SRI VENKATESWARA COLLEGE:
DHAULA KUAN NEW DELHI-110021

Program outcomes (POs), Program Specific Outcomes (PSOs) and Course Outcomes (COs) for all Undergraduate courses offered by Sri Venkateswara College

Program Outcomes are a set of statements that provide information about the contents, scope and competencies expected to be developed for a particular course of study or program offered by an Institution. This clarity helps the teacher to plan and execute content-delivery in an efficient manner, while the learner (student) is made aware of the standards that he/she is expected to attain. Being a constituent college of University of Delhi (DU), Sri Venkateswara College follows the syllabus as prescribed by the University of Delhi. Programme Specific Outcomes (PSOs) for the courses offered provide information about the knowledge and skills that would be expected to be possessed by a student, in a particular subject, upon the completion of a undergraduate program. The PSOs and POs are communicated to students at the commencement of every semester.

In order to develop clear academic goals, University of Delhi has made it mandatory to formulate Course Outcomes (COs) describing what every student should be able to attain at the end of any particular course. The COs has been developed in consultation with Head of Department, teachers, students and other stakeholders. The CO is also communicated by respective faculty to the students at the commencement of the course.

The POs, PSOs and COs, as included in the undergraduate syllabus are also uploaded on the College website for wider dissemination and ease of access. This exercise has been undertaken for all courses of the Old Course (CBCS) and the New Course (LOCF) effective from 2019-20.

C. Shula Reddy
PRINCIPAL

PRINCIPAL
Sri Venkateswara College
(University of Delhi)
Dhaula Kuan, New Delhi-110021

Courses Offered by Sri Venkateswara College
List of UG Courses

S. No	NAME OF THE UNDERGRADUATE COURSE
1	B.Sc (Hons) Biological Sciences
2	B.Sc (Hons) Botany
3	B.Sc (Hons) Chemistry
4	B.Sc (Hons) Electronics
5	B.Sc (Hons) Mathematics
6	B.Sc (Hons) Physics
7	B.Sc (Hons) Zoology
8	B.A (Hons) History
9	B.A. (Hons) English
10	B.A (Hons) Hindi
11	B.A (Hons) Political Science
12	B.A (Hons) Sanskrit
13	B.A (Hons) Sociology
14	B.Com (Programme)
15	B.Com (Hons)
16	B.Sc (Hons) Statistics
17	B.Sc (Hons) Biochemistry
18	B.Sc (Prog) Life Science
19	B.A (Hons) Economics
20	B.A Programme

C Shula Reddy
PRINCIPAL
PRINCIPAL
Sri Venkateswara College
(University of Delhi)
Dhaula Kuan, New Delhi-110021

Program Outcomes (POs), Program Specific Outcomes & Course Outcomes (COs) of UG courses offered by Sri Venkateswara College

1. COURSE : B.SC (HONS) BIOCHEMISTRY

Department: BIOCHEMISTRY

Program Outcomes (PO)

The curriculum is based on the following learning outcomes -

PO1: Inculcate the basic concepts of biochemistry including an understanding of the fundamental biochemical principles and their applications in a systematic, methodical, scientific, evidence-based process. The programme will also provide a general understanding of the related disciplines with a holistic knowledge generation in biological sciences.

PO2: Develop problem solving and analytical skills through case studies, research papers and hands-on-experience, especially integrated into skill enhancement courses.

PO3: Students will gain proficiency in basic laboratory techniques and be able to apply the scientific method to the processes of experimentation, hypothesis testing, data interpretation and logical conclusions.

PO4: Provide requisite knowledge of laboratory safety, data replication and quality control, record keeping and other aspects of “responsible conduct of research”.

PO5: Ability to employ modern library search tools to locate and retrieve primary literature on a topic and critically evaluate the literature.

PO6: Students will be able to apply and effectively communicate scientific reasoning and data analysis in both written and oral forms. They will be able to communicate effectively with 11 well-designed posters and slides in talks aimed at scientific audiences as well as the general public.

PO7: Students will learn to work collaboratively in a team.

PO8: Students will gain knowledge of ethical and good laboratory practices, health and biohazard regulations, plagiarism and intellectual property rights related issues practiced in modern era of scientific investigation.

PO9: Graduates will be able to apply the major theories and research procedures to contemporary societal issues.

P10: The programme will prepare students to plunge into various fields of higher education or related profession in various disciplines, armed with plethora of knowledge, hands-on experience and scientific attitude, at national and global levels.

Program Specific Outcomes (PSO)

- To provide students with scholarly experiences, both theoretical and hands-on, that help instil deep interests in learning the chemistry underlying the working of biological systems while developing broad and balanced knowledge and understanding of key biological concepts, principles and theories. The idea is to equip students with appropriate tools of analysis so that they can independently tackle issues and problems in the field of biology and chemistry.
- To encourage students to study the structure and function of specific molecules and pathways and their interactions and networking in biological systems with particular emphasis on regulation of chemical reactions in living cells.
- To develop in students an inquisitive learning approach to seek answers regarding the complex workings of various physiological systems, cellular multiplication and differentiation and communication within and between cells and organs, and the chemical bases of inheritance and disease.
- To empower students to apply the knowledge and skills they have acquired to the solution of specific theoretical and applied problems in Biochemistry.
- To build concepts in biochemistry that would enable them to undertake further studies in Biochemistry and related areas or in multidisciplinary areas and help develop a range of generic skills that are relevant to wage employment, self-employment and entrepreneurship.

Course Outcomes: B.Sc. Hons. Biochemistry (CBCS)

Core Course

BCH C1: Molecules of Life (Sem – I)

This paper covers the chemical and molecular foundations of life and students will appreciate the structure and importance of biomolecules, water and vitamins in biological systems. They will be able to comprehend the structure, function and acid base properties of amino acids. The students will be introduced to the structure, properties and roles of carbohydrates, lipids and nucleic acids. In the practical sessions, students will be able to independently identify various biomolecules in the laboratory.

BCH C2: Cell Biology (Sem- I)

The objective of this paper is to offer insights into the basic structure and function of a cell and cellular organelles. Students will learn about cell theory and basic cell structure. They will be introduced to cell fractionation and cell visualization techniques. Gain knowledge about the structure and function of various cell organelles in a eukaryotic cell and acquire knowledge about the composition of cytoskeleton and extracellular matrix. Acquire insight into cell division and cell death mechanisms

BCH C-3: Proteins (Sem II)

The course aims to introduce "proteins" and their importance to modern biochemistry, highlighting their structural features and unique characteristics that help them participate in every physiological process in life, thus also playing important role in disease manifestation and their interventions. After completion of the course, students will understand the diverse functions of proteins in a cell and hierarchy of protein architecture (primary, secondary, tertiary & quaternary structure), with the ability to distinguish features of globular & fibrous proteins. Students will be able to comprehend the fundamental mechanisms of protein folding, stability and their relation to conformational diseases. They will also learn the purification techniques used in protein chemistry and also learn to use different databases related to protein sequence and structure. Students will learn about the membrane proteins, defence proteins and motor proteins and gain comprehension of structure-function relationship of proteins and their significance in physiology, diseases and applications in industry and medicine.

BCH C-4: Enzymes (Sem II)

The objective of this course is to provide overview of protein biochemistry and enzymology to undergraduate students with diverse science backgrounds, since proteins and enzymes are the most versatile functional entities among the biomolecules. The students were subjected to classroom discussions, oral questions, assignments in form of numerical solving and analytical questions. After completion of this course students were able to understand the unique features and characteristics of proteins and enzymes and their applications in research, medicine and industry. They were able to understand the relationship between three-dimensional structure of proteins and enzymes and their functions and were able to comprehend the basic mechanism of action of enzymes and their remarkable regulation. Students were able to gain insights into the principles of protein isolation, purification and characterization.

BCH C-5: Metabolism of Carbohydrates & Lipids (Sem III)

This paper covers understanding of the concepts of metabolism, characteristics of metabolic pathways and strategies used to study carbohydrate and lipid metabolic pathways. Students will learn the concepts of metabolism with an emphasis on glycolysis and gluconeogenesis. Students will learn about glycogen synthesis, breakdown, glycogen storage diseases, Calvin cycle C3 and C4 pathways in plants. The students will learn about overview, enzymes and regulation of citric acid cycle and glyoxylate cycle in plants. They will also learn about hormonal regulation of carbohydrate metabolism and diseases associated with metabolic irregularities. The students will learn about lipid digestion, Fatty acid oxidation, and Ketone-body metabolism. The students will learn about synthesis of saturated, unsaturated, odd and even chain fatty acids and regulation of fatty acid metabolism. They will also learn about the synthesis of glycerophospholipids and sphingolipids. Cholesterol metabolism, diseases associated with abnormal lipid metabolism. The students will learn

Well-fed state, early fasting state, fasting state, early re-fed state in metabolism. In addition , practical sessions will cover estimation of blood glucose in serum , sugar fermentation by microorganisms, assay of salivary amylase, isolation of lipids from egg yolk and separation by TLC and Cholesterol estimation by colorimetric methods.

BCH C-6: Membrane Biology and Bioenergetics (Sem III)

The objective of the course is to provide a detailed knowledge about the composition of membranes, structure-function relationship and properties of biomembranes. The course also provides an understanding of the various types of membrane transporters and their molecular mechanisms. It also introduces students to the basic tenets of bioenergetics and provides a detailed knowledge about the molecular mechanisms of oxidative phosphorylation and photophosphorylation. The students were subjected to classroom discussions, oral questions, assignments in form of analytical questions. After completion of this course students were able to understand the general composition and structure of biomembranes and gain knowledge of the basic properties of membranes such as membrane fluidity and about the various types of membrane transport mechanisms. They were well equipped to understand and appreciate the basic thermodynamic principles underlying the various biological phenomena such as oxidative phosphorylation and photo-phosphorylation.

BCH C-7: Hormone : Biochemistry and Function (Sem-III)

The course is designed to provide an understanding of the process of cellular communication including signal reception, transduction, amplification and response. To understand and appreciate the different cognate and non-cognate modes of communication between cells in a multi-cellular organism. The course will enable students to understand and appreciate the delicate network and balance of hormones required for the healthy functioning of the human body. The student will understand the role of endocrine system in maintaining ionic and glucose homeostasis and the integrative communications that regulate, growth, appetite, metabolism and reproduction They should be able to describe molecular, biochemical and physiological effects of all hormones and factors on cells and tissues. Students will get an insight into dysregulations that lead to patho-physiologies from mono etiological conditions such as Diapedesis Insipidus to multifactorial conditions like diabetes mellitus and general adaptation syndrome. The course will prepare students for interpreting clinical parameters in real life situation for many of the major public health concerns like Thyroid dysfunctions, Blood pressure irregularities and reproductive disorders. The course will also prepare a student for postgraduate studies in any course related to molecular medicine.

BCH C-8: Human Physiology (Sem IV)

On successful completion of this core paper, students should be able to: Understand the basic organization and homeostatic control of the human body from the cell itself to organ systems and the functioning of the whole body. Comprehend and appreciate the

importance of the fluid components of the body in regulating and connecting the various organ systems; particularly the heart and vascular system. Appreciate and understand the biochemical, molecular and cellular events that orchestrate the coordinate working of the organ systems that regulate life processes. Get a holistic understanding of the different organ systems with respect to their basic functioning, which involves both integrative learning and the regulatory roles of the Nervous and Endocrine system. Develop in students an inquisitive learning approach to seek answers regarding the complex workings of brain. Understand the factors that cause an imbalance to the Homeostatic control in the body and how these lead to disorders and diseases. Perform and analyze various hematological, biochemical and physiological tests that examine the function of various systems of the human body and serve as diagnostic markers for pathophysiological states. The course will prepare students for higher education in any field related to molecular medicine

BCH C-9: Gene Organization, Replication and Repair (Sem IV)

Students will learn about the complexity of DNA double helix structure, the different forms of DNA and the factors that contribute to the stability of DNA in cells. They will learn about the organization of the genomes in various life forms and understand the importance of supercoiling of DNA. They will learn about the details of DNA replication and significance of various proteins and enzymes involved in replication and application of inhibitors. Students will also learn to appreciate the underlying mechanisms, the evolutionary and biological significance of homologous and site-specific recombination, and transposition. They will gain insights about the various ways in which the DNA can be damaged leading to mutations and lesions and different ways to repair DNA damage.

BCH C-10: Metabolism of Amino acids and Nucleotides (Sem IV)

The main objective of the course is to provide a detailed knowledge about the synthesis and degradation pathways of amino acids and nucleotides and their importance with respect to metabolic disorders. The students were subjected to classroom discussions, oral questions, assignments in form of analytical questions and hands on training through practicals. Students learnt about the various metabolic pathways, integration of pathways and their cross-talk in specific tissues. Most importantly, they learnt the significance of these biomolecules in diagnostic tests routinely done for various clinical conditions.

BCH C-11: Concepts in Genetics (Sem V)

The aim of the course is to provide students with an understanding of both classical and modern concepts in genetics with special emphasis on the areas of transmission genetics, molecular and developmental genetics, mapping techniques, chromosomal aberrations and population genetics. The students will learn to appreciate the various factors that confer genotypic and phenotypic variability at both individual and population levels. The course teaches the concepts of bacterial and viral genetics that would enable the students to understand resistance patterns and to create linkage and genetic maps. The students will be

able to apply the principles of transmission and inheritance in real life situations and learn to use statistical tools to analyze large biological data. Students will gain a hands-on training experience of culturing and conducting experiments on the genetic model system *Drosophila melanogaster*. The course also works as preparation for further studies in a Master's program in molecular biology or related topics.

BCH C-12: Gene Expression and Regulation (Sem V)

Through this paper, students will acquire basic knowledge about the processes of transcription and translation in prokaryotes and eukaryotes. They will learn about the features of the genetic code and various experimental approaches used to crack the code. They will develop understanding of the molecular basis of RNA processing and RNA splicing. At the end of the paper, they will gain knowledge about regulation of gene expression in prokaryotes and eukaryotes, concept of operon, regulatory RNA and riboswitches. With the help of established regulatory mechanisms (inducible or repressible) such as lac operon and trp operon, they will learn about the various ways in which gene expression can be regulated in prokaryotes and how activators and small RNA mediated silencing contributes to regulation of eukaryotic gene expression.

BCH C-13: Genetic Engineering and Biotechnology (Sem VI)

The objective of the course is to familiarize the students with the basic principles of genetic engineering and practical aspects of recombinant DNA technology. The empahasis of the course being various techniques for DNA manipulation in prokaryotes and eukaryotes. The students were subjected to classroom discussions, oral questions, assignments in the form of numerical solving and analytical questions. After completion of this course students were able to understand the process of DNA isolation and manipulation of DNA molecules using restriction and modification enzymes. The students also learnt and understood the use of cloning and expression vectors and the methods for creation of genomic and cDNA libraries, their applications and the methods for protein production and their application in medicine, agriculture and industry.

BCH C-14: Immunology (Sem VI)

In this paper the students will learn about the immune system in both healthy and diseased states. The course study, elaborates on the organisation of the immune system and various mechanisms the body uses to fight infections from bacteria, virus and other pathogens. The importance of immunology in the field of medical science and to treat disease is highlighted by giving suitable examples. The students also learn about vaccines and their role in health sector and therapeutics.

Skill Enhancement Course

BCH SEC 1: Biochemical Techniques (Sem- III)

The objective of the course is to introduce to the students , various techniques that are used in a biochemistry lab and to provide them with an understanding of the principle underlying these techniques and laboratory skills in the form of practical exercises so that students can apply this knowledge to pursue research. The students get hands-on experience in various techniques routinely used in any research laboratory.

BCH SEC 2: Biostatistics (Sem – III)

The primary objective of this course is to provide understanding about the principles of biological data collection, statistical analysis and presentation. The course will also provide hands-on-experience through practicals that are well correlated with the theory topics and are designed to support skill oriented learning outcomes in the management of biological data.

BCH SEC 3: Research Methodology (Sem- III/IV)

The objective of this paper is to introduce students to understand the ways to identify biological problems, develop hypotheses and research questions and design research projects. It will also provide an introduction to the concept of controls, statistical tools and computer applications used in research. The course outcome is that students learnt range of designs used in research in laboratory, field experiments, surveys and content analysis. They also learnt how to write scientific articles, oral presentation and the various associated ethical issues.

BCH SEC 4: Bioinformatics (Sem- IV)

Student will understand the basics of bioinformatics and computational biology and develop awareness of the interdisciplinary nature of this field. Students will gain the ability to use several softwares/tools in biology and access and use biological databases in public domain. Students will appreciate protein structure using visualization softwares Students will learn about sequence alignments and will be able to analyze phylogeny using alignment tools. Students will learn the various approaches for protein tertiary structure prediction, tools used and validation methods employed. Students will gain knowledge on applications of bioinformatics from genomes to personalized medicine. Students will be provided with extensive hands on sessions on bioinformatics tools/softwares available in public domain. Hands on exercises will cover Biological databases, Sequence Alignment (BLAST and CLUSTAL omega) , Protein structure prediction and validation of models by Ramachandran plot.

BCH SEC 5: Microbial Techniques (Sem- IV)

At the culmination of this course a student shall be able to gain a basic understanding of the characteristic features of microorganisms, their growth and maintenance under aseptic conditions on different microbial growth media.

Generic Elective Course (Offered to students other than B.Sc. Hons. Biochemistry)

BCH GE 1: Biomolecules (Sem – I)

The main objective of the course is to provide students with an understanding of different types of biomolecules, the basic building blocks that are vital for various life forms, focusing on their key properties, biological roles and functions. The paper also aims to outline organic and physical aspects of biomolecules. The students will acquire knowledge about structure and function of proteins, RNA, DNA, carbohydrates and co-enzymes. The course will provide an understanding of how structure of the biomolecules determines their chemical properties. The students will develop understanding of biochemistry at molecular level and appreciate the biological importance of each biomolecule.

BCH GE 2: Techniques in Biochemistry (Sem – I or II)

The objective of the course is to introduce various techniques to students that are used in biological research as well as to provide them with an understanding of the underlying principles of these techniques. The emphasis is also on experimental skills in the form of practical exercises so that students can apply this knowledge to improve their understanding of the subject for better execution of these techniques.

BCH GE 3: Proteins and Enzymes (Sem – II or III)

The objective of this course is to provide overview of protein biochemistry and enzymology to undergraduate students with diverse science backgrounds, since proteins and enzymes are the most versatile functional entities among the biomolecules. The students were subjected to classroom discussions, oral questions, assignments in form of numerical solving and analytical questions. After completion of this course students were able to understand the unique features and characteristics of proteins and enzymes and their applications in research, medicine and industry. They were able to understand the relationship between three-dimensional structure of proteins and enzymes and their functions and were able to comprehend the basic mechanism of action of enzymes and their remarkable regulation. Students were able to gain insights into the principles of protein isolation, purification and characterization.

BCH GE 4: Biochemical Correlations in Diseases (Sem II or IV)

This paper aims at providing the students with knowledge and understanding of various human diseases. It will help the students gain insight into various disorders associated with imbalanced diet and poor lifestyle. And thus help them develop understand the importance of a well -balanced diet, regular exercises and healthy lifestyle. Students will learn about the biochemical basis of various human diseases and strategies employed for preventing them. Students will also understand the molecular basis of microbial pathogenicity, mechanism of drug action and drug resistance and its implications in public health management.

BCH GE 5: Intermediary Metabolism (Sem III)

The objective of this course is to provide the students an understanding of the major metabolic pathways associated with biomolecules within a cell and their regulation. It will also provide knowledge about the possible correlation between various metabolic pathways. They will develop an understanding of metabolic integration.

BCH GE 6: Biochemical Applications in Forensics (Sem – III or IV)

The course aims to provide an understanding of the applications of biochemistry in forensic sciences through analysis of evidences, which will help students develop analytical and problem solving skills for real life situation. The course will keep abreast with all recent developments and emerging trends in forensic science thus helping interested students take up forensic science as future course of study.

BCH GE 7: Recombinant DNA Technology (Sem IV)

The objective of the course is to teach the basics of theoretical and practical aspects of genetic engineering to students. The students shall be able to understand the principles of gene cloning. They shall be introduced to widely applied techniques like the Polymerase Chain Reaction, DNA sequencing as well as the applications of gene cloning in the field of biotechnology that leads to the production of vaccines and recombinant proteins.

