)Generic Elective - (GE) Credit:6.

Program outcomes:

To make students understand the contribution of short story writer Premchand and will also aware about realities of life with special reference to rural India

17. Department of Zoology

B.Sc.(H) Course:

- Students enrolled in B.Sc. (Hons.) degree program in Zoology will study and acquire complete knowledge of disciplinary as well as allied biological sciences. At the end of graduation, they should possess expertise and will have competitive advantage in pursuing higher studies from India or abroad; and seek jobs in academia, research, or industries.
- Students should be able to identify, classify and differentiate diverse chordates and non-chordates based on their morphological, anatomical and systemic organization. They will also be able to describe economic, ecological and medical significance of various animals in human life. This will create a curiosity and awareness among them to explore the animal diversity and take up wild life photography or wild life exploration as a career option. The procedural knowledge about identifying and classifying animals will provide students professional advantages in teaching, research and taxonomist jobs in various government organizations; including Zoological Survey of India and National Parks/Sanctuaries.
- Acquired practical skills in biotechnology, and molecular biology can be used to pursue career as a scientist in drug development industry in India or abroad. Our students will be acquiring basic experimental skills in various techniques in the fields of genetics; molecular biology; biotechnology; qualitative and quantitative microscopy; enzymology and analytical biochemistry. These methodologies will provide an extra edge to our students, who wish to undertake higher studies. In-depth knowledge and understanding about comparative anatomy and developmental biology of various biological systems; and learning about the organisation, functions, strength and weaknesses of various systems will let students critically analyse the way evolution has shaped these traits in the human body.
- Students undertaking skill enhancement courses like aquaculture, sericulture will inculcate skills involved in rearing fish and silk moth which would help them in starting their own ventures and generating self-employment making them successful entrepreneurs. Acquired skills in diagnostic tests, haematology, histopathology, staining procedures etc. used in clinical and research laboratories will provide them opportunity to work in diagnostic or research laboratory. Deep understanding of different physiological systems and methods available to measure vital physiological parameters and to comprehend the mechanism behind occurrence of different life-threatening disease via laboratory examination, assessment of basic physiological functions by interpreting physiologica l charts will help to find their career options.

Semester I

Core Course-I: Non-chordates I: Protista to Pseudocoelomates

- Learn about the importance of systematics, taxonomy, and structural organization of animals.
- Appreciate the diversity of non-chordates living in varied habit and habitats.
- Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
- Critically analyze the organization, complexity and characteristic features of non-chordates making them familiarize with the morphology and anatomy of representatives of various animal phyla.
- Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
- Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments, and projects.

Core Course-II: Principles of Ecology

- Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors.
- Comprehend the population characteristics, dynamics, growth models and interactions.
- Understand the community characteristics, ecosystem development and climax theories.
- Know about the types of ecosystems, food chains, food webs, energy models, and ecological efficiencies.
- Apply the basic principles of ecology in wildlife conservation and management.
- Inculcate scientific quantitative skills, evaluate experimental design, read graphs, and analyse and use information available in scientific literature.

Generic Elective (GE)-1: Animal Diversity

- Distinguish between major phyla of animals through a demonstrated understanding of their taxonomic classification and diversity.

- Describe the distinguishing characteristics of all major phyla.
- Understand the fundamental differences among animal body plans and relate them to function, taxonomic classification, and evolutionary relationships among phyla.
- Illustrate lifecycles, structure, function and reasons for importance of few representative organisms from different groups of animals.
- Identify anatomical structures from prepared tissues.
- Observe living animals in the environment and relate observations to theory from the course.
- Recognize major animal phyla and animals on the basis of their external characteristics.

Seminar II

Core Course-III: Non-chordates II: Coelomates

- Learn about the importance of systematics, taxonomy and structural organization of animals.
- Appreciate the diversity of non-chordates living in diverse habit and habitats.
- Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
- Critically think about the organization, complexity, and characteristic features of non-chordates.
- Getting familiarized with the morphology and anatomy of representatives of various animalphyla.
- Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
- Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments, and projects.

Core Course -IV: Cell Biology

- Upon completion of the course, students should be able to:
- Understand fundamental principles of Cell Biology.
- Explain structure and functions of cell organelles involved in diverse cellular processes.
- Appreciate how cells grow, divide, survive, die and regulate these important processes.
- Comprehend the process of cell signalling and its role in cellular functions.
- Have an insight of how defects in functioning of cell organelles and regulation of cellular processes can develop into diseases.
- Learn the advances made in the field of cell biology and their applications.