Discipline Specific Elective (DSE) Course

BCH DSE 1: Nutritional Biochemistry (Sem – V)

This course provides students with knowledge and understanding of the characteristics, function, assimilation, distribution and deficiency of macro and micronutrients in the human body. It involves integrated learning between the areas of Biochemistry and Nutrition. The paper aims to help the students critically analyze and evaluate concepts in nutritional biochemistry that are important for an understanding of human nutrition. This will help the students appreciate the biochemical underpinning of human nutrition in maintaining health. They will learn the importance of gut biome in maintenance of health and the role of dietary fiber in maintaining a good gut microbiome and will understand the concepts of diet composition in governing nutrient assimilation. This paper will help the students gain awareness and also understand the importance of macro and micronutrients and the consequences of their nutritional deficiencies. The paper emphasizes on the understanding of the ADME and essentiality of fat- and water-soluble vitamins. The students will also learn about the biochemical mechanisms for the symptoms of vitamin deficiencies and excesses. This paper will also help the students gain knowledge about nutraceuticals, drug nutrient interactions, alcohol and nutrient deficiency and effects of malnutrition. The practical component of this course is quite exhaustive and will give students a good hands-on learning experience of various techniques and procedures related to nutritional

biochemistry like anthropometric identifications for nutrition related diseases, Blood Lipid profiling etc. Thus, this course would lay foundation for the students who are interested and want to pursue higher education and career in the field of nutritional biochemistry

BCH DSE 2: Advanced Cell Biology (Sem – V)

The course aims to provide advanced knowledge of the function of cellular organelles, the structure and function of cytoskeleton and its role in motility. The course will also provide details of cellular interaction with cells and tissues around and the molecular regulation of cell growth and cell death. The course will outline the molecular details of the origin of cancer and the diagnosis and treatment.

Students will develop understanding of the principle and application of some of the classical and advanced cell biology techniques and also understand the role of organelles in the secretion of mature proteins and key role of the cytoskeleton in the living cell. They will also be able to comprehend the role and therapeutic value of stem cells. They will be able to understand the genetic basis of development of cancer, the molecular diagnosis and molecular drugs which are used for chemotherapy.

BCH DSE 3: Microbiology (Sem – V)

The objective of the course is to trace the history of development of the discipline of Microbiology and to emphasize the existence of the immense diversity in the microbial world and maintenance of microbes under aseptic laboratory conditions. By the end of the course, the students shall be able to identify various microorganisms, use microbial staining techniques and be aware of the existence of both pathogenic as well as beneficial microbes.

BCH DSE 4: Molecular Basis of Infectious Diseases (Sem – VI)

Through this paper, students will develop an understanding of important terminologies used in infectious diseases. They will develop an understanding of transmission of bacterial, viral parasitic and fungal pathogens and will gain insight into host immune responses that ensue following infection. Students will also learn the strategies used for management of infectious diseases i.e prevention, transmission control and treatment of infectious diseases.

Specifically, they will learn about various classes of pathogens and their mode of action and transmission. Gain insight into host immune responses that ensue subsequent to infection.

They will learn the details of diseases such as tuberculosis, AIDS and malaria which are highly prevalent in Indian subcontinent.

BCH DSE 5: Plant Biochemistry (Sem – VI)

The course aims at providing deep understanding of metabolic processes in plants and the role of different biosynthetic pathways in plant growth and development. The learning outcomes of this paper include understanding the plant cell structure and organization, concept of the biochemical processes and metabolic pathways specific to plants, like

photosynthesis, carbon fixation by C3, C4 and CAM cycle, plant respiration, photorespiration, cell wall biosynthesis, nitrogen fixation and assimilation and plant secondary metabolism. This will also help the students gain insight of plant hormones and their role in helping the plants to respond to various abiotic and biotic stresses like water deficit and drought resistance, flooding, temperature stress, salt stress, ion toxicity, pollution stress and potential biotic stress (insects and diseases). Students will learn about the significance of secondary metabolites and toxins in plants understanding the role of major phenolic groups; simple phenylpropanoids, coumarins, benzoic acid derivatives, flavonoids, tannins and lignin. The course will also impart knowledge about the basic concepts and applications of plant tissue culture. The practical component of this course will ensure analytical learning and will provide hands-on training of various techniques and methods related to plant biochemistry. Thus, this course will help students develop interest in the field of plant sciences and motivate them to take up plant biochemistry as a subject for higher studies and research.

BCH DSE 6: Advanced Methodologies (Sem – VI)

The objective of the course is to provide students with a sound background of laboratory techniques used in biochemistry research and their applications. The outcome of this course is that students gained laboratory skills through practical exercises such as various methods of labeling DNA, protein separation and staining whole cells and their applications. Students were able to do qualitative and quantitative analysis of biomolecules which is very important in research.

2. COURSE : B.SC (HONS) BIOLOGICAL SCIENCES

Program outcomes: (POs)

PO1: To develop an in-depth knowledge and understanding of the fundamental concepts and principles underlying Biological processes.

PO2: To impart the procedural knowledge that creates different types of professionals in the field of Biological Science and related fields such as Plant physiology, Animal Behaviour, Natural Resource Management, Microbiology, Biotechnology, Nutritional Biochemistry and in teaching, research and environmental monitoring.

PO3: Students will be able to undertake hands on laboratory work and activities that help develop in students practical knowledge and skills that are required for pursuing career in clinical diagnosis, drug design, vaccine development, pharmaceutical industry, teaching, research, environmental monitoring.

PO4: Students will be able to use skills required for the extraction, separation, and synthesis of a variety of biomolecules utilized in clinical diagnosis, pharmaceutical industry or in research laboratories.

PO5: Students will be able to use various bioinformatics tools for training in the basic theory and application of programs used for database searching, protein and DNA sequence analysis and prediction of protein structures.

PO6: Students will be encouraged to effectively communicate scientific reasoning and data analysis in both written and oral forms.

PO7: Students will gain knowledge of ethical and good laboratory practices, health and biohazard regulations, plagiarism and intellectual property rights related issues practiced in modern era of scientific investigation.

P08: Students will recognize and appreciate the importance of the Biological Science and its application in academics, clinical diagnosis, prevention and treatment of diseases, agriculture, and industry and in the economic, environmental and social contexts.

3. COURSE : B.SC (HONS) BOTANY

Department: BOTANY

Program Outcomes (POs)

The course learning outcomes are aligned with program learning outcomes but these are specific to-specific courses offered in a program. The course level learning shall be reflected as program level learning. The core courses shall be the backbone of this framework whereas discipline electives, generic electives and skill enhancement courses would add academic excellence in the subject together with multi-dimensional and multidisciplinary approach.

1. 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 life-forms. Understanding of various analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and is well versed with the use of transgenic technologies for basic and applied research in plants.

2. Understanding of various life forms of plants, morphology, anatomy, reproduction, genetics, microbiology, molecular biology, recombinant DNA technology, transgenic technology and use of bioinformatics tools and databases and the application of statistics to biological data.

4. COURSE : B.SC (HONS) CHEMISTRY

Department: CHEMISTRY

Program Outcomes (POs)

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.

• **Knowledge: Width and depth:** Students acquire theoretical knowledge and understanding of the fundamental concepts, principles and processes in main branches of chemistry, namely, organic chemistry, inorganic chemistry, physical chemistry, analytical chemistry and biochemistry. In depth understanding is the outcome of transactional effectiveness and treatment of specialized course contents. Width results from the choice of electives that students are offered.

• **Laboratory Skills: Quantitative, analytical and instrument based:** A much valued learning outcome of this programme is the laboratory skills that students develop during the course. Quantitative techniques gained through hands on methods opens choice of joining the industrial laboratory work force early on. The programme also provides ample training in handling basic chemical laboratory instruments and their use in analytical and biochemical determinations. Undergraduates on completion of this programme can cross branches to join analytical, pharmaceutical, material testing and biochemical labs besides standard chemical laboratories.

• Communication: Communication is a highly desirable attribute to possess. Opportunities to enhance students' ability to write methodical, logical and precise reports are inherent to the structure of the programme. Techniques that effectively communicate scientific chemical content to large audiences are acquired through oral and poster presentations and regular laboratory report writing.

• Capacity Enhancement: Modern day scientific environment requires students to possess ability to think independently as well as be able to work productively in groups. This requires some degree of balancing. The chemistry honours programme course is designed to take care of this important aspect of student development through effective teaching learning process.

• Portable Skills: Besides communication skills, the programme develops a range of portable or transferable skills in students that they can carry with them to their new work environment after completion of chemistry honours programme. These are problem solving, numeracy and mathematical skills- error analysis, units and conversions, information retrieval skills, IT skills and organizational skills. These are valued across work environments.

5. COURSE : B.COM (HONS)

Department: COMMERCE

Program Outcomes (PO)

PO1: Instil in the students the knowledge and capability of understanding the business world and its complexities. It will also develop the ability and competence to have a problem-solving approach towards the issues which accompany the dynamism attached to the business world.

PO2: Inculcate attitudes and character that will help students evolve into sensitive and technically sound future business leaders rather than managers and aims at enhancing employability options of the students. The curriculum helps instilling learnability among students for upskilling and reskilling even in later part of life.

PO3: 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

PO4: Bring 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.

PO5: Equip students with the knowledge, skills and attitude to meet the challenges of the modern-day business organizations.

PO6: Promote understanding of the issues confronting the business world and the economy as a whole.

PO7: Understand various systems, policy framework and strategies needed to administer the rapid changes in an organization's globally oriented environment like equipping students with an understanding of the financial system, its constituents, the principles on which it operates, inter-linkages and regulatory concerns apart from exposure of different functional domains of management.

PO8: Enable the students to think of a given problem or situation from different perspectives like economic, financial, social, national, global etc. and broadens the horizon of their thought processes.

PO9: Instituting entrepreneurial skills in the students by instilling in them competencies needed to become an entrepreneur. These would lead to develop an attitude of life-long learning.

P10: Inculcate in the young minds the qualities of teamwork, cooperation and solidarity which can be seen as a vision of the current business world though full of competition.

Program Specific Outcomes (PSO)

- To enables the students to be technologically updated as it has courses like computerised accounting system, computer applications etc. which not only make them work using software but also makes them independent enough in this world of digitization.
- To envisage the students demonstrating inclusive knowledge of the areas related to finance, human resource management, marketing, international business, corporate and business laws, accounting and taxation etc. The make students capable of using modern ways and means of dealing with issues arising in the dynamic business world and will also help them tackle the resistances.
- To enhance comprehensive knowledge of various procedures and the procedural glitches that can affect the working of an organisation.
- Application of one's disciplinary knowledge pertaining to theories and principles to find solution to problems of business world.

- ❖ Conversance with working on qualitative as well as quantitative data, along with working on some software in order to familiarise them with the interpretations of results and coming to sound conclusions through critical judgments.
- ❖ Demonstration of multidisciplinary approach towards commerce as it originates from the discipline of economics, politics, law, mathematics, etc.
- ❖ Comprehensive knowledge about current topics and the scholarly research pertaining to chosen areas, also techniques and skills required to comprehend the contemporary issues.

Course Outcomes: B.Com Hons.

Core Course

BCH 1.2: Financial Accounting (Sem – I)

CO1: understand the theoretical framework of accounting and to prepare financial statements CO2: explain and determine depreciation and value of inventory.

CO3: learn accounting for hire purchase transactions, leases, branches and departments.

CO4: understand the concepts of partnership firm and prepare accounts for dissolution of a partnership firm.

CO5: develop the skill of preparation of trading and profit and loss account and balance sheet using computerized accounting.

BCH 1.3 : Business Laws (Sem- I)

CO1: understand basic aspects of contracts for making the agreements, contracts and subsequently enter valid business propositions.

CO2: be able to recognize and differentiate the special contracts and identify their appropriate usage at varied business scenarios.

CO3: equip the students about the legitimate rights and obligations under The Sale of Goods Act.

CO4: enable with skills to initiate entrepreneurial ventures as LLP.

CO5: understand the fundamentals of Internet based activities under The Information and Technology Act.

BCH 2.2 :Corporate Accounting (Sem II)

CO1: develop an understanding of accounting for share capital and debentures.

CO2: prepare financial statements of a company.

CO3: develop an understanding of cash flow statements.

CO4: understand the accounting for amalgamation and liquidation of companies.

CO5: prepare consolidated balance sheet for Holding company.

BCH 2.3: Corporate Laws (Sem II)

CO1: understand the regulatory aspects and the broader procedural aspects involved in different types of companies covering the Companies Act 2013 and Rules there under.

CO2: follow the basic legal documents and their usage essential for operations and management of company.

CO3: enable the students to synthesis company processes, meetings and decisions.

CO4: equip the students with framework of dividend distribution and role of auditors in a company.

CO5: comprehend and evaluate working of depositories and their functions in stock markets.

BCH 3.1: Human Resource Management (Sem III)

CO1: understand basic nature and importance of human resource management.

CO2: analyze the current theory and practice of recruitment and selection.

CO3: realize the importance of performance management system in enhancing employee performance.

CO4: recommend actions based on results of the compensation analysis and design compensation schemes that are cost effective, that increase productivity of the workforce, and comply with the legal framework.

CO5: understand role of modern HRM in meeting challenges of changing business environment.

BCH 3.2: Income Tax Law and Practice (Sem III)

CO1: understand the basic concepts in the law of income tax and determine the residential status of different persons.

CO2: identify the five heads in which income is categorised and compute income under the heads ‘Salaries’ and ‘Income from House Property’.

CO3: compute income under the head ‘ Profits and gains of business or profession’, ‘Capital gains’ and ‘Income from other sources’.

CO4: understand clubbing provisions, aggregate income after set-off and carry forward of losses, and deductions allowed under the Income Tax Act; and further to compute taxable income and tax liability of individuals and firms.

CO5: develop the ability to file online returns of income.

BCH 3.3: Management Principles and Applications (Sem-III)

CO1: understand the evolution of management and apprehend its effect on future managers.

CO2: analyze how organisations adapt to an uncertain environment and decipher decision making techniques managers use to influence and control the internal environment.

CO3: comprehend the changes happening in organisation structure over time.

CO4: analyze the relationship amongst functions of management i.e. planning, organizing, directing and controlling.

CO5: appreciate the changing dynamics of management practice.

BCH 4.1: Cost Accounting (Sem IV)

CO1: understand thoroughly the conceptual framework of Cost Accounting; identification of differences between different financial and cost accounting; cost concepts and elements of cost; preparation of cost sheet.

CO2: understand the accounting and control of material and labour cost.

CO3: develop ability to understand classification, allocation, apportionment and absorption of overheads in cost determination; under and over absorption of overheads; treatment of various item of overheads.

CO4: develop ability to calculate the cost of products, jobs, contracts, processes and services after understanding the basic concepts and processes involved in them.

CO5: understand cost accounting book keeping systems and reconciliation of cost and financial account profits.

BCH 4.2: Business Mathematics (Sem IV)

CO1: comprehend the concept of systematic processing and interpreting the information in quantitative terms to arrive at an optimum solution to business problems.

CO2: develop proficiency in using different mathematical tools (matrices, calculus, linear programming, and mathematics of finance) in solving daily life problems.

CO3: acquire competence to use computer for mathematical computations, especially with Big data.

CO4: obtain critical thinking and problem-solving aptitude.

CO5: evaluate the role played by mathematics in the world of business and economy.

BCH 4.3: Computer Applications in Business (Sem IV)

CO1: understand the various concepts and terminologies used in computer networks and internet and be aware of the recent developments in the fast changing digital business world. CO2: handle document creation for communication.

CO3: acquire skills to create and make good presentations.

CO4: make various computations in the area of accounting and finance and represent the business data using suitable charts. S/He should be able to manipulate and analyze the business data for better understanding of the business environment and decision making.

CO5: understand and apply the various database concepts and tools in the related business areas with the help of suggested popular software.

BCH 5.1:Principles of Marketing (Sem V)

CO1: develop understanding of basic concepts of marketing, marketing philosophies and environmental conditions effecting marketing decisions of a firm.

CO2: understand the dynamics of consumer behaviour and process of market selection through STP stages.

CO3: understand and analyze the process of value creation through marketing decisions involving product development.

CO4: understand and analyze the process of value creation through marketing decisions involving product pricing and its distribution.

CO5: understand and analyze the process of value creation through marketing decisions involving product promotion and also to equip them with the knowledge of various developments in marketing area that may govern marketing decisions of a firm.

BCH 5.2: Financial Management (Sem V)

CO1 - explain the nature and scope of financial management as well as time value of money and risk return trade off.

CO2 – analyze capital budgeting process and capital budgeting techniques.

CO3 - estimate various capital structure theories and factors affecting capital structure decisions in a firm.

CO4 - critically examine various theories of dividend and factors affecting dividend policy.

CO5 - evaluate working capital requirement.

BCH 6.1: Auditing and Corporate Governance (Sem VI)

CO1: differentiate between different aspects of auditing especially for internal check, internal control and for overall corporate governance.

CO2: understand the concept of corporate governance in organisations and its essence for management.

CO3: provide and assimilate information leading to failure of organisation and corporate scams.

CO4: comprehend the governance framework for an organisation provided by different regulatory bodies in India and abroad.

CO5: recognise the essence of ethics in business.

BCH 6.2: Goods & Service Tax (GST) and Custom Laws (Sem VI)

CO1: connect with the genesis of goods and services tax (GST), decipher the constitutional amendment carried out to install GST in India and comprehend the composition and working of GST council.

CO2: understand the meaning of supply under GST law, differentiate between intra-state and inter-state supply, comprehend rules related to the place of supply and compute the value of supply.

CO3: comprehend the utilization of input tax credit, and the reverse charge mechanism of paying GST and to know the procedure for claiming refund under GST law.

CO4: understand the provisions for registration under GST along with special provisions such as those related to anti-profiteering; avoidance of dual control; e-way bills and penalties. CO5: know the basic concepts of Customs Act and to compute the assessable value for charging customs duty.

Skill Enhancement Course

BCH SEC 3.5 (a): E-Commerce (Sem- III)

CO1: understand the basics of E-commerce, current and emerging business models.

CO2: familarize with basic business operations such as sales, marketing, HR etc. on the web.

CO3: enhance the students' skills for designing and developing website.

CO4: identify the emerging modes of e-payment.

C05: understand the importance of security, privacy, ethical and legal issues of e-commerce.

BCH SEC 3.5(b): Training and Development (Sem – III)

CO1: learn the practical applications of training and development theories in recent times. CO2: learn to design training programmes for diverse workforce.

CO3: understand the role of development officers.

CO4: evaluate training and development programmes.

CO5: recognize the mechanism of career development programmes.

BCH SEC 4.5(c): Leadership and Team Development (Sem- IV)

CO1: gain theoretical and practical knowledge to evaluate leadership skills, styles and strategies in contemporary world so as to become a successful leader and effective employee in organisation.

CO2: understand the group dynamics and group decision making so as to develop acumen to utilize the leadership and team building concepts, tools and techniques to handle the complex organisational problems at different levels.

CO3: recognize the dynamics of group decision making.

CO4: understand the working of various teams in organisations.

CO5: evaluate the role of women as leader and using various social media platforms as effective means of communication in contemporary world as a leader.

BCH SEC 4.5 (f): Cyber Crimes and Laws (Sem- IV)

CO1: identify cyber risk associated with online activities.

CO2: prepare them for safe working in the vertical having varied access points, data sources, network and system related issues, especially in online transactions.

CO3: generate and preserve electronic evidences for personal and professional use.

CO4: work in virtual space safely and with business process or products confirming to the regulatory framework and not falling under the ambit of cyber crimes.

CO5: analyse the cases and find pertinent facts for resolutions.

Generic Elective Course (Offered to students other than B.Com Hons)

BCH GE 1.4 (b): Business Organization and Management (Sem – I)

CO1: learn business activities to compete in competitive world.

CO2: understand entrepreneurship from local to international perspective.

CO3: evaluate the application of functional areas of business activity.

CO4: analyze decision making and communication.

CO5: evaluate the impact of legal, social, and economic environment on business.

BCH GE 2.4 (b): Finance for Non Finance Executives (Sem – II)

CO1: understand the overview of finance, concept of time value of money as well as concept of risk & return.

CO2: learn financial analysis with the aid of various financial statements & analyze capital budgeting process and techniques.

CO3: analyze cost of capital, capital structure and leverage.

CO4: examine dividend & working capital dividend decisions CO5: perform valuation of securities.

BCH 3.4 (a) GE Investing in Stock Markets (Sem III)

CO1: learn the basics of investing in stock market, the investment environment as well as risk & return.

CO2: analyze indian securities market including the derivatives market.

CO3: examine EIC framework and conduct fundamental analysis.

CO4: perform technical analysis CO5: invest in mutual funds market.

BCH 4.4 (a) GE : Insurance and Risk Management (Sem IV)

CO1: understand the Concept of Risk, it's types, sources and measurements.

CO2 : learn the Concepts and Principles of Insurance and its operations.

CO3: develop insights into various types of Insurance.

CO4: examine the Legal aspects of Insurance contract and Actuaries.

CO5: familiarize with the Regulatory Framework of Insurance

Discipline Specific Elective (DSE) Course

BCH 5.3 (a) DSE : Management Accounting (Sem – V)

CO1: understand thoroughly the conceptual framework of Management Accounting; identification of differences between different forms of accounting—Financial, Cost and Managerial; distinction between cost control and cost reduction.

CO2: understand the concept of marginal cost and marginal costing; preparation of income statements using absorption and variable costing; learning of cost-volume-profit analysis and break-even analysis using mathematical and graphical approaches; and the application in businesses.

CO3: understand the concept of relevant and irrelevant costs and make decisions related to different business situations using marginal costing and differential costing techniques.

CO4: understand budgetary control system as a tool of managerial planning and control; ability to prepare various types of budget. Ability to understand standard costing system as a tool of managerial control; calculation of variances in respect of each element of cost and sales; control ratios.

CO5: understand management accounting issues of Responsibility accounting, Divisional performance measurement and Transfer pricing.

BCH 5.3 (b) DSE: Organisational behavior (Sem – V)

CO1: understand the development of organisational behavior and its importance in managing people at the workplace.

CO2: understand how individuals behave under different conditions and why individuals behave as they do.

CO3: appreciate different theories of motivation.

CO4: critically evaluate leadership styles and strategies.

CO5: critically evaluate the potential effects of organisation culture and stress on behavior in organisation so as to direct the same towards predetermined goals.

BCH 5.4 (b) DSE : Financial Markets, Institutions & Services (Sem – V)

CO1: understand the meaning and scope of financial markets as well as institutions in India.
CO2: understand the concepts of Money Market and Capital Market.

CO3: explain Commercial Banking and its Current developments.

CO4: explain concept of Non-Banking Financial Companies (NBFC's).

CO5: examine the Financial Services Industry

BCH 5.4(d) DSE : Business Statistics (Sem – V)

CO1: acquire a fair degree of proficiency in comprehending statistical data, processing and analysing it using descriptive statistical tools.

CO2: gather knowledge about various probability concepts and distributions and their business applications.

CO3: understand the relationship between two variables using concepts of correlation and regression and its use in identifying and predicting the variables.

CO4: develop an understanding of the index numbers and their utility in daily life and stock market.

CO5: become aware of the patterns revealed by the time series data and to use it to make predictions for the future.

BCH 6.3 (a) DSE : Fundamentals of Investment (Sem – VI)

CO1: explain investment environment and concept of return & risk.

CO2: understand bond valuation & role of credit rating agencies.

CO3: examine equity approaches.

CO4: analyze two securities portfolio using Harry Markowitz model, Calculating portfolio risk and return, explaining CAPM and evaluating Mutual Funds and Financial derivatives. CO5: evaluate investors protection framework

BCH 6.3 (d) DSE: Consumer Affairs and Customer Care (Sem – VI)

CO1: understand the importance of consumer buying process and to identify the ethical and legal issues in advertisements and in packaging.

CO2: learn how to pursue the consumer rights under consumer protection act 1986.

CO3: understand the procedure of filing a complaint.

CO4: analyse the role of industry regulators in consumer protection.

CO5: comprehend the hearings, enquiry and appeal provisions.

BCH 6.4 (a) DSE: Financial Reporting and Analysis (Sem – VI)

CO1: describe the conceptual framework of financial reporting have an understanding the components of financial statements.

CO2: identify major disclosures to be made in the annual report by the listed companies.

CO3: explain techniques of analysis of financial statements.

CO4: analyze and interpret financial statements of companies using the case study method. CO5: gain understanding of emerging areas in financial reporting - Accounting for Ecommerce business, value added statements and Integrated Reporting

BCH 6.4 (d) DSE: International Business (Sem – VI)

CO1: understand the process of globalization, its impact on the evolution and growth of international business and to appreciate the changing dynamics of the diverse international business environment.

CO2: analyze the theoretical dimensions of international trade and intervention measures adopted; to appreciate the significance of different forms of regional economic integration and to understand the concept of Balance of payment account and its components.

CO3: understand the significance of different forms of regional economic integration and to appreciate the role played by various international economic organisations such as the WTO, UNCTAD, IMF and World Bank.

CO4: familiarize students with the international financial environment, and get them acquainted with the basic features of the foreign exchange market – its characteristics and determinants. CO5: critically examine the concept and form of foreign direct investment, and to create awareness about emerging issues in international business such as outsourcing and ecological issues.

6. COURSE : B.COM

Department: COMMERCE

Program Outcome (PO)

PO1: Helping the students simulate themselves in the actual working situations like analysing annual reports and balance sheets, working on live software.

PO2: Instill in students the basic knowledge and fundamentals of commerce and business which would be beneficial for them to comprehend, analyse and evaluate the current economic/business scenario of the country and the world at large.

PO3: Develop in students the capability to transform theoretical and conceptual knowledge into practical problem-solving approach using critical thinking.

PO4: Develop skills which would help students undertake research and innovations in commerce and would enhance their employability.

PO5: Develop a sense of attitude towards life-long learning as the world of business is constantly in a state of flux. The course content shall help students build on sustaining themselves and being relevant in all times through having such an attitude.

Program Specific Outcomes (PSO)

- To make the students blend theoretical concepts with practice, furthering students with a better skillset and a fresh perspective.
- To give insight to the students of the day to day commercial procedures for becoming good leaders and assets for an organization.
- Acquainting the students with problem solving techniques by providing them with real life situations through case-studies. The students shall be able to develop better sense of problem solving after going through the courses.
- Inculcate in the young minds the qualities of teamwork, cooperation and solidarity which can be seen as a vision of the current business world. Students shall be able to gain insight into the need to balance the aspects of collaboration and competition for healthier delivery to society whose hallmark currently is fierce competition.
- Understand the need of the current business world and make them capable to view different aspects and dimensions from global perspective. The courses are designed in such a way that the learners are encouraged to seek deeper understanding of issues and develop research abilities.
- Involve training the students to check unethical behaviour, falsification and manipulation of information in order to avoid debacles which can be seen rising persistently over the period of time.

- Inculcate management skills like teamwork, cooperation, motivation and leadership etc. that help build the character of a future employee and facilitate him/her in inspiring others in an organisation. The courses would be able to make the students capable of handling present complexities and future challenges.
- Help the students acquire knowledge of computers and become digitally literate by learning basics of computers and computerised accounting, thus becoming self-reliant.
- Demonstrate interdisciplinary knowledge in different fields like finance, accounting, human resources, economics, marketing, statistical methods, international business, legal framework existing in the country and its comparison with international standards etc.

Course Outcomes: B.Com. Programme

BC 1.2: FINANCIAL ACCOUNTING (SEM – I)

This course provides conceptual knowledge of financial accounting and provides knowledge about the techniques for preparing accounts in different type of business organisations.

Build an understanding of theoretical framework of accounting and be able to prepare financial statements. Explain and determine depreciation and inventory value. Develop understanding of accounting for hire purchase transactions and lease transactions. Understand branch and departmental accounting. Develop the skill of preparation of trading and profit and loss account and balance sheet using computerized accounting or prepare accounts for dissolution of a partnership firm.

BC 1.3: BUSINESS ORGANISATION AND MANAGEMENT (SEM- I)

The objective of this course is to develop an understanding about functions of management and challenges faced by management and organisations with changing dynamics.

Develop the skill of preparation of trading and profit and loss account and balance sheet using computerized accounting or prepare accounts for dissolution of a partnership firm. Understand varied perspectives related to business environment and entrepreneurship. Analyse how organisations adapt to an uncertain environment and decipher decision making techniques managers use to influence and control the internal environment. Analyse the relationship amongst functions of management i.e. planning, organizing, directing and controlling. Appreciate the change in working pattern of modern organisations.

Paper BC 2.2- BUSINESS LAWS (SEM II)

To impart basic knowledge of the important business laws relevant to conduct general business activities in physical and virtual spaces along with relevant case laws.

Understand basic aspects of contracts for making the agreements, contracts and subsequently enter valid business propositions. Handle the execution of special contracts

used in different types of business. Learn legitimate rights and obligations under The Sale of Goods Act. Acquire skills to initiate entrepreneurial ventures as LLP. Understand the fundamentals of Internet based activities under The Information and Technology Act.

Paper BC 2.3: BUSINESS MATHEMATICS AND STATISTICS (SEM II)

The objective of this course is to familiarize students with the applications of Mathematics and Statistical techniques in business decision making.

Acquire proficiency in using different mathematical tools (matrices, calculus and mathematics of finance) in solving real life business and economic problems. Develop an understanding of the various averages and measures of dispersion to describe statistical data. Understand the relationship between two variables through correlation and regression. Understand the construction and application of index numbers to real life situations. Understand the trends and tendencies over a period of time through time series analysis.

Paper BC 3.1: COMPANY LAW (SEM III)

The objective of the course is to impart basic knowledge of the provisions of the Companies Act 2013 to understand the conduct of business as per legal framework provided in the country. Case studies involving issues in company law are required to be discussed.

Understand the rules and the broader procedural aspects involved in different types of companies covering the Companies Act 2013. Comprehend and appropriately use the basic legal documents essential for operations and management of company. Distinguish between varied company processes, meetings and decisions. Know the framework of dividend distribution and role of auditors in a company. Understand and evaluate working of depositories and their functions for working in stock market.

Paper BC 3.2: INCOME TAX LAW & PRACTICE (SEM III)

To impart knowledge of laws pertaining to levy of income tax in India and to enable students to apply the same practically.

Understand the basic concepts in the law of income tax and determine the residential status of different persons. Identify the five heads in which income is categorised and to compute income under the heads ‘Salaries’ and ‘Income from House Property’. Compute income under the head ‘ Profits and gains of business or profession’, ‘Capital gains’ and ‘Income from other sources’. Understand clubbing provisions, aggregate income after set-off and carry forward of losses, and deductions allowed under the Income Tax Act. Compute tax liability of individuals and firms and understand the provisions of filing return of income.

Paper BC 4.2: CORPORATE ACCOUNTING (SEM IV)

To acquire the conceptual knowledge of corporate accounting and to understand the various techniques of preparing accounting and financial statements.

Develop an understanding of accounting for share capital and debentures. Prepare financial statements of a company. Develop understanding of cash flow statements. Understand the

accounting for amalgamation of companies. Prepare consolidated balance sheet for Holding company.

Paper BC 4.3: COST ACCOUNTING (SEM IV)

To provide an in-depth understanding of the cost accounting principles for identification, analysis and classification of cost components and cost ascertainment using various costing methods.

Understand conceptual framework of Cost Accounting. Understand in detail the accounting and control of material and labour cost. Understand classification, allocation, apportionment and absorption of overheads in cost determination. Calculate the cost of products, jobs, contracts, processes and services. Have basic understanding of cost accounting book keeping systems and reconciliation of cost and financial account profits.

Skill Enhancement Course

Paper BC 3.4 (a): COMPUTER APPLICATIONS IN BUSINESS (SEM- III)

To provide computer based knowledge to commerce students and to equip them with computational skills using ICT tools.

Handle document creation for communication. Acquire skills to create and make good presentations. Make various computations in the area of accounting and finance and present business data using appropriate charts. Process and analyse the business data and generalize the work sheets for better understanding of the business environment and decision making. Understand and apply the various database concepts and tools in the related business areas.

Paper: BC 4.4 (a): E-COMMERCE (SEM IV)

To familiarize the students with concepts and techniques of E-Commerce and to enhance skills for effective and contemporary applications of E- commerce.

Understand the basics of E-commerce, current and emerging business models. Familiarize with basic business operations such as sales, marketing, HR etc. on the web. Enhance the students' skills for designing and developing website. Identify the emerging modes of e-payment. Understand the importance of security, privacy, ethical and legal issues of ecommerce.

Paper BC 6.3 (a): ADVERTISING, PERSONAL SELLING AND SALESMANSHIP (SEM VI)

The objective of this course is to provide knowledge concerning advertising and personal selling and to equip them with the skill to use these promotion tools.

Understand the communication objectives behind advertising and promotions. Understand the various message and media elements in the advertising decisions. Analyse the effectiveness of advertising. Comprehend the importance and role of personal selling. Understand the process of personal selling.

Discipline Specific Elective (DSE) Course

Paper BC 5.1 (c): AUDITING AND CORPORATE GOVERNANCE (SEM – V)

To provide knowledge of auditing principles and techniques and to familiarize the students with the understanding of issues and practices of corporate governance in the global and Indian context including case studies.

Differentiate between different aspects of auditing especially for internal check, internal control and for overall corporate governance. Understand the concept of corporate governance in organisations and its essence for management. Provide and assimilate information leading to failure of organisation and corporate scams. Comprehend the governance framework for an organisation provided by different regulatory bodies in India and Abroad. Recognise the essence of ethics in business.

Paper BC 5.2 (a): FUNDAMENTALS OF FINANCIAL MANAGEMENT (SEM – V)

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

Explain the nature, scope and objective of financial management, along with Time Value of Money, Risk & Return. Analyse Capital Budgeting Process and Techniques including NPV, IRR and Profitability Index. Examine various Capital structure theories and estimating cost of capital. Critically examine basic Theories and policies of Dividend. Estimate working capital along with an overview of cash receivables and inventory management.

Paper BC 6.1 (c): MANAGEMENT ACCOUNTING (SEM – VI)

Enable students to acquire knowledge of concepts, methods and techniques of management accounting for the purpose of managerial planning, control and decision making.

Understand thoroughly the conceptual framework of Management Accounting; different forms of accounting—Financial, Cost and Managerial; types of costs for decision making and cost control; cost control and cost reduction. Understand the concept of marginal cost and marginal costing; preparation of income statements using absorption and variable costing; learning of cost-volume-profit analysis and break-even analysis using mathematical and graphical approaches; and their application in businesses. Understand the concept of relevant cost and make decisions related to different business situations using marginal costing and differential costing techniques. Understand preparation of various types of budgets and budgetary control system as a tool of managerial planning and control; Ability to understand standard costing system as a tool of managerial control; calculation of variances in respect of each element of cost and sales; control ratios. Have basic understanding of techniques of performance measurement such as Responsibility Accounting, Divisional Performance Measurement and Transfer Pricing.

Paper BC 6.1 (e): FINANCIAL MARKETS, INSTITUTIONS AND SERVICES (SEM – VI)

To provide students an overview of financial markets & institutions in India and familiarize them with important fee and fund based financial services.

Understand the meaning and scope of Financial Markets as well as institutions in India. Familiarize the students with the concepts of Money Market and Capital Market. Explain

Commercial Banking and its Current developments. Familiarize the students with the concept of Non-Banking Financial Companies (NBFC's). Examine the Financial Services Industry.

Paper BC 6.2 (b): FUNDAMENTALS OF INVESTMENT (SEM – VI)

To familiarize the students with different investment alternatives, introduce them to the basics of their analysis, valuation and investor protection.

Acquaint with the Investment Environment and concept of Return & Risk. Develop the understanding of Bond valuation & role of Credit Rating agencies. Understand the methods of Equity analysis approaches. Analyse two securities portfolio using Harry Markowitz model and CAPM, Mutual Funds and Financial derivatives. Examine investors' protection framework.

Paper BC 6.2 (d): ORGANISATIONAL BEHAVIOR (SEM – VI)

The underlying objective of this course is to create basic understanding of concept of organisational behaviour and help students gain theoretical and practical knowledge along with desirable skills to become successful managers and effective employees in organisation.

Understand the development of organisational behaviour and its importance in managing people at the workplace. Understand human behaviour as an individual. Appreciate different theories of motivation. Critically evaluate leadership styles and strategies. Understand the importance of organisational culture and learn to deal with change and stress.

7. COURSE : B.A (HONS) ECONOMICS

Programme Learning Outcomes

Students will:
1. Get an understanding of basic economic theory;
2. Learn the mathematical and statistical techniques necessary for a proper understanding of the discipline;
3. Get an introduction to real world economic issues and problems facing the country and the world;
4. Gain an understanding of proper policy responses to economic problems;
5. Get trained to collect primary data and learn sampling techniques;
6. Learn to use scientific empirical methods to arrive at conclusions about the validity of economic theories;
7. Get trained in the art of economic modelling.

Course Outcomes

HC11: Mathematical Methods for Economics I (Semester 1) (C-1)

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.

HC12: Introductory Microeconomics(Semester 1) (C-2)

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.

HC21: Mathematical Methods for Economics I (Semester 2) (C-2)

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.

HC22: Introductory Macroeconomics(Semester 2) (C-2)

Students will have capability to understand government policies and will enable informed participation in economic decision making, thus improving their employment prospects and career advancement.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.

HC 31: Intermediate Microeconomics-I(Semester 3) (C-3)

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

HC 32: Intermediate Macroeconomics-II(Semester 3) (C-4)

This course enables students to analyse the macroeconomic performance of various countries using formal analytical tools. It also allows them to evaluate important macroeconomic policies and their implications.

HC33: Statistical Methods for Economics (Semester3)(C-5)

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 analyse statistics in everyday 16 life to distinguish systematic differences among populations from those that result from random sampling.

HC41: Intermediate Microeconomics-II (Semester 4)(C-6)

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

HC 42: Intermediate Microeconomics-II (Semester 4) (C-7)

This course will enable students to combine their knowledge of the working of the 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.

HC43: Introductory Econometrics (Semester 4) (C-8)

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

HC51: Indian Economy-I (Semester V) (C-9)

At the end of the course, a student should be able to understand the development paradigm adopted in India since independence and evaluate its impact on economic as well as social indicators of progress and well being.

HC52: Development Economics-I (Semester VI)(C-10)

This course introduces students to the basics of development economics, with indepth discussions of the concepts of development, growth, poverty, inequality, as well as the underlying political institutions.

HC 61: Indian Economy-II (Semester VI) (C-11)

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.

HC 62: Development Economics-I (Semester VI) (C-12)

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 Electives (DSE)

HE 52: International Trade (Semester V)

The module aims to introduce students to the main theoretical and empirical concepts in international trade, equip students with a thorough analytical grasp of trade theory, ranging from Ricardian comparative advantage to modern theories of intra-industry trade, and familiarise students with the main issues in trade policy and with the basic features of the international trading regime. At the end of the course, the students should be able to demonstrate their understanding of the economic concepts of trade theory.

HE 53: Public Economics (Semester V)

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.

HE54: Financial Economics (Semester V)

Students acquire extensive theoretical knowledge in portfolio risk management, capital asset pricing, and the operation of financial derivatives. The course familiarises 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

HE55: Applied Econometrics (Semester V)

Students will learn the theoretical basis for techniques widely used in empirical research and consider their application in a wide range of problems.

HE63: Environmental Economics (Semester VI)

The module aims to introduce students to the main theoretical and empirical concepts in environmental economics, equip students with a thorough analytical grasp of environmental policy theory, ranging from externalities to international environmental agreements, and familiarise students with the main issues in environmental valuation and with the basic features of the environmental policy tools. At the end of the module the students should be able to demonstrate their understanding of the economic concepts of environmental policy.

HE 65: Money and Financial Markets (Semester VI)

This allows students to understand current monetary policies and financial market outcomes. It also enables them to critically evaluate policies

Skill Enhancement Courses (SEC)

HS31: Data Analysis

The course will use data simulations and publicly available data sources to help students learn about data types, their organization and visual representation. They will learn how to compute summary statistics and do some basic statistical inference.

HS 41: Research Methodology

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.

Generic Elective Courses (for students pursuing BA(Hons) other than in Economics / B Sc(Hons) /BCom(Hons)

GE11: Introductory Microeconomics (Semester I)

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.

GE 21: Introductory Macroeconomics (Semester II)

This course will allow students to understand the basic functioning of the macroeconomy

GE 31: Money and Financial Markets(Semester III)

This course exposes students to the theory and functioning of the monetary and financial sectors of the economy.

GE 33:Indian Economy-I (Semester III)\

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 thus improving their chances of getting employed, and be more effective, in positions of responsibility and decision making

GE 41: Public Finance (Semester IV)

The module aims to introduce students to the main concepts in public finance, equip students with a thorough analytical grasp of government taxes: direct and indirect taxes, and familiarise students with the main issues in government expenditure. At the end of the module the students should be able to demonstrate their understanding of the economic concepts of public finances, use diagrammatic analysis to demonstrate and compare the economic welfare effects of various government policy options, and demonstrate their understanding of the usefulness and problems related to government revenues and expenditures.

GE 42: Indian Economy-II (Semester IV)

Students will have capability to understand government policies and will enable informed participation in economic decision making, thus improving their employment prospects and career advancement.

8. COURSE : B.SC (HONS) ELECTRONICS

Department: Electronics

Program Outcomes (POs)

PLO1 Ability to apply knowledge of mathematics & science in solving electronics related problems

PLO2 Ability to design and conduct electronics experiments, as well as to analyze and interpret data

PLO3 Ability to design and manage electronic systems or processes that conforms to a given specification within ethical and economic constraints.