General Elective (GE)-2: Human Physiology

- Know the principles of normal biological function in human body.
- Outline basic human physiology and correlate with histological structures.
- Understand how animals maintain an internal homeostatic state in response to changes in their external environment.

Semester III

Core Course -V: Diversity of Chordates

- Understand different classes of chordates, level of organization and evolutionary relationship between different subphyla and classes, within and outside the phylum.
- Study about diversity in animals making students understand about their distinguishing features.
- Appreciate similarities and differences in life functions among various groups of animals in Phylum Chordata.
- Comprehend the circulatory, nervous, and skeletal system of chordates.
- Know about the habit and habitat of chordates in marine, freshwater and terrestrial ecosystems.

Core Course-VI: Physiology: Controlling and Coordinating Systems

- Once the student has completed the course, they will be able to understand the fundamentals as well as the advanced concepts that will help develop a strong foundation to enable them to acquire knowledge and skill.
- Students will be able to grasp and analyze problem-based questions, identify and explicate how all physiological systems work in tandem to maintain body homeostasis by using feedback loops.
- Further students will develop an integrative approach to learn the interactions of various organ systems in a holistic way.
- Apply innovative ideas to create links between knowledge of physiology in real world situations, that include developing healthy lifestyle and homeostatic imbalances.
- Students must appreciate the role of regulatory systems such as the endocrine and nervous systems to maintain the physiological processes.

Core Course-VII: Fundamentals of Biochemistry

- Upon completion of the course, students should be able to: Gain knowledge and skill in the fundamentals of biochemical sciences, interactions, and interdependence of physiological and biochemical processes.

- Get exposed to various processes used in industries and gain skills in techniques of chromatography and spectroscopy.
- Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation.
- Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation.
- Know about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments, and analyse the resulting data.
- Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

Skill Enhancement Course (SEC)-1: Medical Diagnostic

- Gain knowledge about various infectious, non-infectious and lifestyle diseases, tumors, and their diagnosis
- Understand the use of histology and biochemistry of clinical diagnostics and learn about the molecular diagnostic tools and their relation to precision medicine.
- Develop their skills in various types of tests and staining procedure involved in hematology, clinical biochemistry and will know the basics of instrument handling.
- Learn scientific approaches/techniques used in the clinical laboratories to investigate various diseases and will be skilled to work in research laboratories.
- Gain knowledge about common imaging technologies and their utility in the clinic to diagnose a specific disease

General Elective (GE) -3: Food Nutrition and Health

- Have a better understanding of the association of food and nutrition in promoting healthy living.
- Think more holistically about the relationship between nutrition science, social and health issues.
- Move on to do post-graduation studies and can apply for jobs as food safety officers, food analysts, food inspectors, food safety commissioners or controllers for jobs in organizations like FSSAI.
- Specialize in various fields of nutrition.

Semester IV

Core Course-VIII: Comparative Anatomy of Vertebrates

- Upon completion of the course, students should be able to: Explain comparative account of the different vertebrate systems.
- Understand the pattern of vertebrate evolution, organization, and functions of various systems.
- Learn the comparative account of integument, skeletal components, their functions and modifications in different vertebrates.
- Understand the evolution of heart, modification in aortic arches, structure of respiratory organs used in aquatic, terrestrial and aerial vertebrates; and digestive system and its anatomical specializations with respect to different diets and feeding habits.
- Learn the evolution of brain, sense organs and excretory organs to a complex, highly evolved form in mammals.
- Learn to analyze and critically evaluate the structure and functions of vertebrate systems, which helps them to discern the developmental, functional and evolutionary history of vertebrate species.
- Understand the importance of comparative vertebrate anatomy to discriminate human biology.

Core Course IX: Physiology: Life Sustaining Systems

Learning Objective:

The fundamental or coherent understanding of the subject will be extended to related disciplinary areas/subjects through understanding of normal body functions, enabling effective treatment of abnormal or diseased states. The students will be equipped with skill-based knowledge to help them undertake further studies in physiology and related areas as well as in multidisciplinary subjects.