PLO4 Ability to identify, formulate, solve and analyze the problems in various disciplines of electronics

PLO5 Ability to function as a member of a multidisciplinary team with sense of ethics, integrity and social responsibility

PLO6 Ability to communicate effectively in term of oral and written communication skills

PLO7 Recognize the need for, and be able to engage in lifelong learning

PLO8 Ability to use techniques, skills and modern technological /scientific / engineering software/tools for professional practices

Course Outcomes

For students of B.Sc. (Hons) : Electronics

Core Course

Paper Title: Basic Circuit Theory and Network Analysis Lab

Students would understand the basic circuit concepts in a systematic manner suitable for analysis and design. They will be able to understand transient analysis and determine AC steady state response. They will be able to analyse the electric circuit using network theorems and understand the two–port network parameters.

Paper Title: Mathematics Foundation for Electronics

Students will be able to use mathematics as a tool for solving/modelling systems in electronics. They will be able to solve non-homogeneous linear differential equations of any order using a variety of methods, solve differential equations using power series and special functions. And to understand methods to diagonalize square matrices and find eigenvalues and corresponding eigenvectors for a square matrix, and check for its diagonalizability . They will be familiarized with the concept of sequences, series and recognize convergent, divergent bounded, Cauchy and monotone sequences and perform operations with various forms of complex numbers to solve equations.

Paper Title: Semiconductor Devices

The paper focuses on the behaviour of semiconductor materials. Students would be able to reproduce the I-V characteristics of diode/BJT/MOSFET devices, and to apply standard device models to explain/calculate critical internal parameters of semiconductor devices. They will be able to explain the behaviour and characteristics of power devices such as SCR/UJT etc.

Paper Title: Applied Physics

Students would understand the limitations of classical physics and basic concepts of quantum physics. They will be able to describe the mechanical, thermal and magnetic properties of materials. They will understand the various thermal effects life Seebeck and Peltier effect and their usefulness in solving the real life problems

Paper Title: Electronics Circuits

Students would learn about diode, transistor and FET and their applications. They would study various biasing circuits and would compare the performance of these devices with low frequency models. They would be able to describe the frequency response of MOSFET and BJT amplifiers. Also explain the concepts of feedback and construct feedback amplifiers and oscillators. They will be able to summarizes the performance parameters of amplifiers with and without feedback

Paper Title: Digital Electronics and Verilog/VHDL

Students will be able to understand and represent numbers in powers of base and converting one from the other, carry out arithmetic operations, also understand basic logic gates, concepts of Boolean algebra and techniques to reduce/simplify Boolean expressions. They will be able to analyse and design combinational as well as sequential circuits. Also they will be able to explain the concepts related to PLD's and use VLSI design methodologies to understand and design simple digital systems They will be able to understand the HDL design flow and capability of writing programs in VHDL/Verilog and familiarized with Simulation and Synthesis Tools, Test Benches used in Digital system design

Paper Title: C Programming and Data Structures

This paper aims at teaching students of BSc (Hons) /Electronics the fundamentals of programming using C language. It helps in forming base in programming so that the students can develop programs / codes for Mathematical or any other applications. It gives a solid understanding of how various aspects of programming and data managing happens in a computer. Algorithm development is also encouraged to develop programs in a systematic manner.

Paper Title: Operational Amplifiers and Applications

Students would understand basic building blocks of an op-amp and its parameters for various applications design. They will be able to elucidate and design the linear and non-linear applications of an op-amp and understand the working of multivibrators using IC 555 timer and V-F inter-conversion using special application ICs 565 and 566. They will be able to study various fixed and variable IC regulators.

Paper Title: Signals & Systems

Students would learn to represent various types of continuous-time and discrete-time signals. They would understand the concept of convolution, LTI systems and classify them based on their properties and determine the response of the LTI system. They will be able to determine the impulse response, step response and frequency response of LTI systems. Also they will be able to analyse system properties based on impulse response and Fourier

analysis and the spectral characteristics of continuous-time periodic and a periodic signal using Fourier analysis. They will be able to understand Laplace transform and its properties and apply the Laplace transform to obtain impulse and step response of simple circuits

Paper Title: Electronic Instrumentation

At the end of this course, students would be able to describe the working principle of different measuring instruments, choose appropriate measuring instruments for measuring various parameters in their laboratory courses. They'll be able to correlate the significance of different measuring instruments, recorders and oscilloscopes.

Paper Title: Microprocessors and Microcontrollers

At the end of this course, students would be able to understand the basic blocks of microcomputers i.e. CPU, Memory, I/O and architecture of Microprocessor and Microcontroller. They'll be able to apply knowledge and demonstrate proficiency of designing hardware interfaces for memory and I/O as well as write assembly language programs for 8085 Microprocessor and pic Microcontroller and derive specifications of a system based on the requirements of the application and select the appropriate Microprocessor or Microcontroller.

Paper Title: Electromagnetics

At the end of this course, students would get familiar with vector algebra, coordinate system and coordinate conversion, plotting of fields (Electrostatic and Magneto-statics) and solution of Laplace's equation. They'll be able to understand Physical interpretation of Maxwell's equation and problem solving in different media and will be understanding the propagation of an electromagnetic wave.

Paper Title: Communication Electronics

At the end of this course, students would understand the basic concept of a communication system and need for modulation. They will be able to evaluate modulated signals in time and frequency domain for various continuous modulation techniques and describe the working of transmitters and receivers and effect of noise on a communication system. They'll be able to understand baseband Pulse Modulation.

Paper Title: Photonics

At the end of this course, students will be able to describe the optics and simple optical systems, understand the concept of light as a wave and the relevance of this to optical effects such as interference, diffraction and Polarization. They would also learn about optoelectronic devices and communication in optical fibre. They'll be able to use mathematical methods to predict optical effects with e.g. light-matter interaction, interference, fibre optics etc.

Discipline Specific Electives (DSE)

Paper Title: Power Electronics

After studying this course, students would be able to explain the basic principles of switch mode power conversion, models of different types of power electronic converters including dc-dc converters, PWM rectifiers and inverters. They will be able to choose appropriate power converter topologies and design the power stage and feedback controllers for various applications. They use power electronic simulation packages for analysing and designing power converters. They will be able to describe the operation of electric machines, such as motors and generators and their electronic controls and can analyse the performance of the electric machine.

Paper Title: Numerical Analysis

At the end of this course, students would know the common numerical methods and how they are used to obtain approximate solutions to mathematical problems. They will be able to derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. They will be able to analyse and evaluate the accuracy of common numerical methods.

Paper Title: Digital Signal Processing

At the end of this course students would understand the basic concepts related to discrete time signals, systems, Z transform and Fourier transform. They will be able to Apply The knowledge and could demonstrate proficiency of analysing signals in time as well as frequency domain using Fourier and Z transforms and would be able to design and analyse IIR/FIR filters with given specifications. They will be able to apply transform methods for representing signals and systems in time and frequency domain.

Paper Title: Basic VLSI Design

At the end of this course, students will be able to understand the concept of models of MOS devices and their implementation in designing of the CMOS inverter. They will be able to measure the performance parameters like threshold voltage, noise margins, time delays etc. They will get familiar with the techniques and components involved in combinational MOS circuit designs and they will be able to describe the various types of semiconductor memories and issues involved in them.

Paper Title: Computer Networks

At the end of this course, students would know the fundamentals of computer networks. They would understand the set of rules and procedures that mediates the exchange of information between communicating devices.

Paper Title: Semiconductor Fabrication and Characterization

At the end of this course, students will be able to summarize the developments in the field of microelectronics technologies and would be able to explain the semiconductor material characterization techniques like SEM, TEM, UV-Vis. They will be able to describe the

lithography, etching and various film deposition processes and explain the process sequence for BJT, CMOS and BiCMOS fabrication Processes.

Paper Title: Biomedical Instrumentation

At the end of this course, students will be able to understand the basic knowledge of physiology and explore the occurrence of potential and operation of cardiovascular measurements. They will be able to understand the basic knowledge on respiratory and pulmonary measurements. They will be able to describe the methods used for monitoring the patients.

Paper Title: Electrical Machines

At the end of this course, students will get familiar with the basics of DC Machines, Generators and Motors and they would be able to explain the concept of polyphase circuits and their applications in polyphase induction motors. They will be able to describe the synchronous motors and their comparison with induction motors

Paper Title: Modern Communication Systems

At the end of this course, students will be able to summarize different types of modern communication systems and understand the basics of a digital communication system. They will be able to explain the basics of an optical communication system, working of a cellular communication system and the working of satellite communication.

Paper Title: Control Systems

At the end of this course, students would understand the concepts of closed loop control systems and will be able to analyse the stability of closed loop systems. They will be able to apply the control techniques to any electrical systems and compute and assess system stability.

Paper Title: Transmission Lines, Antenna and Wave Propagation

At the end of this course, students will be able to describe the principles of electromagnetic wave propagation and various effects involved in it and they will be able to explain the phenomenon of transmission line, its types and finding out performance parameters of transmission lines like losses SWR. They will be able to calculate input impedance and reflection coefficient of an arbitrarily terminated transmission-line and can use Smith chart to convert these quantities. They will be able to understand the concept of retarded potential to explain radiation, half wave dipole and characteristics of antenna, radar equation.

Paper Title: Nanoelectronics

At the end of this course, students will be able to describe the principles of nanoelectronics and the processes involved in making nano components and material. They will be able to

explain the advantages of the nanomaterials and appropriate use in solving practical problems. They will be able to explain the various aspects of nano-technology and the processes involved in making nano components and material. They will be able to differentiate between various nanomaterials synthesis processes.

Paper Title: Embedded Systems

At the end of this course, students will be able to explain the concepts related to embedded systems and architecture of microcontrollers. They will get familiarized with serial bus standards and will be able to design systems for common applications like general I/O, counters, PWM motor control, data acquisition etc. They will be able to demonstrate knowledge of the development tools for a microcontroller, and write assembly language code according to specifications

Paper Title: Dissertation/Project Work

At the end of the project students would be able to survey and study the published literature on the assigned topic. They will be working out a preliminary Approach to the Problem relating to the assigned topic and Conducting preliminary Analysis/ Modelling/ Simulation/ Experiment/ Design/ Feasibility. They will be able to prepare a Written Report on the Study conducted for presentation to the Department Final Seminar, as oral Presentation before a departmental committee.

Skill Enhancement Course (SEC)

Paper Title: Mobile Application Programming

At the end of this course, students would be able to explain the concepts on: Elements of user interface, Model-View-Controller architecture, Data persistence and storage, Multithreading, Mobile web vs. mobile app, Services, broadcasts and notifications, Sensor management and location-based services. They will be able to describe different mobile application models/architectures and patterns. They will be able to describe the components and structure of a mobile development framework (Google's Android Studio) and would be able to apply a mobile development framework in the development of a mobile application.

Paper Title: Programming with LabVIEW

At the end of this course, students will learn the concepts of Virtual Instrumentation and Graphical user interface and will be able to operate LabVIEW to design Virtual instruments They will be able to Develop, debug, and test LabVIEW VI's for specific applications.

Paper Title: Design and Fabrication of Printed Circuit Boards

At the end of this course, students will get familiar with the type of devices/components that may be mounted on PCB. They will be able to understand the PCB layout techniques for

optimized component density and power saving. They will be able to perform design and printing of PCB with the help of various image transfer and soldering techniques and will be able to understand the trends in the current PCB industry.

Paper Title: Robotics

At the end of this course, students will be able to familiarize with the programming environments used in robotics applications. They will be able to understand the working of sensors, actuators and other components used in design and implementation of robotics. They will be able to design timer/counter circuits and display their outputs using LCD and other indicator devices and will be able to understand the communication standards like RS232 etc.

Paper Title: Internet and Java Programming

At the end of this course, Students will be able to describe the various aspects of internet technologies, java programming. They will get familiar with data type, data operators, exception handling and file management and will be able to use Java Applets.

Paper Title: Artificial Intelligence

After taking this course the student would be able to understand an AI paradigm and develop search solutions and games. Python Programming is used as it is simple to understand. Students can develop programs using different agents under different environment.

Paper Title: Internet of Things

At the end of this course, Students will be able to understand internet of Things and its hardware and software components They will be able to understand Interface I/O devices, sensors & communication modules .They will be able to Remotely monitor data and control devices and will able to develop real life IoT based projects

Paper Title: Data Sciences

At the end of this course, Students would understand the mathematical foundations needed for data science and will be able to collect, explore, clean, munge and manipulate data. They will be able to implement models such as k-nearest neighbours, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering and will be able to build data science applications using Python based toolkits.

Paper Title: Cyber Security

At the end of this course, Students would be able to understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information. They will be able to identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios

and will also be able to identify common trade-offs and compromises that are made in the design and development process of Information Systems. They will be able to demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.

Paper Title: 3D Printing and Design

At the end of this course, Students would be able to develop CAD models for 3D printing and Import and Export CAD data and generate .stl files. They will be able to select a specific material for the given application. They will be able to select a 3D printing process for an application, produce a product using 3D Printing or Additive Manufacturing (AM).

Paper Title: Virtual Reality

At the end of this course, Students will be able to understand geometric modelling and Virtual environment. They will be able to understand about Virtual Hardware and Software and will able to develop Virtual Reality applications

Generic Elective: For students of courses other than B.Sc. (Hons) : Electronics

Paper Title : Artificial Intelligence

Students will learn to build intelligent agents for search and games, Solve AI problems through programming with Python, Learning optimization and inference algorithms for model learning. They would also learn to Design and develop programs for an agent to learn and act in a structured environment

Paper Title : Internet of Things

Understand internet of Things and its hardware and software components. They would learn to Interface I/O devices, sensors & communication modules, remotely monitor data and control devices and Develop real life IoT based projects.

Paper Title : Data Science

Demonstrate understanding of the mathematical foundations needed for data science. They would learn to Collect, explore, clean, munge and manipulate data and Implement models such as k-nearest Neighbours, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering. They would also learn to build data science applications using Python based toolkits.

9. COURSE : B.SC (HONS) ENGLISH

Department : ENGLISH

1) CORE 1 - INDIAN CLASSICAL LITERATURE

The paper introduces students to a rich and diverse literature from two classical languages of India, Sanskrit and Tamil. A key feature is the study 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. The paper lays a foundation in Indian poetics, theories of representation, aesthetics, aspects of Indian theatre, and traditions of story-telling and narrative structures. Optional papers on Indian literature in subsequent semesters will reinforce the centrality of this paper in providing an understanding of key concepts related to the form and content of Indian literatures.

2) CORE 2- EUROPEAN CLASSICAL LITERATURE

This course provides a humanist foundation to English studies, to be considered essential reading. It enables an exploration of 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. The paper offers a wide-ranging perspective on the aesthetic, philosophical, and social concerns of classical literature. It introduces students to 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.

3) CORE 3 - INDIAN WRITING IN ENGLISH

This course aims to 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.

4) CORE 4 - BRITISH POETRY AND DRAMA:14TH-17TH CENTURY

This paper is the first Core British literature paper out of a cluster of six, and initiates the student into the earliest writings in England from medieval literature through the Renaissance. The first unit of the paper on British literature begins with Chaucer'sGeneral Prologue', which is taught in Middle English. It introduces students to *Canterbury Tales* and helps them recognize its narrative complexity and structure. The second unit on the Renaissance poetry explores the form and innovation in content in the Elizabethan sonnet tradition and the metaphysical poetry underlining a critical engagement with the Petrarchan tradition. The two plays, Marlowe's *Dr. Faustus* as a tragedy on Renaissance man and *Twelfth Night* as a Shakespearean comedy enable a focus on drama as a significant genre in the Renaissance. The prose readings establish the European context for the Renaissance and offer readings crucial to understanding the sociocultural and religious aspects of the age.

5) CORE5 - AMERICAN LITERATURE

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.

6) CORE 6 - POPULAR LITERATURE

The paper will trace the emergence of a mass printing culture from the nineteenth century onwards, and the rise of genres such as Literature for Children, Detective Fiction, Science Fiction, and Graphic Fiction. The course introduces students to the idea of popular literature‘ and stresses its importance within modern culture. It familiarises students with the debate between high‘ and low‘ culture, and the tension between what is studied a canonical‘ texts and other texts. Students will also engage with issues concerning print culture, bestsellers, and popular literature in other media.

7) CORE7 - BRITISH POETRY AND DRAMA: 17TH & 18TH CENTURY

The paper explores the British Literature in the 17th Century with its varied genres, the historical ruptures and the intellectual debates of the time. It begins with Shakespeare‘s tragedy *Macbeth,* exploring the issues of succession and individualism pertinent to the Jacobean age. Milton‘s significant portrayal of Satan in Book 1 of *Paradise Lost* has influenced imaginative writing on the idea of evil thereafter. Aemilia Lanyer was the first secular woman poet to be published professionally. The prescribed poem offers a perspective on Eve on the fall of Man. Aphra Behn, currently one of the most popularly studied writers of the Restoration, offers an opportunity to discuss the paradox of Tory conservatism and the woman‘s question in Restoration stage. Pope‘s *The Rape of the Lock* extends the mock epic tradition to the early 18thC as a representative of the neoclassical aesthetics. The readings enable a wide philosophical and political understanding of the period.

`8) CORE 8 - BRITISH LITERATURE: 18TH CENTURY

This is a survey course covering a variety of genres in eighteenth-century England, including both canonical and new writings within a history of ideas. It is designed to represent a comprehensive study of texts both in the Augustan period and in the later eighteenth century, often called the age of sensibility. The first unit *The Way of the World* by William Congreve portrays the shift from the libertine sensibility to the culture of politeness at the turn of the century. The course includes the major canonical authors of the early eighteenth century— Swift and Johnson—with some of their representative texts, as well as writers who have received considerable recent scholarship like Daniel Defoe and Eliza Haywood. The latter half of the century is marked by the emerging genre of the novel and Fielding‘s first novel *Joseph Andrews* included here, is considered by many to be one of the earliest English novels. The paper includes non-fictional genres that were dominant in the age like the periodical essay and the public letter. The intellectual context includes Locke‘s treatise on empiricism and William Hay‘s observations on deformity. An excerpt from one of the

earliest slave autobiographies at the end of the century helps to contextualize Britain in a global world and the debates on the abolition of the slave trade.

9) CORE 9 - BRITISH ROMANTIC LITERATURE

This course aims to introduce students to the Romantic period in English literature, a period of lasting importance, since it serves as a critical link between the Enlightenment and Modernist literature; offer a selection of canonical poems and prose that constitute the core texts of the Romantic period; introduce marginal voices that were historically excluded from the canon of British Romantic writers; and provide an introduction to important French and German philosophers who influence the British Romantic writers.

10) CORE 10 - BRITISH LITERATURE: 19TH CENTURY

This course aims to introduce students to the Victorian Age in English literature through a selection of novels and poems that exemplify some of the central formal and thematic concerns of the period; focus on three novels, a major genre of the nineteenth century, so as to show both the formal development of the genre as well as its diverse transactions with the major socio-historic developments of the period; and introduce the students, through the readings in Unit 5, to the main intellectual currents of the period.

11) CORE 11 - WOMEN'S WRITING

This paper focuses on writings by women, about women. Since women are always defined in relation to men in a structurally patriarchal society, women writing about their experiences and identities are almost always writing about their community, since they do not have the privilege to write about themselves as individuals inhabiting a certain position in society. This paper focuses on those stories, poems, plays, novels, autobiographies, and theoretical writings that most clearly articulate the struggle to define experiences, and challenge patriarchal constructs. The texts in this paper focus on gender and sexuality as related to women, their bodies, their desires, and their aspirations. However, women do not form a homogenous group and their oppressions and acts of resistance need to be understood in all their complexities. Therefore, the intersectionality of the position of womanhood with caste, class, race, disability, education, slavery, etc., need to be studied with attention to the socio- economic historical location.

12) CORE 12 - BRITISH LITERATURE: THE EARLY 20TH CENTURY

This course aims to introduce students to the Romantic period in English literature, a period of lasting importance, since it serves as a critical link between the Enlightenment and Modernist literature; offer a selection of canonical poems and prose that constitute the core texts of the Romantic period; introduce marginal voices that were historically excluded from the canon of British Romantic writers; and provide an introduction to important French and German philosophers who influence the British Romantic writers.

10) CORE 10 - BRITISH LITERATURE: 19TH CENTURY

This course aims to introduce students to the Victorian Age in English literature through a selection of novels and poems that exemplify some of the central formal and thematic concerns of the period; focus on three novels, a major genre of the nineteenth century, so as to show both the formal development of the genre as well as its diverse transactions with the major socio-historic developments of the period; and introduce the students, through the readings in Unit 5, to the main intellectual currents of the period.

11) CORE 11 - WOMEN'S WRITING

This paper focuses on writings by women, about women. Since women are always defined in relation to men in a structurally patriarchal society, women writing about their experiences and identities are almost always writing about their community, since they do not have the privilege to write about themselves as individuals inhabiting a certain position in society. This paper focuses on those stories, poems, plays, novels, autobiographies, and theoretical writings that most clearly articulate the struggle to define experiences, and challenge patriarchal constructs. The texts in this paper focus on gender and sexuality as related to women, their bodies, their desires, and their aspirations. However, women do not form a homogenous group and their oppressions and acts of resistance need to be understood in all their complexities. Therefore, the intersectionality of the position of womanhood with caste, class, race, disability, education, slavery, etc., need to be studied with attention to the socio- economic historical location.

12) CORE 12 - BRITISH LITERATURE: THE EARLY 20TH CENTURY

This course aims to develop an understanding among students of the various forms of critique of modernity that evolved in England (and Europe) in the course of the 20th century; help students comprehend the path-breaking and avant-garde forms of literary expression and their departures from earlier forms of representations; facilitate an understanding of the impact of the two world wars on literary expression and the various political/ideological positions of the European intelligentsia vis-à-vis the phenomenon; and create an awareness of new disciplines/areas of inquiry that decisively influenced European art and literature in the 20th century.

13) CORE 13 - MODERN EUROPEAN DRAMA

This is a genre-based and performance-oriented paper. It provides an overview of formative theatrical movements in Europe. The plays included focus on innovative performance trends that began at the end of the nineteenth century and evolved into diverse forms in the twentieth century. Some of these are naturalism, expressionism, epic theatre and the theatre of the absurd. The impact of these new directions radiated across the globe and gave a new impetus to drama in the twentieth century. A deep engagement of theatre with important social issues of the time was central to these developments. The course focuses on the work of significant European playwrights from the late nineteenth century to the late twentieth century; a span of almost a century has been covered.

The lived lives of people had a direct bearing with their representation on stage. At the level of performance, the shift from the naturalistic set-up to the more flexible epic theatre can be observed through these texts. Courses on Modern European Drama have generally been

marked by a lack of women's voices. The presence of Franca Rame's Rape' along with Dario Fo's Can't Pay, Won't Pay enables a gendered perspective more grounded in the realities of the time.

14) CORE 14 - POSTCOLONIAL LITERATURES

The paper aims to introduce the students to postcolonial theorisations and texts from hitherto colonized regions; demonstrate an awareness of the postcolonial situation through the reading of a wide variety of texts; familiarize students with of the variety of postcolonial literatures from Africa, Latin America and South Asia and to counter the stereotypes usually associated with assumptions regarding these literatures; inculcate adequate knowledge of the importance of gender, class, and caste issues in postcolonial literatures; and expose students to various genres of writing: the novel, drama, short stories, prose writings, critical essays and poetry.

15) DSE2 - LITERARY CRITICISM AND THEORY - I

This is the first of two papers dealing with literary criticism and theory as a discipline within literary studies in the European tradition. It is crucial to the understanding of the interface between the history of ideas and the literary texts that are studied in the Core Curriculum. The paper covers a large historical span from the Classical Greco-Roman tradition to New Criticism and Russian Formalism in the twentieth century. In the process, it traverses key moments in the emergence of aesthetic theory in Europe including British Neoclassicism German Romanticism and the Nineteenth Century. The paper aims to introduce students to important excerpts from a wide range of literary theorists and philosophers whose works intervene in specific ways with the idea of literary representation and aesthetic theory. Each unit explores a particular set of inter-related themes raising various connections between the theoretical questions.

16) DSE8 - MODERN INDIAN WRITING IN ENGLISH TRANSLATION

This paper aims to give students a glimpse of the vast diversity of modern Indian writing in bhasha traditions; show students the polyphonic tumultous richness of the 19^{th} and 20^{th} centuries, from peasant life in colonial India in Fakir Mohan Senapati's novel to the mythical reality of O.V. Vijayan's novel, from the reworking of a Mahabharata story in Girish Karnad's play to the myriad life-worlds of the poems and stories; and encourage, through the carefully selected poems, stories and prose selections, a deeper engagement with and a nuanced discussion of issues of history, memory, caste, gender and resistance

17) DSE9 - NINETEENTH CENTURY EUROPEAN REALISM

This course aims to acquaint the student with realism as an historically and culturally specific mode of representation, obtainable from the study of novels in nineteenth-century Europe ; allow the student an opportunity to see critical connections between nineteenth-century European aesthetics, and epistemological and political debates around reality and historical change; and offer a wider comparatist perspective on the emergence of the novel as the dominant genre of literary expression in nineteenth-century Europe.

18) DSE 13 - LITERARY CRITICISM AND THEORY — 2

The course aims to expose students to the history of ideas in the twentieth century and the material and discursive conditions of intellectual production; encourage students to grapple with literary studies, from a privileging of form to an interdisciplinary engagement with the literary text; help students develop a critical wherewithal which would enable them to engage with a literary text from multiple pedagogical entry-points; and have students closely examine the methods of argument and rhetorical constructions through which important theoretical ideas and concepts have been established and made to impact the field of cultural production in the West.

19) DSE14 - LITERATURE AND CINEMA

This course aims to examine the close relationship between literature and cinema by studying the points of contact of literary and cinematic praxis; enable students to study cinema as a composite medium, since the texts under discussion will open space for examining cinema as audio-visual articulation, as adaptation/translation, and as a form of (popular) culture with its own parameters of reception and its own history (movements/frameworks of study); equip students in a practical sense for understanding the cinematic medium; examine cinema as an art employing different time frames, situations, literary cultures and other media/forms to compose itself as a text; provide students with texts in emerging media, thus broadening the field of literary study in relation to cinematic language; stress the interdisciplinary nature of academic work by imparting skills of reading and understanding literary texts and cinematic expressions through the development of relevant critical vocabulary and perspective among students; and provide a theoretical framework to strengthen the awareness about intertextuality and the convergence between the modes of literature and cinema.

20) DSE16 - PARTITION LITERATURE

This paper aims to enable an understanding of the affective dimensions of the Partition in varied geopolitical spaces; aid the student in comprehending the country's postcolonial realities; and introduce students to the following topics through the study of literary texts: colonialism, nationalisms and the Partition of India in 1947, communalism, violence and the British Rule in India, homelessness, exile and migration, women and children in the Partition, refugees, rehabilitation and resettlement, borders and borderlands.

SEC COURSE FOR ENGLISH HONS.-

21) SEC 3 - LITERATURE IN CROSS CULTURAL ENCOUNTERS

This course aims to help students develop skills of textual and cultural analysis; develop insights into and interpretations of complex cultural positions and identities; and pay specific attention to the use of language and choice of form/genre that affects the production and reception of meaning between writers and readers.

COMPULSORY PAPER IN ENGLISH - AECC

Effective communication is an essential skill for success in any sphere of activity, from leadership responsibilities, teamwork, interviews, presentations, and inter-personal relations. This is a skill that needs to be taught in a systematic manner so that students imbibe the fundamentals of communication. The art of persuasive speaking and writing depends crucially on clarity of thought and contextual understanding expressed through appropriate vocabulary.

The ability to think critically is crucial for a good communicator and involves an understanding of the communicative process. Therefore, we need to study every stage of this process systematically in order to be much more effective at communicating successfully -- in interviews, public speaking, letter writing, report writing, presentations, and inter-personal debates and conversations.

Learning Outcomes

o Students will master the art of persuasive speech and writing.
o Students will master the art of listening, reading, and analyzing. Students will spend

the bulk of their time in class in practical exercises of reading and writing.
o Students will develop critical thinking skills.
o They will be introduced to established principles of academic reading and writing.

COURSES FOR OTHER HONS./ NON-ENGLISH HONS.- GE PAPERS

1) THE INDIVIDUAL AND SOCIETY

This anthology introduces students to the various issues that face society today – caste, class, race, gender violence, and globalization. It serves as an effective entry point to an understanding of these areas that students will encounter in their higher studies and daily lives, and aims to provide them with a holistic understanding of these issues and their complexities.

2) MARGINALITIES IN INDIAN WRITING

This paper intends to make undergraduate students approach literature through the lens of varied identity positions and evolve in them a fresh critical perspective for reading literary representations; enable them to explore various forms of literary representations of marginalisation as well as writing from outside what is the generally familiar terrain of Indian writing in schools; make them aware of the different ways in which literary narratives are shaped, especially since some of the texts draw on traditions of the oral mythic folk and the form of life-narrative as stylistics; make them understand how literature is used also to negotiate and interrogate this hegemony; and evolve an alternative conception of corporeal and subjective difference.

3) CONTEMPORARY INDIA: WOMEN & EMPOWERMENT

This course engages with contemporary representations of women femininities, gender-parity and power. The course aims to help students from non-English literature backgrounds to develop a robust understanding of how discourses of gender underlie and shape our very

lives, experiences, emotions and choices. The course exposes students to a broad range of literary and textual materials from various historical periods and contexts, so that they are able to examine the socially-constructed nature of gendering. Through the analysis of literary texts humanities and social sciences scholarship students will develop a nuanced understanding of how to perceive, read, understand, interpret and intervene ethically in debates on the subject.

4) READINGS ON INDIAN DIVERSITIES AND LITERARY MOVEMENTS

This course seeks to equip students with an overview of the development of literatures in India and its wide linguistic diversity. Students will study authors and movements from different regions and time periods.

COURSES FOR NON-HONS.

1) ENGLISH LANGUAGE THROUGH LITEARTURE- ELTL

This course aims to develop in students the ability and confidence to process understand and examine different kinds of texts - verbal and written - that they encounter in everyday life ; enable students to identify and understand social contexts and ethical frameworks in the texts they encounter ; encourage suitable research; to recognize sources; to distinguish fact from opinion/editorialization; produce objective versus subjective pieces ;teach skilled comprehension; listening/reading; skimming; summarising; précis writing; paraphrasing; note making ; identify key topics/arguments/ideas ; accomplish writing goals: creating an essay; writing a thesis statement; producing topic sentences; developing organised paragraphs; evolving the skill of producing suitable transitions between paragraphs ; enable students to write in expository argumentative and descriptive modes ; help students identify and use the characteristic features of various writing forms: letters programmes reports/press-releases; newspaper hard news; feature articles; fiction and nonfiction ; enable students to choose between expository argumentative descriptive and narrative writing styles to assemble their own writing ; inculcate confident expression: to enable students to articulate their own views confidently because their language skills sufficiently empower them to converse research and collate information from various textual sources be these verbal or written.

2) ENGLISH FLUENCY

This course is intended for students who possess basic grammatical and vocabulary skills in English but may not be able to effectively communicate in their everyday contexts The course aims to equip them with skills that will help them interact with people around their personal institutional and social spaces The course will help students to describe or express their opinions on topics of personal interest such as their experiences of events, their hopes and ambitions. They would read and understand information on topical matters and explain the advantages and disadvantages of a situation ; write formal letters, personal notes, blogs, reports, and texts on familiar matters comprehend and analyse texts in English & organise and write paragraphs and a short essays in a variety of rhetorical styles.

3) ENGLISH PROFICIENCY

The English Proficiency course is intended for students who have had inadequate exposure to English and hence exhibit a very low level of proficiency in the language – difficulty in comprehending simple texts, limited vocabulary, a poor grasp of basic syntactical structures, and an inability to speak or write the language with confidence. The course that is spread over two semesters aims to redress these issues and aims to enhance comprehension skills and enrich vocabulary through the reading of short and simple passages with suitable tasks built around these ; introduce simple syntactical structures and basic grammar to students through contextualized settings and ample practice exercises so that they can engage in short independent compositions; introduce the sounds of the language and the essentials of English pronunciation to students in order to remove the inhibitions experienced by them while speaking English ;acquaint students with social formulae used to perform various everyday functions so that ; they can converse in English in simple situations.

DISCIPLINE ENGLISH - OVER 6 SEMESTERS

The course offers the BA Programme student an opportunity to study three years of English Discipline papers that enable them to go for further studies in English if they so desire. The course attributes to the students a working knowledge of how to read literary texts and enables them to use such knowledge to enhance and augment their professional job opportunities . The course introduces students to contemporary literary ideas and issues in an increasingly complex world. The course allows the student a familiarity with literary texts through different genres and time periods.

SEC -

1) MODES OF CREATIVE WRITING - POETRY, FICTION AND DRAMA

Through this course, students will be introduced to a variety of tropes and figures of speech, and sensitised to the texture of literary language; understand the importance of reading with a view to unlocking the writers' craft; be introduced to various forms of poetry, fiction and drama and the wide range of possible genres within them; be made aware of the range of career opportunities that exist within the field of creative writing as well as within the realm of theatre and performance; and be encouraged to revise their work critically and inculcate the skills of editing and preparing their work for publication.

2) TRANSLATION STUDIES

Through the study of this course the student will develop the ability to sensitively translate literary and non-literary texts including official and technical documents from one language to another; interpret from one language to another; examine what is translated and why; discern the difference in language systems through the practice of translation; understand the processes involved in translation in mass media, especially news reporting, advertising and films; engage with the demands of subtitling and dubbing; compare translations; evaluate and assess translated texts; and edit translated texts.

3) INTRODUCTION TO CREATIVE WRITING FOR MEDIA

This course aims to introduce students to the idea that creativity is a complex and varied phenomenon that has an important relationship with social change; familiarize students

with ideas about language varieties and the nuances of language usage; introduce students to the language and types of media writing across forms and genres; and encourage students to revise their work critically and inculcate the skills of proofreading.

10. COURSE : B.A (HONS) HINDI

इस पायम को पढ़ने- पढ़ानेक दशा मिननिलखत परणाम सामनेआएंगे :-

1) इस पायम के मायम सेसीखने-िसखानेक या महंद भाषा के आरंिभक तर सेअब तक के बदलतेप क वततृ जानकार ा क जा सकेगी ।

2) भाषा के सा ै ंितक प के साथ साथ यावहारक प को भी जाना जा सकेगा ।

3) उच शक ै तर पर हंद भाषा कस कार महवपणू भिमका ू िनभा सकती है, इससेसंबंिधत परणाम को ा कया जा सकेगा ।

4) छा अपनी भाषा को सीखनेक या मभाषागत मय ू को यावहारक प सेभी जान सकगे।

5) यावसाियक मता को बढ़ावा देनेके िलए भाषा, अनवाद ु , कयटरू जसै ेवषय को हद सेजोड़कर पढ़ाना जससेबाज़ार के िलए आवयक योयता का भी वकास कया जा सके|

6) हंद के अितर भारतीय साहय का ान भी अपेत रहेगा जो छा के यव वकास मसहायक होगा तथा अिभय मता का वकास भी कया जा सकेगा ।

7) साहय के सौदय, कला बोध के साथ वचारक ै मय ू को बढ़ावा देना |

8) साहय क वधाओं के मायम सेवाथ क रचनामकता को दशा देना | कवता, कहानी और नाटक जसी ै वधाओं ारा वाथ क रचनामकता को ोसाहत करना |

9) साहय के आदकालीन सदभ सेलेकर समकालीन प सेपरिचत कराना जससेवाथ साहयकार और यगबोध ु के सबध को परख और पहचान सके|

10) साहय ववेक का िनमाण

11. COURSE : B.A (HONS) HISTORY

Graduates of this department are expected to branch out into different paths seeking spheres of knowledge and domains of professional work that they find fulfilling. After graduating with History Honours from the University of Delhi, they will be able to demonstrate comprehensive knowledge of scholarly research and professional literature relating to the discipline. This will establish a platform from which the student can pursue higher studies in History. It is expected that besides the skills specific to the discipline, these wider life skills of argumentation and communication, attitudes and temperaments, and

general values inherent in a discipline that studies human beings in their social context, in all its complexity, will ultimately enable learners to live rich, productive and meaningful lives.

The list below provides a synoptic overview of possible career paths provided by the undergraduate training in history from the University of Delhi:

- Teaching
- Research
- Politics
- Journalism
- Media
- Performing Arts
- International Relations
- Administration
- Social Work
- Law
- Management
- Policy Making
- Human Resource Development

12.COURSE : B.SC (LIFE SCIENCES)

Program Outcomes (PO)

PO1: The program covers a wide range of basic and applied aspects of Botany, Zoology and Chemistry courses as well as courses of interdisciplinary nature. The core courses that are a part of the program are designed to build knowledge base in the student, and furthermore, will acquaint the students with the applied aspects of this fascinating discipline as well.

PO2: Provide expertise which will help them gain competitive advantage in pursuing higher studies from India and abroad or seek jobs in academia, research, or industries. Also, the program will help the students apply the skills learnt in the Program to solving practical societal problems.

PO3: Help acquire practical skills in biological sciences, biochemistry, biotechnology, and chemical sciences that can be used in pursuing career as a scientist in pharmaceutical industry, research laboratories. Students will be gaining basic experimental skills in genetics, biotechnology, qualitative and quantitative microscopy, and enzymology that will give them an edge to pursue higher studies in diverse fields.

PO4: Learn 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 in Chemical Science.

PO5: Students will appreciate the biological diversity of plant and animals and compounds in them to be able to describe/explain the processes used by microorganisms for their

replication, survival, and interaction with their environment, hosts, and host populations. They will become aware of the key role of plant and animals in ecosystem functioning.

PO6: Provide requisite knowledge of laboratory safety, data replication and quality control, record keeping and other aspects of "responsible conduct of research".

PO7: Ability to employ modern library search tools to locate and retrieve primary literature on a topic and critically evaluate the literature.

PO8: Students will develop proficiency in the quantitative skills necessary to analyze biological problems (e.g., arithmetic, algebra, and statistical methods as applied to biology)

PO9: Students will develop strong oral and written communication skills through the effective presentation of experimental results as well as through seminars.

PO10: The program will help create ethical awareness in the students. They will learn to avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, as well as appreciate the environmental and sustainability issues.

Program Specific Outcomes (PSO)

- Gain disciplinary and comprehensive basic knowledge of major concepts, theoretical principles and experimental findings in life sciences and chemical sciences and its different subfields including biodiversity, physiology, biochemistry, biotechnology, genetics, evolutionary biology, and immunology and some of the other applied areas of study such as wildlife conservation and management, apiculture, sericulture, aquatic biology, etc.
- To provide interdisciplinary knowledge of allied biological sciences, environmental sciences and chemical science. The program will help students in learning various techniques and computational software used for analysis of animal's forms and functions.
- The skill enhancement courses will help the students gain skills in rearing fish, bees, and silk moth for generating self-employment. Students can acquire expertise to join clinical and research laboratories for diagnostic assays, hematology, histopathology, staining procedures etc. They will be able to examine and assess some basic physiological functions and interpret physiological charts.
- To enable students to understand and appreciate the relevance of Microbes and Plants to environment (ecological significance) and human well-being (economic importance). The students will develop an understanding of evolution of Plant forms and the consequent biodiversity. These are instrumental in creating awareness on the threats to biodiversity and sensitize students towards the Conservation of Biodiversity for sustainable development.

Course Outcomes:

Core Courses

LS Core I: Animal Diversity

The main purpose of introducing this course is to teach the students the Morpho-taxonomy, and evolutionary relationships among and between non-chordates and chordates along with creating awareness and concern towards importance of animal diversity for human survival and its socioeconomic significance. In addition to this, the course is aimed at nurturing skills of conducting scientific inquiry and experimentation in the field of animal diversity to acquire knowledge of fundamental concepts and theories of animal diversity. The course will help students understand the economic importance of non-chordates and chordates and their significance in the ecosystem.

LS Core II: Comparative Anatomy and Developmental Biology of Vertebrates

The course offers a complete understanding about anatomy of vertebrate animals. It educates the students regarding derivatives of integuments, skeletal system and visceral arches, anatomy of digestive system and associated glands, different respiratory organs, urinogenital organs, components of nervous system and receptors in vertebrates. Thorough understanding of essential and evolutionary aspects of comparative anatomy will be developed through pictorial presentation of different anatomical details. The course will also provide a glimpse of scope and historical background of developmental biology to the students, impart knowledge regarding basic concepts of differentiation, morphogenesis and pattern formation and insight into IVF, stem cells and cloning. It will provide detailed understanding of essential events of developmental biology through proper explanation of gametogenesis, and stages of embryonic development and fetal formation.

LS Core III: Physiology and Biochemistry

The study of physiology is the study of the internal working of organisms; how organs and systems within the body work, communicate and integrate their efforts to make conditions favorable for survival. The study of biochemistry explains how inanimate constituents of living organisms i.e., the biomolecules interact to maintain and perpetuate life. The students after their school have an elementary knowledge with respect to structure, function, and metabolism in human body. The present course aims to expand their knowledge with respect to functioning of various organ systems such as muscular, nervous, digestive, circulatory, respiratory, excretory, reproductive, and endocrine in humans. The biochemistry portion is designed in a way to help the student understand fundamental metabolic pathways and their coordinated regulation in the body.

LS Core IV: Genetics and Evolutionary Biology

The focus of first half of this course is to familiarize students with basic principles of genetics and its application in understanding of real-life hereditary conditions. The second half of the course aims at imparting fundamental understanding of evolutionary processes and how it works in context of populations. Students would be able to understand the fundamentals of Mendelian inheritance and its exceptions. 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. This will 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 appreciate the contribution of fossil studies in evolution and the phylogeny of horse. This will help the students learn how to calculate the gene and allele frequency using Hardy-Weinberg law and analyze population genetics problems.