Learning Outcome:

- Upon completion of the course, students will be able to understand the fundamentals as well as the advanced concepts of Physiology including Digestion, Respiration, Urinary system, Blood and Circulatory system.
- The Learning Outcomes-Based approach to curriculum planning and execution will require that the teaching learning processes are oriented towards enabling students to attain the defined outcomes relating to the courses within the programme so as to acquire a strong foundation and relevant skill.
- Students will be able to grasp and analyze problem-based questions, identify and explicate how all physiological systems work in tandem to maintain body homeostasis by using feedback loops.
- Students will be able to recognize and explain how all physiological systems work in unison to maintain homeostasis in the body; and use of feedback loops to control the same.

- It will have them learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.

Core Course-X: Biochemistry of Metabolic Processes

- Gain knowledge and skill in the interactions and interdependence of physiological and biomolecules.
- Understand essentials of the metabolic pathways along with their regulation.
- Know the principles, instrumentation, and applications of bioanalytical techniques.
- Get exposure to various processes used in industries.
- Become aware about classical laboratory techniques, use modern instrumentation, design, and conduct scientific experiments and analyse the resulting data.
- Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

General Elective (GE)-4: Animal Cell Biotechnology

- Get a clear concept of the basic principles and applications of biotechnology.
- Know the basic techniques used in genetic manipulation helping them continue with higher studies in this field.
- Acquire knowledge of the basic principles, preparations and handling required for animal cell culture.
- Understand principles underlying the design of fermenter and fermentation process and its immense use in the industry.
- Design small experiments for successful implementation of the ideas and developed.
- solutions to solve problems related to biotechnology keeping in mind safety factor for environment and society.
- Apply knowledge and skills gained in the course to develop new diagnostic kits and to innovate new technologies further in their career.
- Enhance their understanding of the various aspects and applications of biotechnology as well as the importance of bio-safety and ethical issues related to it.

Skill Enhancement Course (SEC)- 2: **Aquarium Fish Keeping**

- Acquire knowledge about the potential of variety of traditional and exotic fishes with their compatibility.
- Understand the benefits of Aquarium industry as commercial, decorative and of scientific studies.
- Develop personal skills on fabrication and maintenance of aquarium.
- Learn about the basic requirements to set up an aquarium, i.e., site of installation, maintenance of water- quality, reflector, filters, scavenger, aquatic plants etc.

Semester V

Core Course- XI: Molecular Biology

- Comprehend the structures of DNA and RNA as well as Watson-Crick model of DNA and explore emerging area of genomics and genome sequencing.
- Understand and compare the processes of DNA Replication, Transcription and Translation in Prokaryotes and Eukaryotes
- Explain the Principles of Gene regulation in Prokaryotes and Eukaryotes.
- Elucidate DNA damage and its repair in living system.
- Understand RNA interference and RNA regulation of gene expression under normal condition as well as disease state like cancer.
- Hands on experience of bacteria culture
- Know quantitative estimation of DNA and RNA

Core Course-XII: Principles of Genetics

- Understand the basic principles of genetics in relation to Mendel's laws.
- Have an in-depth clarity to the exceptions, extensions and deviations from Mendelian principles (such as existence of multiple alleles, the modification of dominance relationships, essential genes and lethal genes, gene expression and the environment, maternal effect, complementation tests, gene interactions and modified Mendelian ratios and extranuclear inheritance).
- Analyse pedigree leading to development of analytical skills and critical thinking enabling the
- students to present the conclusion of their findings in a scientific manner.
- A knowledge of the mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day-to-day life.
- Learn to distinguish between a normal human karyotype and various genetic disorders.
- Acquire understanding of gene mapping in eucaryotes, how the order of and distance between the genes on eucaryotic chromosomes are determined in genetic experiments designed to quantify the crossovers that occur during meiosis. And acquire the skill to draw genetic maps.

Discipline Specific Electives (DSE)-1: Animal Behaviour and Chronobiology

- History of Animal behaviour: Various scientists" contribution.
- Importance of Nest building behaviour and other behaviours involved in parental care, breeding etc.
- Enhance their observation, analysis, interpretation, and documentation skills by taking short projects pertaining to Animal behaviour and chronobiology.
- Relate animal behaviour with other subjects such as Animal biodiversity, Evolutionary biology, Ecology, Conservation biology and Genetic basis of the behaviour.
- Understand basic concept of rhythms related to daily life and physiological responses.
- Learn about the biological rhythm and their application in pharmacology and modern medicine.
- Realize, appreciate, and develop passion to biodiversity; and will respect the nature and environment.