Discipline Specific Elective

LS DSE-1: Reproductive Biology

The foremost aim of a living being on this planet is to reproduce so that their species can flourish. Reproductive system is an intricate physiological system of the body and has been extensively studied in mammals. The students will learn and understand the intriguing working and regulation of reproductive system that would be useful to address the effect of modern day's stressful life on infertility issues both in males and females. The design of the course is to understand the anatomy and functional histology of male and female reproductive systems, their cycles, and regulations. The course intends to impart the basic knowledge of male and female reproductive systems with close reference to human being.

LS DSE 2: Wildlife Conservation and Management

This DSE course on Wildlife Conservation and Management is designed to acquaint students with varied aspects of wildlife conservation, including its importance, major threats, management of their habitats and populations. The emphasis will be on developing interest and invoking a sense of responsibility among students towards wildlife conservation. The course also explores different techniques, perspectives, and approaches to both identify and achieve wildlife management goals. This course will motivate students to pursue career in the field of wildlife conservation and management.

LS DSE 3: Animal Biotechnology

Biotechnology is the advanced branch of biological sciences which mostly deals with technologies that use living organisms or their components to produce products for specific use. The present paper attempts to give a wholesome idea of biotechnology at a basic level. It provides a tool kit in the form of several techniques and processes developed over time to solve problems involving primarily human welfare with focus on health and medicine. It will make the students gain awareness about the scope of this field which encompasses every field of science like engineering, research, commercialization, and academics. It will equip students with basic techniques of biotechnology that are necessary for everyone interested in pursuing a career in biotechnology. This paper also attempts to illustrate the role of biotechnology by giving common examples as to how to use these tools to solve a specific problem in either of medicine, agriculture, or food technology.

LS DSE 4: Immunology

This course will help the students gain knowledge about basic concepts of immunology. The students will study hematopoiesis to know the concepts of stem cells and their

differentiation into progenitor stem cells and adult lineages. They will learn the concepts of innate and acquired immunity and understand adaptive immune responses and sequential phases-antigen recognition by lymphocytes, their proliferation, differentiation into effector and memory cells and elimination of pathogens. This course will help the students learn about major histocompatibility complex and their role in transplantation immunity and autoimmunity. It will encourage the students to know and understand the basic immunological aspects to comprehend the newer strategies in vaccine design, and efforts to treat autoimmunity, hypersensitivity, and immunodeficiency.

LS DSE 5: Applied Zoology

Applied zoology paper aims to enable the students to learn different practical beneficial of zoology. It explores the students to the biology of human parasites, their transmission and method to control them. An insight into Agricultural Pests and medically important insect vector is provided and methods to manage them. The beneficial aspects and management of Diary Technology, Poultry Farming and Aquaculture is to be explored. After completing this Course, the students will be able to contribute towards resolving serious issues pertaining to Parasitology, Protozoology, Helminthology, and Entomology (especially with respect to increase in requirement for expert resource persons for containing the alarming rise in mosquito-borne diseases; Dengue and Chikungunya in Delhi). The students will learn about Animal Husbandry, Poultry farming, Fish farming and, after thorough practical training skills pertaining to the commercial aspects of these studies, the students would emerge as successful entrepreneurs and establish their research enterprise and later, generate employment as well

Skill Enhancement Courses

LS SEC 1: Apiculture

The course will make the student aware about the significance of beekeeping as the economically viable industry. It will help the students to understand the biology and behavior of bees. The course would clarify the techniques of honey bee rearing, optimization of techniques based on climate and the geographical regions, and various measures to be taken to maximize the benefits. It would also help the students to develop entrepreneurial skills required for self-employment in beekeeping sector. Upon completion of the course, students should be able to learn about the various species of honey bees in India, their social organization and importance. They will become aware about the opportunities and employment in apiculture – in public, private and government sector. The students will gain thorough knowledge about the techniques involved in bee keeping and honey production. It will develop entrepreneurial skills necessary for self-employment in beekeeping sector.

LS SEC 2: Aquarium Fish Keeping

The course will impart basic knowledge of ornamental fish Industry and inculcate its scope as an avenue for career development in Entrepreneurship or as an Aquariculturist. It will provide a clear understanding on the basics of habits and biology of aquarium fishes to

facilitate taking up ornamental fish keeping even at a household level. The skill capacity building of students will be promoted by teaching the techniques of aquarium constructions, feed formulation and preparation, transportation, maintenance, and management of the system. The students will have first hands-on experience by exposure to technology, production, functioning or operation of an institution through visits to public aquariums in the markets, ornamental fish farms, hatcheries, and fish feed production plant as study tours or field visits. Upon completion of the course, students should be able to acquire knowledge about various kinds of fishes, their compatibility in aquarium. They will become aware of Aquarium as commercial, decorative and of scientific studies and develop personal skills on maintenance of aquarium.

LS SEC 3: Medical Diagnostics

Medical diagnostics paper is aimed to provide students a unique opportunity to study how doctors or clinicians conclude regarding disease prediction, prevention, diagnosis, and optimal treatment regimens. Students will learn about multiple diagnostic tools, techniques and technologies use in medical practices. The emphasis is on how to select an appropriate diagnostic technique, methods, and technologies to conduct analyses to understand the results and their implications in patient diagnosis. The medical diagnostic paper is primarily focused on, clinical chemistry, hematology, diagnostic microbiology, histopathology, molecular diagnostics, and diagnostic medical imaging. After completing this course, the students should be able to gain knowledge about various infectious, non-infectious and lifestyle diseases, tumors, and their diagnosis. This will help the students understand the use of histology and biochemistry of clinical diagnostics and learn about the molecular diagnostic tools and their relation to precision medicine. They will develop their skills in diverse types of tests and staining procedure involved in hematology, clinical biochemistry and will know the basics of instrument handling.

LS SEC 4: Public Health and Hygiene

This course is multidisciplinary in nature and focusses on imparting the basic concepts of Environmental science, as well as it gives a deep insight into the factors causing environmental degradation and its outcome in form of increasing number of diseases leading to deterioration of public health. Upon completion of the course, students will get familiarized with various aspects of environmental risks and hazards. This course will help them get sensitize about the climate change due to human activities. The students will become aware of the various impacts of environmental degradation on human health through case studies and modes of prevention. • they will learn about the nuclear and chemical disasters and their aftereffects through cases studies. They will be encouraged to Kkow about the various waste management technologies and their utility.

LS SEC 5: Sericulture

The course will make the student aware about the significance of sericulture as the profit-making enterprise. It will help the students to understand the biology of silkworms and its nutritional requirement to secrete quality silk. The course would clarify the techniques of silkworm rearing, reeling of silk and various measures to be taken to maximize the benefits.

It would also help the students to know about various uses of silk and develop entrepreneurial skills required for self-employment in sericulture and silk production sector. The students will learn about the history of sericulture and silk route. They would learn to recognize various species of silk moths in India, and Exotic and indigenous races. It will make them aware about the opportunities and employment in sericulture industry – in public, private and government sector. The course will help the students gain thorough knowledge about the techniques involved in silkworm rearing and silk reeling. It will encourage the students to develop entrepreneurial skills necessary for self-employment in mulberry and seed production and be apprised about practicing sericulture as a profit-making enterprise.

LS SEC 6: Environmental Audit

This course will help the students develop the appropriate documentation for an environmental impact statement and respond appropriately to an environment audit or environmental management system. It aims to provide students with information related to obtaining competencies for environmental auditing and how the environmental commitments by industry can be monitored and audited. The students will learn how potential environmental impacts are described in Environmental Impact Assessments (EIA) and how industry controls their environmental impacts through Environmental Management Systems (EMS). This will help them develop an ability to plan, execute and document the environmental audit.

13. COURSE : B.SC (HONS) MATHEMATICS

Department: Mathematics

Programme Learning Outcomes in B.Sc. (Hons.) Mathematics

The completion of the B.Sc. (Hons.) Mathematics Programme will enable a student to: i) Communicate mathematics effectively by written, computational and graphic means. ii) Create mathematical ideas from basic axioms. iii) Gauge the hypothesis, theories, techniques and proofs provisionally. iv) Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis. v) Identify applications of mathematics in other disciplines and in the real-world, leading to enhancement of career prospects in a plethora of fields and research.

Course Outcomes

Core Courses

Paper Title: BMATH101: Calculus

This course will enable the students to:

- Learn first and second derivative tests for relative extrema and apply the knowledge in problems in business, economics and life sciences.
- Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference.

- Compute area of surfaces of revolution and the volume of solids by integrating over cross-sectional areas.
- Understand the calculus of vector functions and its use to develop the basic principles of planetary motion.

Paper Title: BMATH102: Algebra

This course will enable the students to:

- Employ De Moivre's theorem in a number of applications to solve numerical problems.
- Learn about equivalent classes and cardinality of a set.
- Use modular arithmetic and basic properties of congruences.
- Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix.
- Find eigenvalues and corresponding eigenvectors for a square matrix.

Paper Title: BMATH203: Real Analysis

This course will enable the students to:

- Understand many properties of the real line $\mathbb{R}$, including completeness and Archimedean properties.
- Learn to define sequences in terms of functions from $\mathbb{N}$ to a subset of $\mathbb{R}$.
- Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.
- Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

Paper Title: BMATH204: Differential Equations

The course will enable the students to:

- Learn basics of differential equations and mathematical modeling.
- Formulate differential equations for various mathematical models.
- Solve first order non-linear differential equations and linear differential equations of higher order using various techniques.
- Apply these techniques to solve and analyze various mathematical models.

Paper Title: BMATH305: Theory of Real Functions

This course will enable the students to:

- Have a rigorous understanding of the concept of limit of a function.
- Learn about continuity and uniform continuity of functions defined on intervals.
- Understand geometrical properties of continuous functions on closed and bounded intervals.
- Learn extensively about the concept of differentiability using limits, leading to a better understanding for applications.

- Know about applications of mean value theorems and Taylor's theorem.

Paper Title: BMATH306: Group Theory-I

The course will enable the students to:

- Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc.
- Link the fundamental concepts of groups and symmetrical figures.
- Analyze the subgroups of cyclic groups and classify subgroups of cyclic groups.
- Explain the significance of the notion of cosets, normal subgroups and factor groups.
- Learn about Lagrange's theorem and Fermat's Little theorem.
- Know about group homomorphisms and group isomorphisms.

Paper Title: BMATH307: Multivariate Calculus

This course will enable the students to:

- Learn the conceptual variations when advancing in calculus from one variable to multivariable discussion.
- Understand the maximization and minimization of multivariable functions subject to the given constraints on variables.
- Learn about inter-relationship amongst the line integral, double and triple integral formulations.
- Familiarize with Green's, Stokes' and Gauss divergence theorems.

Paper Title: BMATH408: Partial Differential Equations

The course will enable the students to:

- Formulate, classify and transform first order PDEs into canonical form.
- Learn about method of characteristics and separation of variables to solve first order PDE's. Classify and solve second order linear PDEs.
- Learn about Cauchy problem for second order PDE and homogeneous and nonhomogeneous wave equations.
- Apply the method of separation of variables for solving many well-known second order PDEs.

Paper Title: BMATH409: Riemann Integration & Series of Functions

The course will enable the students to:

- Learn about some of the classes and properties of Riemann integrable functions, and the applications of the Fundamental theorems of integration.
- Know about improper integrals including, beta and gamma functions.
- Learn about Cauchy criterion for uniform convergence and Weierstrass M-test for uniform convergence.
- Know about the constraints for the inter-changeability of differentiability and integrability with infinite sum.

- Approximate transcendental functions in terms of power series as well as, differentiation and integration of power series.

Paper Title: BMATH410: Ring Theory & Linear Algebra-I

The course will enable the students to:

- Learn about the fundamental concept of rings, integral domains and fields.
- Know about ring homomorphisms and isomorphisms theorems of rings.
- Learn about the concept of linear independence of vectors over a field, and the dimension of a vector space.
- Basic concepts of linear transformations, dimension theorem, matrix representation of a linear transformation, and the change of coordinate matrix.

Paper Title: BMATH511: Metric Spaces

The course will enable the students to:

- Learn various natural and abstract formulations of distance on the sets of usual or unusual entities. Become aware one such formulations leading to metric spaces.
- Analyse how a theory advances from a particular frame to a general frame.
- Appreciate the mathematical understanding of various geometrical concepts, viz. balls or connected sets etc. in an abstract setting.
-
- Know about Banach fixed point theorem, whose far-reaching consequences have resulted into an independent branch of study in analysis, known as fixed point theory.
- Learn about the two important topological properties, namely connectedness and compactness of metric spaces.

Paper Title: BMATH512: Group Theory-II

The course shall enable students to:

- Learn about automorphisms for constructing new groups from the given group.
- Learn about the fact that external direct product applies to data security and electric circuits.
- Understand fundamental theorem of finite abelian groups.
- Be familiar with group actions and conjugacy
- Understand Sylow theorems and their applications in checking nonsimplicity.

Paper Title: BMATH613: Complex Analysis

The completion of the course will enable the students to:

- Learn the significance of differentiability of complex functions leading to the understanding of Cauchy−Riemann equations.
- Learn some elementary functions and valuate the contour integrals.
- Understand the role of Cauchy−Goursat theorem and the Cauchy integral formula.

- Expand some simple functions as their Taylor and Laurent series, classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals.

Paper Title: BMATH614: Ring Theory and Linear Algebra-II

On completion of this course, the student will be able to:

- Appreciate the significance of unique factorization in rings and integral domains.
- Compute the characteristic polynomial, eigenvalues, eigenvectors, and eigenspaces, as well as the geometric and the algebraic multiplicities of an eigenvalue and apply the basic diagonalization result.
- Compute inner products and determine orthogonality on vector spaces, including Gram−Schmidt orthogonalization to obtain orthonormal basis.
- Find the adjoint, normal, unitary and orthogonal operators.

Skill Enhancement Courses

Paper Title: SEC-1: LaTeX and HTML

This course will enable the students to:

- Create and typeset a LaTeX document .
- Typeset a mathematical document using LaTex.
- Learn about pictures and graphics in LaTex.
- Create beamer presentations.
- Create web page using HTML.

Paper Title: SEC-2: Computer Algebra Systems and Related Software

This course will enable the students to:

- Use of computer algebra systems (Mathematica/MATLAB/Maxima/Maple etc.) as a calculator, for plotting functions and animations.
- Use of CAS for various applications of matrices such as solving system of equations and finding eigenvalues and eigenvectors.
- Understand the use of the statistical software R as calculator and learn to read and get
  data into R.

- Learn the use of R in summary calculation, pictorial representation of data and exploring relationship between data.
- Analyze, test, and interpret technical arguments on the basis of geometry.

Discipline Specific Elective (DSE) Courses

Paper Title: DSE-1 (i): Numerical Analysis

This course will enable the students to:

- Learn some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision.
- Know about methods to solve system of linear equations, such as Gauss−Jacobi, Gauss−Seidel and SOR methods.
- Interpolation techniques to compute the values for a tabulated function at points not in
  the table.
- Applications of numerical differentiation and integration to convert differential equations into difference equations for numerical solutions.

Paper Title: DSE-1 (ii): Mathematical Modeling and Graph Theory

This course will enable the students to:

- Know about power series solution of a differential equation and learn about Legendre's and Bessel's equations.
- Use of Laplace transform and inverse transform for solving initial value problems.
- Learn about various models such as Monte Carlo simulation models, queuing models,
  and linear programming models.
- Understand the basics of graph theory and learn about social networks, Eulerian and Hamiltonian graphs, diagram tracing puzzles and knight's tour problem.

Paper Title: DSE-1 (iii): C++ Programming for Mathematics

This course will enable the students to:

- Understand and apply the programming concepts of C++ which is important to mathematical investigation and problem solving.
- Learn about structured data-types in C++ and learn about applications in factorization
  of an integer and understanding Cartesian geometry and Pythagorean triples.
- Use of containers and templates in various applications in algebra.
- Use mathematical libraries for computational objectives
- Represent the outputs of programs visually in terms of well formatted text and plots.

Paper Title: DSE-2 (i): Probability Theory and Statistics

This course will enable the students to:

- Learn about probability density and moment generating functions.
- Know about various univariate distributions such as Bernoulli, Binomial, Poisson, gamma and exponential distributions.
- Learn about distributions to study the joint behavior of two random variables.

- Measure the scale of association between two variables, and to establish a formulation
  helping to predict one variable in terms of the other, i.e., correlation and linear regression.
- Understand central limit theorem, which helps to understand the remarkable fact that:
  the empirical frequencies of so many natural populations, exhibit a bell-shaped curve,
  i.e., a normal distribution.

Paper Title: DSE-2 (ii): Discrete Mathematics

This course will enable the students to:

- Understand the notion of ordered sets and maps between ordered sets.
- Learn about lattices, modular and distributive lattices, sublattices and homomorphisms between lattices.
- Become familiar with Boolean algebra, Boolean homomorphism, Karnaugh diagrams, switching circuits and their applications.
- Learn about basics of graph theory, including Eulerian graphs, Hamiltonian graphs.
- Learn about the applications of graph theory in the study of shortest path algorithms.

Paper Title: DSE-2 (iii): Cryptography and Network Security

This course will enable the students to:

- Understand the fundamentals of cryptography and computer security attacks.
- Learn about various ciphers and data encryption standard
- Review basic concepts of number theory and finite fields.
- Learn about advanced encryption standard.
- Understand the fundamentals of RSA and elliptic curve cryptography.
- Encrypt and decrypt messages using block ciphers, sign and verify messages using well known signature generation and verification algorithms.

Paper Title: DSE-3 (i): Mathematical Finance

This course will enable the students to:

- Know the basics of financial markets and derivatives including options and futures.
- Learn about pricing and hedging of options, as well as interest rate swaps.
- Learn about no-arbitrage pricing concept and types of options.
- Learn stochastic analysis (Ito formula, Ito integration) and the Black–Scholes model.
- Understand the concepts of trading strategies and valuation of currency swaps.

Paper Title: DSE-3 (ii): Introduction to Information Theory and Coding

This course will enable the students to:

- Learn about the basic concepts of information theory.
- Know about basic relationship among different entropies and interpretation of Shannon's fundamental inequalities.
- Learn about the detection and correction of errors while transmission.
- Representation of a linear code by matrices.
- Learn about encoding and decoding of linear codes.

Paper Title: DSE-3 (iii): Biomathematics

This course will enable the students to:

- Learn the development, analysis and interpretation of bio mathematical models such as population growth, cell division, and predator-prey models.
- Learn about the mathematics behind heartbeat model and nerve impulse transmission
  model.
- Appreciate the theory of bifurcation and chaos.
- Learn to apply the basic concepts of probability to molecular evolution and genetics.

Paper Title: DSE-4 (i): Number Theory

This course will enable the students to:

- Learn about some fascinating discoveries related to the properties of prime numbers,
  and some of the open problems in number theory, viz., Goldbach conjecture etc.
- Know about number theoretic functions and modular arithmetic.
- Solve linear, quadratic and system of linear congruence equations.
- Learn about public key crypto systems, in particular, RSA.

Paper Title: DSE-4 (ii): Linear Programming and Applications

This course will enable the students to:

- Learn about the graphical solution of linear programming problem with two variables.
- Learn about the relation between basic feasible solutions and extreme points.
- Understand the theory of the simplex method used to solve linear programming problems.
- Learn about two-phase and big-M methods to deal with problems involving artificial variables.
- Learn about the relationships between the primal and dual problems.
- Solve transportation and assignment problems.
- Apply linear programming method to solve two-person zero-sum game problems.

Paper Title: DSE-4 (iii): Mechanics

This course will enable the students to:

- Know about the concepts in statics such as moments, couples, equilibrium in both two
  and three dimensions.
- Understand the theory behind friction and center of gravity.
- Calculate moments of inertia of areas and rigid bodies.
- Know about conservation of mechanical energy and work-energy equations.
- Learn about translational and rotational motion of rigid bodies.

For students other than B.Sc. (H) Mathematics

Generic Elective Papers

Paper Title: GE-1: Calculus

This course will enable the students to:

- Sketch the curves in Cartesian and polar coordinates as well as learn techniques of sketching the conics.
- Visualize three dimensional figures and calculate their volumes and surface areas.
- Understand limits, continuity and derivatives of functions of several variable and vector-valued functions.

Paper Title: GE-1: Analytic Geometry and Theory of Equations

This course will enable the students to:

- Classify and sketch conics four different types of conic sections – the circle, the ellipse,
  the hyperbola and the parabola – in Cartesian and polar coordinates.
- Visualize three dimensional objects – spheres and cylinders – using vectors.
- Understand the properties of roots of polynomial equations.