Discipline Specific Electives (DSE)-2: Immunology

- Describe the basic mechanisms, distinctions, and functional interplay of innate and adaptive immunity.
- Define the cellular/molecular pathways of humoral/cell-mediated adaptive responses including the role of Major Histocompatibility Complex.
- Explain the cellular and molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory.
- Understand the molecular basis of complex, humoral (Cytokines and Complement) and cellular processes involved in inflammation and immunity, in states of health and disease.
- Describe basic and state-of-the-art experimental methods and technologies.
- Integrate knowledge of each subsystem to see their contribution to the functioning of higher-level systems in health and disease including basis of vaccination, autoimmunity, immunodeficiency, hypersensitivity and tolerance

Semester VI

Core Course-XIII: Developmental Biology

- Understand the history and contributions of various scientist and events that lead to formation of a multicellular organism from a single fertilized egg, the zygote.
- □□nowledge of the cellular processes and communications of development and the molecular mechanisms underlying these.
- □Describe the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multicellular organisms.
- Understand about the evolutionary development of various animals.
- Learn about various morphogenetic movements.
- □Know the process of ageing leading to interventions that can improve the overall health and quality of life in aged people.
- Learn the importance of latest techniques like stem cell therapy, *in vitro* fertilization, and amniocentesis etc. to be applied for human welfare.
- Learn about Drosophila culture.

Core Course-XIV: Evolutionary Biology

- Understand Life's beginning through Chemogeny and Biogeny.
- Get to know the Concepts of Evolutionary Biology in historical context.
- Enumerate fossils as direct evidence of evolution and gain insight into molecular evidence of evolution.
- Explain sources of variations which are key to evolution.
- Understand the evolution caused by change in allelic frequency by evolutionary forces utilizing Hardy-Weinberg law of Equilibrium. Attempt numerical to find out evolution in a population.
- Elucidate the reproductive isolation in speciation events.
- Perform simulation exercises on Natural selection and Genetic drift.

Discipline Specific Electives (DSE)-3: Animal Biotechnology

- Upon completion of the course, students will get a clear concept of the basic principles and applications of biotechnology.
- Acquire knowledge of the basic principles, preparations and handling required for animal cell culture.
- Make a strategy to manipulate genetic structure of an organism for the improvement in any trait or its well-being based on the techniques learned during this course.
- Use or demonstrate the basic techniques of biotechnology like DNA isolation, PCR, transformation, restriction digestion etc.
- Understand better the ethical and social issues regarding GMOs.
- Use the knowledge for designing a project for research and execute it.
- Enhance their understanding of the various aspects and applications of biotechnology as well as the importance of bio-safety and ethical issues related to it.

Discipline Specific Electives (DSE)-4: Parasitology

- Understand the variation amongst parasites, parasitic invasion in both plants and animals, applicable to medical and agriculture aspects.
- Help to know the stages of the life cycles of the parasites and the respective infective stages.
- Develop ecological model, know population dynamics of parasite, establishment of parasite population in host body, adaptive radiations and methods adopted by parasite to combat with the host immune system.
- Develop skills and realize significance of diagnosis of parasitic attack and treatment of patient or host.
- Learn important case studies to highlight interesting research, serendipities towards the advancement and enrichment of knowledge in the field of Parasitology.

B.Sc.(Prog.) Life Science Course:

Semester I

Discipline Core Course-I: Animal Diversity

- Understand the importance of taxonomy and structural organization of animals from Protista to Mammalia to appreciate the diversity of non-chordates and chordates living in varied habitats.
- Meticulously analyze the complexity and characteristic features of non-chordates and chordates by familiarization with the morphology and anatomy of representatives of various animal phyla.
- Comprehend the evolutionary history and relationships of different non-chordates and chordates through functional and structural affinities.
- Realize the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
- Appreciate the diverse habitats, including marine, freshwater, and terrestrial.
- Understand similarities and differences in life functions among various chordates.

Semester II

Discipline Core Course-II: Comparative Anatomy and Developmental Biology of Vertebrates

- Know about the levels of organization among different groups of vertebrates.
- Understand that different organs and organ systems integrate with each other to impart proper regulation of a particular function.
- Understand various organs evolved during evolution through succession.
- Know the evolution of different concepts in developmental biology.
- Be able to understand the process of gamete formation from stem cell population to mature ova and sperm.
- Be able to comprehend the sequence of steps leading to the formation of gametes and development of embryo.
- Learn the mechanisms underpinning cellular diversity and specificity in animals.
- Study the methods and tools related to developmental biology which help to understand different processes of embryogenesis.

Semester III

Discipline Core Course-III: Physiology and Biochemistry

- Have an increased knowledge of human physiology and be able to appreciate its functions.
- Understand the functions of major physiological systems in body.
- Recognize and identify principal tissue structures.
- Understand the metabolic pathways of carbohydrates, proteins and fats; and appreciate how the cells harness energy.
- Understand the importance of enzymes, mechanism of working and kinetics.
- Relate how biochemical systems interact to yield integrated physiological responses.
- Understand the principles and approach to experimental design.
- Perform, analyses and interpret basic experiments and observations in physiology and biochemistry.
- Learn control of enzyme activity, its mechanism of action and how a drug might inhibit the enzyme.
- Develop practical learning skills, like qualitative estimation of carbohydrates, chromatography, and interpretation of results.

Semester IV

Discipline Core Course-IV: Genetics and Evolutionary Biology

- They would be able to appreciate various other gene interactions like co-dominance, incomplete dominance, lethal alleles, and pleiotropy. Further, students would be able to describe the concepts of linkage and crossing over and their usage in constructing gene maps.
- Help students understand the basic principles of pedigree analysis and will be able to
- construct and analyze pedigree related problems for inherited traits.
- Students would gain knowledge on chromosomal and genetic mutation.

- Students would be able to describe the chromosomal sex-determination mechanisms and dosage compensation.
- Students would be able to understand the major events in history of life and major theories of évolution.
- Students would be able to appreciate the contribution of fossil studies in evolution and the phylogeny of horse.
- Students would be able to calculate the gene and allele frequency using Hardy-Weinberg law and analyses population genetics problems.
- Students would understand the fundamental concepts of natural selection, speciation, mass extinction and macro-evolution.

Semester V

Discipline Specific Electives (DSE)-1: Animal Biotechnology

- Learn to isolate genomic DNA and plasmid DNA, perform restriction digestion of DNA and construct circular and linear restriction maps, PCR, transformation, restriction digestion etc.
- Learn basic techniques used in Biotechnology like construction of genomic, cDNA libraries, blotting techniques, sequencing method, use of DNA finger printing and microarray in diagnosis of genetic diseases.
- Understand the methodology of producing GMOs and the ethical and social issues associated.
- Learn to prepare a project on Animal Cell culture

Skill Enhancement Course (SEC)-III: Sericulture

- Understand history and concept of sericulture and silk route.
- Identify the four species and sub-species of silk moths in India, and exotic and indigenous races.
- Learn about opportunities and employment in sericulture industry – in public, private and government sector.
- Traditional and advanced about the techniques involved in silkworm rearing and silk reeling.
- Develop entrepreneurial skills necessary for self-employment in mulberry and seed production and be apprised about practicing sericulture as a profit-making enterprise.
- Learn about the diseases their causing agents of silkworm.
- Traditional and advancement equipment's for reeling, culture and processing of silk fibre.

Semester VI

Discipline Specific Electives (DSE)-2: Immunology

- Study haematopoiesis to know the concepts of stem cells and their differentiation into progenitor stem cells and adult lineages.
- Learn the concepts of innate and acquired immunity.
- Understand adaptive immune responses and sequential phases-antigen recognition by lymphocytes, their proliferation, differentiation into effector and memory cells and elimination of pathogens.
- Learn about major histocompatibility complex and their role in transplantation immunity and autoimmunity.
- Gain knowledge about the Complement system and how they interact and activate a catalytic cascade to remove immunogens.
- Study the role of various cytokines involved in cell-to-cell communication in the removal of pathogens.
- Understand the advent of hypersensitivities due to inappropriate innate and adaptive immune responses.
- Know the basic immunological aspects to comprehend the newer strategies in vaccine design, and efforts to treat autoimmunity, hypersensitivity, and immunodeficiency