Paper Title: GE-2: Linear Algebra

This course will enable the students to:

- Visualize the space R^n in terms of vectors and the interrelation of vectors with matrices, and their application to computer graphics.
- Familiarize with concepts in vector spaces, namely, basis, dimension and minimal spanning sets.
- Learn about linear transformations, transition matrix and similarity.
- Learn about orthogonality and to find approximate solution of inconsistent system of linear equations.

Paper Title: GE-2: Discrete Mathematics

This course will enable the students to:

- Understand the basic principles of logic, set theory, lattices and Boolean algebra.

- Understand the ideas of mathematical induction and basic counting techniques.
- Proficiently construct logical arguments and rigorous proofs.

Paper Title: GE-3: Differential Equations (with Practicals)

This course will enable the students to:

- Solve the exact, linear and Bernoulli equations and find orthogonal trajectories.
- Apply the method of variation of parameters to solve linear differential equations.
- Formulate and solve various types of first and second order partial differential equations.

Paper Title: GE-3: Linear Programming and Game Theory

This course will enable the students to:

- Learn about the simplex method used to find optimal solutions of linear optimization problems subject to certain constraints.
- Write the dual of a linear programming problem.
- Solve the transportation and assignment problems.
- Learn about the solution of rectangular games using graphical method and using the solution of a pair of associated prima-dual linear programming problems.

Paper Title: GE-4: Numerical Methods (with Practicals)

This course will enable the students to:

- Find the consequences of finite precision and the inherent limits of numerical methods.
- Appropriate numerical methods to solve algebraic and transcendental equations.
- Solve first order initial value problems of ODE's numerically using Euler methods.

Paper Title: GE-4: Elements of Analysis

This course will enable the students to:

- Understand the real numbers and their basic properties.
- Be familiar with convergent and Cauchy sequences.
- Test the convergence and divergence of infinite series of real numbers.
- Learn about power series expansion of some elementary functions.

14. COURSE : B.A (HONS) POLITICAL SCIENCE

A graduate in Political science is a person who embodies a curiosity towards the political puzzles that confront her and is endowed with the ability to apply various tools to solve them. The undergraduate course encourages raising questions and a problem-solving thought process in its students, which it believes is central to the idea of shaping an informed graduate student and an active citizen.

Political science graduates receive a strong training in foundational concepts enabling them to distinguish and delineate features of each. This level of inquiry is further complicated as

they proceed through the curricular semesters; enabling them to engage in systematic reflection of a kind that distinguishes their understanding from that of a lay person.

The undergraduate course in Political science shapes graduate sensibilities such that students are alert to instances of discrimination and deprivation; difference and diversity which they not only identify but can also persuasively argue about.

A Political science graduate is privy to the unique location of the discipline within the social sciences and can contextual their learning within the disciplinary boundaries while simultaneously and consciously using inter-disciplinary methods and concepts to understand inter-connected social, economic and political realities.

Political science graduates go through rigorous training in academic writing which includes writing logical and coherent essays as well as longer research articles in terms of term papers. Class room debate and discussion encourages them to think on their feet; sharpen their submissions and argue persuasively. They are also introduced to a variety of writing including commentaries and original manuscripts; government reports and alternative assessments as well as visual and print media.

The discipline teaches students how to distinguish between various ideological orientations; the multiple lens that may be used to make sense of the same political event or issue and thereby how to side-step biases and partisan positions in presenting their findings. The discipline inculcates a culture of academic honesty and investigative rigour to ensure authentic analytical outcomes. The syllabus of the undergraduate course on Political science also encourages students to get hands on experience of how research in the discipline is conducted. They are encouraged to draw up research questionnaires, select the field and decide on sample size and method of selection, conduct interviews with respondents as well as focused group discussions and finally translate the responses into a coherent write up. These exercises are not limited to election analysis and collecting voter responses but are primarily conducted to teach the student how to transition from the level of policy to the practice of politics. Political science graduates are uniquely positioned as the undergraduate course also imparts extensive understanding of International relations and global politics which allows them to move beyond the traditional area and concerns of the discipline. The course not only introduces them to various theories and concepts within international relations but also includes detailed discussion of contemporary international events and decisions made by state and non-state actors apart from also looking at the functioning of global and multinational organisations and institutions. The perspective sharpens their understanding of the national and they can better appreciate the nuances of state policies. The comparative perspective which students imbibe through courses in two semesters highlights the differences in states mapped along various indices such as development trajectories and state formation. Along with a richer understanding of select areas students are also encouraged to reflect and think critically about western frameworks of knowledge and understanding and how these may be challenged by alternative frameworks emerging in what is broadly referred to as the 'Global South' Courses on Public administration familiarize the student with the complexities of state and bureaucratic functioning as well as policy making and advocacy. The student learns about the concepts of organisation and management and their application which is extremely relevant to unravelling the intricacies of large public organisations and corporate bodies.The study of Indian politics provides the

student a means to navigate the labyrinth that politics in India reflects. Students decode this through various categories including gender, caste, class, ethnicity and others while also effortlessly transiting across various levels of the national, subnational and local. These courses anchor the indispensability of the inter and multi-disciplinary lens and provide a corrective and challenge to the western frameworks and models of understanding political phenomena.

On the completion of the six semesters undergraduate course in Political science a graduate is therefore equipped with an understanding of the six core areas in the discipline of political science namely Political theory, Indian politics, Comparative politics, Public Administration, International relations and Indian Political Thought. They carry with them an understanding of research methods and investigation as well as field experience of institutional functioning and survey research. Given this diverse skill set and knowledge basket that the graduates have; the learning outcomes enable them to seek gainful employment and engagement in diverse sectors such as academics, journalism, law, social work, government agencies and research organisations, human resource development, management, marketing and also the bureaucracy.

Feminism: Theory and Practice: The course on Feminism theory and Practice helps students in gaining a clear understanding of the theoretical perspectives of feminist thought. It helps them to gain knowledge about major feminist movements around the world. A critical understanding of concepts such as patriarchy, gender, social justice, inequality in the Indian specific context helps the students to understand the women specific issues in India. It develops the ability in students to place the divergent feminist epistemological framework into a variety of socio, economic and political context.

The course helps in developing critical writing skills in students, it inculcates the habit of reading and hones the ability of formulating and defending arguments. It helps students to develop a critical understanding of political concepts such as equality, justice, freedom, nationalism in the context of gender. It sensitizes students towards gender.

Perspectives on International relations and world history: The main aim of the course is to inform students about major events in diplomatic history and how these events shaped the future course of human history. The course also teaches the theoretical foundations of international relations and the importance of having a structural framework in order to evaluate the international events.

It develops the ability of the students to think and analyze, inculcates the habit of reading and comprehending the text and teaches them to use methods of scientific enquiry in understanding international relations. It develops communication skills in the students. The students are trained to apply the theoretical knowledge and skills they learned into day structure and operations of political life and prepares them for being active citizens.

Global Politics: The course on global politics enables stu6 to critically engage with the help of the theoretical tools in understanding the phenomena of globalization. It trains them to understand the contemporary global issues such as ecology, terrorism, nuclear proliferation,

migration, the challenges and complexity of living in a diverse global environment and prepares them to be active global citizens.
The students develop the art of critical writing, articulative communication, responsible use of reference materials, ability to form and defend their arguments and present them with skills to be better citizens.

Citizenship in a Globalizing World: This paper has broadened the understanding of the students in areas of global justice and cosmopolitanism. It has helped them to have a critical understanding of diversity, multiculturalism and themes of citizenship. This course will help the students in the future since this is paper is a part of the MA course as well.

Political Theory Concepts & Debates. This paper has helped the students to have a better understanding of the concepts such as freedom, justice, rights, equality. The course seeks to cultivate interest and provide insights for future research in the field. It also helps in the preparation for various competitive exams.

Constitutional Government and Democracy in India. This course acquaints students with the constitutional design of state structures and institutions, and their actual working overtime. The Indian Constitution accommodates conflicting impulses within itself. The course help traces the embodiment of some of these conflicts in constitutional provisions, and shows how these have played out in political practice. It further encourages a study of state institutions in their mutual interaction, and in interaction with the larger extra-constitutional environment

Indian Political Thought-I. This course introduces the specific elements of Indian Political Thought spanning over two millennia. The basic focus of study is on individual thinkers whose ideas are however framed by specific themes. The course as a whole provides a sense of the broad streams of Indian thought while encouraging a specific knowledge of individual thinkers and texts. Selected extracts from some original texts are also given to discuss in class.

Indian Political Thought-II. Based on the study of individual thinkers, the course introduces a wide span of thinkers and themes that defines the modernity of Indian political thought. The course helps to study general themes that have been produced by thinkers from varied social and temporal contexts. This paper is helpful for the students to pursue higher studies.
Political Process in India. An understanding of the political process thus calls for a different mode of analysis - that offered by political sociology. This course maps the working of 'modern' institutions, premised on the existence of an individuated society, in a context marked by communitarian solidarities, and their mutual transformation thereby. It also familiarizes students with the working of the Indian state, paying attention to the contradictory dynamics of modern state power

1: **Political Processes and Institutions in comparative Perspective**: While teaching this paper to the 4rth Semester Political Science Students I was able to touch upon the fact that every aspect of political life i.e., election, political participation, Representation, Political Socialisation is an outcome of their respective historical, social- cultural context and a comparatist must adopt the holistic approach in order to do comparative study.

2. **Your Laws your Rights:** This is SEC Paper. While doing this paper we focussed on real execution of some of our basic rights like consumer protection rights, forests dwellers rights, right to property for women, how to make our ration card, driving license etc.

3. **International Relations:** while doing this paper on International relations to BA program students of 4rth semester we explored on various theories of International Relation with contemporary examples. We discussed at greater length on Cold War. We also focussed on the India's foreign Policy and emerging powers especially in the presents Covid crisis.

Classical & Modern Political Philosophy. This paper has helped the students to understand the Political Science subject in more theory with practice. It has helped to clear the entrance exam for higher education like MA (DU, JNU, TISS etc.) This paper had also built the critical understanding. It has also helped the students to see the career in development and research sector.

Reading Gandhi & Human Rights, Gender & Environment. This paper has provided basic understanding about the Subject and Gandhi's Philosophy along with the contemporary issues like environment, gender and human rights affairs. This paper has also helped the students to go for higher education (JNU, DU, TISS etc) and crack the competitive exams.

Global Politics. This paper has built the critical understanding about the Global and International Politics. It has helped the students to go for higher studies in area like International Politics and International studies. It has also helped the students to see the career in Journalism and work as journalist.

DSE- Colonialism and Nationalism in India (BA Honours IV Semester): The course on colonialism and nationalism in India is an expansive guide for students of political science that helps them understand the nuances of the Indian nationalist movement from different perspectives.

The course is particularly well suited for students of political science as it introduces new academic discourses on nationalism in India viz women's movements, peasant movements, caste movements etc.

The course helps students of political science understand historiography of the Indian nationalist movement from unique standpoints and helps them to critically evaluate the context of each standpoint within the broader framework of the Indian nationalist movement.

Paper: Public Policy and Administration in India (BA Honours IV Semester- Core Paper): This course acquainted students with the what's and the how's of the whole process and multiple actors that work in the background of a public policy that is brought in front of the common citizens.

Unit 2 on Decentralization helped in understanding the basic setup of power allocation and distribution in the governance of our country, and how this apparatus contributes in the process of public policy. The third Unit aided in apprehending the key details in the budgetary process of India as well as some other variations and models being practiced around us. Having a policy and getting it implemented is one thing, and being able to get a redressal of our grievances attached to or aroused by them, is another. And the options available to students in this regard were very well explained in the fourth Unit. In the last Unit of the course, students got to learn, in a proper way, the actual meaning of the commonly used and practiced term "Social Welfare." Also, the few key Social Welfare Policies implemented in India for the four significant requirements of food, health, education and employment.

The learnings of this course will always help students not only as students of Political Science but also as citizens of our nation. The practical reference of Indian examples made the theoretical concepts more comprehensive. In a nutshell, this course is a very valuable addition to the knowledge base of our students.

SEC Paper: Your Laws and Your Rights (BA Honours IV Semester)

To be an aware, active and vigil citizen, learning about various laws and rights are crucial as it is a part and parcel of our lives. This subject adds a new and unique tangent to our overall learning of Political Science.

The course is fruitful for the students of political science as it gives them a comprehensive outlook about laws as a source of rights and its significance in a progressive society, while placing emphasis on specific values viz equality, empowerment, non-discrimination etc.

The course of Political Science has been structured in a way that they introduce the student to the vast canvas of subjects that concern the discipline of political science.

B.A (P) 1st Semester - Introduction to Political theory (Paper code-62321101). Through the study of Political Theory, students from different Perspectives tried to learn practiced Politics through theoretical framework of Political concept. It was studied how ideologies have contributed to the political activities and processes that exist today.

B.A (H) 1st Semester- Understanding Political Theory (Paper code-12321101). This course is also from political theory but it belongs to honours course of political science. The subject studied all the things that could help in the decision-making process. At the same time, the students expended their understanding of political theory in an Analytical and critical manner.

B.A (P) 4th Semester- Public Opinion and survey Research (Paper code 62323412). This course helps in understanding the public survey process on election in India and other democracies. Through this course, students learnt how electoral survey are conducted in India and what are the method by research finding is collected along with field studies. So now can say, this course is very help to know about Public opinion and survey research.

B.A (P) 6th Semester- Democracy and Governance. This course is about to develop understanding practice of democracy, Political Institution and governance. It is very useful for the Students because Students will gain knowledge of Indian governance and use it in their field. Through this course, Students learnt about Democratic Institutional practice in India and how institutional function within a constitutional framework.

United Nations and Global Conflicts. This course helps students develop an understanding of the United Nations as an international organization. The paper evolves the students' analytical skills on the United Nations role in creating an equitable social-economic world order. It is also helpful for their future research.

Indian Political Thought – II. This course helps the student to think about issues and debates in contemporary India from multiple perspectives. It helps them develop tolerance and respect for diverse opinions. This paper is helpful for the students to pursue higher studies.

Democracy and Governance. This paper has created awareness of the policy-making process within democratic institutions.

It also makes students aware about the opportunities and future prospects in the field.

Understanding Political Theory: This paper helps students understand the significance of theorizing and of applying theory into practice. It helps them develop the ability to use critical, analytical, and reflective thinking and reasoning.

Gandhi and the Contemporary World: This course helps students to engage with Gandhian philosophy in a critical and analytical manner. It also helps in describing the impact of Gandhian thought on Indian and global politics. It caters to the Discipline specific requirements of students from different Honours.

Conflict and Peace Building: This course is designed to help build an understanding of a variety of conflict situations among students to relate to them through their lived experiences. The course enhances students' understanding on the meaning, nature and significance of peace, conflict management, conflict resolution and conflict transformation. It develops the values of tolerance, progressiveness, and fraternity that contribute to making a healthy and prosperous society.

1) **Constitutional Government and Democracy in India- BA (H) 1st Semester**. The aim of this course was to enable students to gain knowledge about the constitutional design as well as the empirical practice of state structures and institutions. The course enabled the students to develop the ability to construct rigorous arguments on Indian politics, based on

empirical knowledge along with critical awareness of the scholarly literature on the subject. It enabled students to develop an understanding of the tenets of Indian constitutionalism by engaging with Constituent Assembly debates. It helped in understanding the working of different organs of government and analyze the interaction amongst them. Moreover, it enabled the students to understand the division of powers in Indian federal set-up and its asymmetrical federal arrangement. The students got familiarized with the process of rural and urban governance and the dynamics of gender and caste in these domains. The students also became familiar with challenges of addressing emergency conditions and security concerns within the constitutional framework.

2) **Introduction to Political Theory- BA (P) 1st Semester.** This course aimed to introduce certain key aspects of conceptual analysis in political theory and the skills required to engage in debates surrounding the application of the concepts. The course enabled the students to understand the nature and relevance of Political Theory, it also made the students familiar with and understand different concepts like liberty, equality, justice and rights. Lastly, the course helped the students to reflect upon some of the important debates in Political Theory.

3) Conflict and Peace Building- BA (P) 6th Semester. This course is designed to help build an understanding of a variety of conflict situations among students in a way that they can relate to them through their lived experiences. It's an interdisciplinary course that draws its insights from various branches of social sciences and seeks to provide a lively learning environment for teaching and training students how to bring about political and social transformations at the local, national and international levels. The course enhanced students' understanding on the meaning, nature and significance of peace, conflict management, conflict resolution and conflict transformation. The students also learned the importance of resource sharing in the conflict zones. The paper helped in developing students' knowledge on ideological and socio-cultural dimensions of conflict at local, sub-national and international levels. It also made the students familiar about negotiation and mediation skills for conflict resolution through active listening, different tracks of diplomacy and Gandhian methods.

4) **Political Process in India- BA (H) 2nd Semester.** This course aims to equip students with the tools of studying the political process in India by looking at the relationship between the components of the political system, the social and economic contexts in which they unfold, and the democratic values that they seek to achieve. It helps the students gain insights into the interconnections between social and economic relations and the political process in India along with understanding the challenges arising due to caste, class, gender and religious diversities and also analyze the changing nature of the Indian state in the light of these diversities. Lastly, the paper helps the students in making 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 behavior.

5) **Indian Government and Politics-BA (P) 2nd Semester.** The course aims to give students a thorough understanding of the structures of Indian government and politics. It equips the students with the different perspectives on studying Indian politics and the state in India, the constitutional principles on which the institutions of the state are founded and function, the social structures of power and salient features of the political process in India. It lays emphasis on understanding the inter-relationship between formal institutional structures, social movements, and political development to focus on the complex ways in which social and political power interact and have impact on political institutions and processes. The paper helps the students to demonstrate an understanding of the different viewpoints on Indian politics and the nature of Indian state and how social inequalities have an impact on political institutions and processes.

15.COURSE : B.SC (HONS) PHYSICS

Programme Outcomes

Students graduating with the B.Sc. (Honours) Physics degree should be able to acquire

(i) a fundamental/systematic and coherent understanding of the academic field of basic Physics in areas like Mechanics, Electricity and Magnetism, Waves and Optics, Thermal and Statistical Physics, Quantum Mechanics, Mathematical Physics and their applications to other core subjects in Physics;

(ii) a wide ranging and comprehensive experience in physics laboratory methods in experiments related to mechanics, optics, thermal physics, electricity, magnetism, digital electronics, solid state physics and modern physics. Students should acquire the ability for systematic observations, use of scientific research instruments, analysis of observational data, making suitable error estimates and scientific report writing.

(iii) procedural knowledge that creates different types of professionals related to the disciplinary/subject area of Physics, including professionals engaged in research and development, teaching and government/public service;

(iv) Knowledge and skills in areas related to their specialization area corresponding to elective subjects within the disciplinary/subject area of Physics and current and emerging developments in the field of Physics.

Program Specific Outcomes

Demonstrate the ability to use skills in Physics and its related areas of technology for formulating and tackling Physics-related problems and identifying and applying appropriate physical principles and methodologies to solve a wide range of problems associated with Physics.

Recognize the importance of mathematical modelling simulation and computational physics, and the role of approximation and mathematical approaches to describing the physical world.

Plan and execute Physics-related experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate software such as programming languages and purpose-written packages, and report accurately the findings of the experiment/investigations while relating the conclusions/findings to relevant theories of Physics.

Demonstrate relevant generic skills and global competencies such as

(i) problem-solving skills that are required to solve different types of Physics related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary area boundaries;

(ii) Investigative skills, including skills of independent investigation of Physics related issues and problems;

(iii) Communication skills involving the ability to listen carefully, to read texts and research papers analytically and to present complex information in a concise manner to different groups/audiences of technical or popular nature;

(iv) analytical skills involving paying attention to detail and ability to construct logical arguments using correct technical language related to Physics and ability to translate them with popular language when needed;

(v) ICT skills;
(vi) Personal skills such as the ability to work both independently and in a group.

Demonstrate professional behavior such as

(i) being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behavior such as fabricating, falsifying or misrepresenting data or committing plagiarism;
(ii) the ability to identify the potential ethical issues in work-related situations;
(iii) be committed to the free development of scientific knowledge and appreciate its universal appeal for the entire humanity;
(iv) appreciation of intellectual property, environmental and sustainability issues;
(v) promoting safe learning and working environment.

Course Outcomes

Semester I (Core Course):

CC-I: Mathematical Physics-I (32221101):

The emphasis of course is to equip students with the mathematical and critical skills required in solving problems of interest to physicists. The course will also expose students to fundamental computational physics skills enabling them to solve a wide range of physics problems. The skills developed during course will prepare them not only for doing fundamental and applied research but also for a wide variety of careers.

After completing this course, student will be able to: Draw and interpret graphs of various functions. Solve first and second order differential equations and apply these to physics problems. Understand the concept of gradient of scalar field and divergence and curl of vector fields. Perform line, surface and volume integration and apply Green's, Stokes' and Gauss's Theorems to compute these integrals. Apply curvilinear coordinates to problems with spherical and cylindrical symmetries. Understand elementary probability theory and the properties of discrete and continuous distribution functions.

In the laboratory course, the students will be able to design, code and test simple programs in C++ in the process of solving various problems.

CC-II: Mechanics (32221102):

This course reviews the concepts of mechanics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with Newton's Laws of Motion and ends with the Fictitious Forces and Special Theory of Relativity. Students will also appreciate the Collisions in CM Frame, Gravitation, Rotational Motion and Oscillations. The students will be able to apply the concepts learnt to several real world problems.

Upon completion of this course, students are expected to: 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.

B.Sc. First Semester (General Elective): [For students of B.Sc. Hons other than Physics]

GE: Electricity and Magnetism (32225101):

This course begins with elementary vector analysis, an essential mathematical tool for understanding static electric field and magnetic field. By the end of the course student should appreciate Maxwell's equations.At the end of this course, students will be able to gain : The concepts of vector analysis. Apply Gauss's law of electrostatics to solve a variety of problems. Articulate knowledge of electric current, resistance capacitance in terms of electric field and electric potential. And Calculate the magnetic forces that act on moving charges and the magnetic fields due to currents (Biot- Savart and Ampere laws). Gain brief idea of dia, para and ferro-magnetic materials. Understand the concepts of induction and self-induction, to solve problems using Faraday's and Lenz's laws. Have an introduction to Maxwell's equations.

In the laboratory course the student will get an opportunity to verify network theorems and study different circuits such as RC circuit, LCR circuit. Also, different methods to measure low and high resistance, capacitance etc.

B.Sc. Second Semester (Core Course):

CC-III: Electricity and Magnetism (32221201):

This course reviews the concepts of electromagnetism learnt at school from a more advanced perspective and goes on to build new concepts. The course covers static and dynamic electric and magnetic fields, and the principles of electromagnetic induction. It also includes analysis of electrical circuits and introduction of network theorems. The students will be able to apply the concepts learnt to several real world problems.

At the end of this course the student will be able to: Demonstrate the application of Coulomb's law for the electric field, and also apply it to systems of point charges as well as line, surface, and volume distributions of charges. Demonstrate an understanding of the relation between electric field and potential, exploit the potential to solve a variety of problems, and relate it to the potential energy of a charge distribution. Apply Gauss's law of electrostatics to solve a variety of problems. Calculate the magnetic forces that act on moving charges and the magnetic fields due to currents (Biot- Savart and Ampere laws). Understand the concepts of induction and self-induction, to solve problems using Faraday's and Lenz's laws. Understand the basics of electrical circuits and analyze circuits using Network Theorems.

In the laboratory course the student will get an opportunity to verify network theorems and study different circuits such as RC circuit, LCR circuit. Also, different methods to measure low and high resistance, capacitance, self-inductance, mutual inductance, strength of a magnetic field and its variation in space will be learnt.

CC-IV: Waves and Optics (32221202):

This course reviews the concepts of waves and optics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with explaining ideas of superposition of harmonic oscillations leading to physics of travelling and standing waves. The course also provides an in depth understanding of wave phenomena of light, namely, interference and diffraction with emphasis on practical applications of the same.

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 behaviourof transverse, longitudinal waves can be learnt in this laboratory course.

B.Sc. Second Semester (Genral Elective): [For students of B.Sc. Hons other than Physics]

GE: Mechanics (32225201):

This course begins with the review of Vectors and Differential equations and ends with the Special Theory of Relativity. Students will also appreciate the Gravitation, Rotational Motion and Oscillations. The emphasis of this course is to enhance the basics of mechanics.

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.

B.Sc. Third Semester (Core Course):

CC-V: Mathematical Physics-II (32221301)

The emphasis of course is to equip students with the mathematical tools required in solving problems interest to physicists and expose them to fundamental computational physics skills thus enabling them to solve a wide range of physics problems. This course will aim at introducing the concepts of Fourier series, special functions, linear partial differential equations by separation of variable method.

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.

CC-VI: Thermal Physics (32221302):

This course deals with the relationship between the macroscopic properties of physical systems in equilibrium. It reviews the concepts of thermodynamics learnt at school from a more advanced perspective and develops them further. The primary goal is to understand the fundamental laws of thermodynamics and their applications to various systems and processes. In addition, it will also give exposure to students about the Kinetic theory of gases, transport phenomena involved in ideal gases, phase transitions and behavior of real gases.

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, thermalconductivity, 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.

CC-VII: Digital Systems and Applications (32221303):

This is one of the core papers in physics curriculum which introduces the concept of Boolean algebra and the basic digital electronics. In this course, students will be able to understand the working principle of CRO, Data processing circuits, Arithmetic Circuits, sequential circuits like registers, counters etc. based on flip flops. In addition, students will get an overview of microprocessor architecture and programming.

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.

B.Sc. Third Semester (Genral Elective): [For students of B.Sc. Hons other than Physics]

GE: Waves and Optics (32225310):

This course reviews the concepts of waves and optics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with explaining ideas of superposition of harmonic oscillations leading to physics of travelling and standing waves. The course also provides an in depth understanding of wave phenomena of light, namely, interference and diffraction with emphasis on practical applications of the same.

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.

B.Sc. Fourth Semester (Core Course):

CC-VIII: Mathematical Physics – III (32221401):

The emphasis of the course is on applications in solving problems of interest to physicists. Students will be examined on the basis of problems, seen and unseen. The course will

develop understanding of the basic concepts underlying complex analysis and complex integration and enable student to use Fourier and Laplace Transform to solve real world problems.

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.

CC-IX: Elements of Modern Physics (32221402):

The objective of this course is to teach the physical and mathematical foundations necessary for learning various topics in modern physics which are crucial for understanding atoms, molecules, photons, nuclei and elementary particles. These concepts are also important to understand phenomena in laser physics, condensed matter physics and astrophysics.

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. 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.

CC-X: Analog Systems and Applications (32221403):

This course introduces the concept of semiconductor devices and their applications. It also emphasizes on understanding of amplifiers, oscillators, operational amplifier and their applications.

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.

B.Sc. Fourth Semester (Skill Enhancement Course):

SEC: Computational Physics Skills (32223902):

This course is intended to give an insight to computer hardware and computer applications. Students will familiarize with use of computer to solve physics problems. They will learn a programming language namely fortran and data visualization using GNU plot. Further they will also learn to prepare long formatted document using latex.

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.

SEC: Renewable Energy and Energy harvesting (32223905):

To impart knowledge and hands on learning about various alternate energy sources to teach the ways of harvesting energy using wind, solar, mechanical, ocean, geothermal energy etc. To review the working of various energy harvesting systems which are installed worldwide.

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.

B.Sc. Fourth Semester (General Elective): [For students of B.Sc. Hons other than Physics]

GE : Thermal Physics and Statistical Mechanics (32225415) :

This course will introduce Thermodynamics, Kinetic theory of gases and Statistical Mechanics to the students. Th primary goal is to understand the fundamental laws of thermodynamics and it's applications to various thermo dynamical systems and processes. This coursework will also enable the students to understand the connection between the macroscopic observations of physical systems and microscopic behaviour of atoms and molecule through statistical mechanics.

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 coefficient of resistance, study variation of thermo emf across two junctions of a thermocouple with temperature etc.

GE: Astronomy and Astrophysics (32225418):

This General Elective course is meant to introduce undergraduate students to the wonders of the Universe. Students will understand how astronomers over millennia have come to understand mysteries of the universe using laws of geometry and physics, and more recently chemistry and biology. They will learn about diverse set of astronomical and astrophysical phenomenon, from the daily and yearly motion of stars and planets in the night sky which they can observe themselves, to the expansion of the universe deduced from the latest observations and cosmological models. The course presupposes school level understanding of mathematics and physics.

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.

Fifth Semester (Core Course):

CC-XI: Quantum Mechanics &Applications (32221501):

After learning the elements of modern physics, in this course students would be exposed to more advanced concepts in quantum physics and their applications to problems of the sub atomic world.

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.

CC-XII: Solid State Physics (32221502):

This course introduces the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solids. It enables the students to appreciate how the interesting and wonderful properties exhibited by matter depend upon its atomic and molecular constituents. The gained knowledge helps to solve problems in solid state physics using relevant mathematical tools. It also communicates the importance of solid state physics in modern society.

On successful completion of the module students should be able to: Elucidate the concept of lattice, crystals and symmetry operations. 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 behavior. 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.

B.Sc. Fifth Semester (Discipline Specific Electives):

DSE: Advanced Mathematical Physics - I (32227502):

The course is intended to impart the concept of generalized mathematical constructs in terms of Algebraic Structures (mainly Vector Spaces) and Tensors to have in-depth analysis of our physical system.

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 covariant 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, eigenenergy values of Hermitian differential operators, Lagrangian formulation in classical dynamics etc.

DSE: Nuclear and Particle Physics (32227504):

The objective of the course is to impart the understanding of the sub atomic particles and their properties. It will emphasize to gain knowledge about the different nuclear techniques and their applications in different branches Physics and societal application. The course will focus on the developments of problem based skills.

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. It will acquaint students with the nature and magnitude of different forces, particle interactions, families of sub-atomic particles with the different conservation laws, concept of quark model. The acquired knowledge can be applied in the areas of nuclear medicine, medical physics, archaeology, geology and other interdisciplinary fields of Physics and Chemistry. It will enhance the special skills required for these fields.

DSE: Astronomy and Astrophysics (32227506):

This course is designed to provide students with the basic knowledge about the theory and techniques of observational astronomy and physics of the astrophysical phenomenon. It applies theoretical concepts and mathematical techniques students have learnt in their earlier courses to astronomical and astrophysical phenomenon.

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.

B.Sc. Sixth Semester (Core Course):

CC-XIII: Electromagnetic Theory (32221601):

This core course develops further the concepts learnt in the electricity and magnetism course to understand the properties of electromagnetic waves in vacuum and different media.

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.

CC-XIV: Statistical Mechanics (32221602) :

Statistical Mechanics deals with the derivation of the macroscopic parameters (internal energy, pressure, specific heat etc.) of a physical system consisting of large number of particles (solid, liquid or gas) from knowledge of the underlying microscopic behavior of atoms and molecules that comprises it. The main objective of this course work is to introduce the techniques of Statistical Mechanics which has applications in various fields including Astrophysics, Semiconductors, Plasma Physics, Bio-Physics etc. and in many other directions.

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 forcalculation of thermodynamic variables for physical system (Ideal gas, finite level system). Difference between the classical and quantumstatistics. 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.

B.Sc. Sixth Semester (Discipline Specific Electives):

DSE: Nano Materials and Applications (32227612):

The syllabus introduces the basic concepts and principles to understand nanomaterial. Various nanomaterial synthesis/growth methods and characterizations techniques are

discussed to explore the field in detail. The effect of dimensional confinement of charge carries on the electrical, optical and structural propertie are discussed. The concept of micro- and nano- electro mechanical systems (MEMS and NEMS) and important applications areas of nanomaterials are discussed.

On successful completion of the module students should be able to: Explain the difference between nanomaterials and bulk materials and their properties. Explain the role of confinement on the density of state function and so on the various properties exhibited by nanomaterials compared to bulk materials. Explain various methods for the synthesis/growth of nanomaterials including top down and bottom up approaches. Analyze the data obtained from the various characterization techniques. Explain the concept of Quasi-particles such as excitons and how they influence the

optical properties. Explain the Interger Quantum Hall Effect and the concept of Landau Levels, and edge states in conductance quantization. Explain the conductance quantization in 1D structure and its difference from the 2DEG system. Explain various applications of nano particles, quantum dots, nano wires etc. Explain why nanomaterials exhibit properties which are sometimes very opposite, like magnetic, to their bulk counterparts.

In the Lab course students will synthesize nanoparticles by different chemical routes and characterize them in the laboratory using the different techniques, learnt in the theory. They will also carry out thin film preparation and prepare capacitors and evaluate its performance. They will fabricate a PN diode and study its I-V characteristics.

DSE: Advanced Mathematical Physics-II (32227625)

The course is intended to develop new mathematical tools in terms of Calculus of Variation, Group Theory and Theory of Probability in the repertoire of the students to apply in Theoretical and Experimental Physics.

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.

DSE: Classical Dynamics (32227626):

This course on classical dynamics trains the student in problem solving ability and develops understanding of physical problems. The emphasis of this course is to enhance the understanding of Classical Mechanics (Lagrangian and Hamiltonian Approach).

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.

DSE: Dissertation (32227627):

Dissertation involves project work with the intention of exposing the student to research /development. It involves open ended learning based on student ability and initiative, exposure to scientific writing and inculcation of ethical practices in research and communication.

Outcomes: Exposure to research methodology Picking up skills relevant to dissertation project, such as experimental skills in the subject, computational skills, etc. Development of creative ability and intellectual initiative. Developing the ability for scientific writing. Becoming conversant with ethical practices in acknowledging other sources, avoiding plagiarism, etc.

B.Sc. Hons. Second Semester (Inter-departmental Course):

Biological Sciences (CBCS Structure) Core Course: Biophysics(BSC-3):

This inter disciplinary course introduces the basic concepts of physics and their applications in biology for better understanding of various biological processes at cellular and molecular level. This knowledge will empower the students to develop a basic understanding about the principles and concepts of Biophysics and will enable the students to develop quantitative approaches to solve physical/biological problems.

Students will learn basic concepts of physics and apply them to study the physicochemical properties of biomolecules. Students will learn to investigate the light absorption properties of biomolecules through spectrophotometry, for qualitative and quantitative analysis of biomolecules. Students will learn the concepts related to mechanics of solids and liquids to understand the basic mechanisms of cell biology especially cell adhesion, migration and mechano transduction. Students will learn about the mechanism of transport of various ions/molecules across cell membranes and their significance in several biological processes.

16.COURSE : B.A (HONS) SANSKRIT

For centuries Sanskrit has been the repository of Indian wisdom. In the ancient period of her history itself, India had made significant strides in several areas of knowledge production. She had a rich tradition of philosophy and religion along with major achievements in logic, mathematics, law, medicine, literature, dramatics, agricultural sciences, marine technology and many crafts and trades. Prior to the imposition of the colonialist agenda by British imperialists, these subjects were being taught in Indian schools and universities. However, these subjects were replaced with western knowledge systems under the Education policies pursued by the British government.

In the twenty first century, the Euro –centric approach is being challenged and it is being increasingly recognized that Asian and especially Indian knowledge systems need to be revived and used for the betterment of humankind. As the principal medium of all intellectual advancements in India, Sanskrit needs to be given a pride of place in the scheme of studies. India's Education policies of 1968 and 1986 declare that 'more liberal facilities' must be provided for the study of Sanskrit in universities.

Sanskrit is offered in different forms as an Honours course where students read at least twenty papers in Sanskrit; as a Programme course where students study lesser number of papers in Sanskrit ; as a Generic Elective subject for students from other disciplines.

The Sanskrit Honours and Programme syllabus has a two pronged objective – to introduce students to a variety of traditional disciplines in Sanskrit studies and to strengthen their knowledge of the language. When students come from school to College, the level of difficulty both in terms of the language and content rises dramatically. Therefore, the Sanskrit Honours Course aims to train them in classical

Sanskrit in which major works on various disciplines are written. It is also aims to train them in important traditional disciplines which may be put under the category of humanities. These are – Vedic studies ; the huge volume of literature – prose, poetry and drama which have inspired and continue to inspire great literary works in almost all Indian languages; literary criticism or kavya Shastra; vyakarana which covers a large area of linguistics; darshana i.e. philosophy and logic; dharma Shastra which covers many areas of sociology and legal studies.

The syllabus also realizes that Sanskrit has been the language of governance for centuries and therefore several ruling dynasties and even private entities got their inscriptions written in Sanskrit. These inscriptions are extremely important for the study of Indian history, paleography and chronology. These find place in various forms in this syllabus.

This course also seeks to introduce certain non technical aspects of scientific disciplines - the Indian system of medicine, mathematics and astronomy.

The Honours course will especially focus on issues which have a contemporary resonance. It will seek to enrich our modern understanding of these issues with traditional Indian wisdom. It will combine traditional wisdom with modern studies and research in these various disciplines in India and abroad.

In most courses an attempt will be made to expose students to e-resources and help them to use them fruitfully.

The Honours course will thus make students better equipped to pursue their post graduate studies and undertake further research in these disciplines.

The BA Programme in Sanskrit is less ambitious in range and level of difficulty. It offers limited courses in literature and language. Students pursuing the BA Programme course will also get the opportunity to read some Generic Courses in Sanskrit where the emphasis will be more on introducing domain knowledge than language studies.

17.COURSE : B.A (HONOURS) SOCIOLOGY

Graduate Attributes, Qualification Descriptors and Program Learning Outcomes

The Honours program in Sociology is premised on an axiom that a graduate is not the mere product of a system. On the contrary, the graduate attributes are the most concrete manifestation of the spirit of the entire program, its operationalization through institutions and collective and concerted efforts of all stake holders. Every other feature of the programme is fused into this. Hence graduate attributes, qualification descriptors and programme learning outcomes may not be described separately since they are innately interconnected. A Sociology graduate from University of Delhi would be a person with a thorough grounding in the fundamentals of Sociology and infused with the 'Sociological Imagination'. They can see the connections between biographies and history, personal problems and historical currents, pierce the seamless fabric of common sense that envelopes the everyday life of societies, draw connections between seemingly independent social factors, processes and institutions using observation and analysis. Being trained in a highly context-sensitive discipline, a Sociology graduate is alert to social, cultural and historical context of all issues. In the Indian context, that implies an ingrained post-colonial sensibility that critically engages constitutions of self and engagement with the other. Sociology is a deeply self-reflexive discipline with an inter-disciplinary orientation. A graduate would be capable of describing and embodying the mandate and perspective of Sociology as a discipline, how it differs from cognate social sciences and be able to engage productively with them without losing disciplinary perspective.

A Sociology graduate is exposed to a significant quantum of concepts, conceptual writing, theories and theoretical reasoning throughout the three years across all the courses. Hence she/ he has an ability to grasp and generate a conceptual conversation in general and within the discipline of Sociology in particular. She/he is also familiar with well-defined, critical and evolving multiplicity of theoretical perspectives.

A Sociology graduate would be well versed with the basic tenets of these perspectives and capable of generating versions of social world from these perspectives. iv Endowed with this awareness of multiple perspectives on any significant issue a Sociology graduate is able to reason it out and weigh the various operational options in any given context. Rigorous empirical investigation of the social being an inalienable aspect of graduate training, Sociology graduates are well trained to engage in research. They are familiar with the elementary techniques of social investigation via a thorough two semester long training in sociological research methods. A chief graduate attribute of Sociology students is a demonstrable ability to constitute a significant sociological problem to investigate, design research, choose appropriate techniques of social investigation, gather data from a scientifically determined sample, make sense of the data after due analysis, render the results in appropriate conceptual context and draw viable theoretical conclusions.

Sociology graduates are an embodiment of highly desirable combination of keen observation, deep empathy, rigorous reason, hard nosed empiricism and scholarly detachment. They have abilities to read diverse kinds of material ranging from statistics, theoretical tracts, official reports, research reports, visual material, imaginative literature, cultural artefacts and social gestures and synthesise and generalize from them to draw viable conclusions. They are keenly aware of social context of knowledge production itself. Substantively, Sociology graduates possess specialized knowledge of a range of social institutions and processes. Through courses on Indian society, polity, economy, religion, kinship and family, gender and social stratification they have a fine grasp of social structures, processes, institutions, cultural diversities and dynamics of social change along with attendant conceptual tool- kit of the discipline.

The courses around these themes are constructed inter-textually and indexed to the courses on theories and methods. Hence a key graduate attribute in terms of disciplinary knowledge is an ability to access substantive stock of existing research on these areas of sociological knowledge and invoke it strategically to draw conclusions, throw light on emerging issues, and generate insights and research agendas. Sociology graduates are instinctually comparative across and within the cultures. They are trained to spot social patterns and trends and seek causation at the level of social and cultural collectives to explain the observed social regularities. They are averse to attaching undue v causal weight to individual subjective understandings and are resistant to unfounded ethnocentric assumptions. They can seamlessly redefine and reconstitute a range of social issues at multiple scales from diverse perspectives simultaneously to produce optimal solutions. Most students find this new found ability not only transformative but almost therapeutic.

A Sociology graduate from Delhi University is likely to have a specialized understanding of sociological conversation around Sociology of Gender; Social Stratification; Urban Sociology; Agrarian Sociology; Environmental Sociology; Sociology of Work and Industry; Health and Medicine; Visual Cultures; Indian Sociological Traditions and Reading Ethnographic Monographs. Sociology is both precise and evocative in the representation of the results of its scholarly labours.It is also keenly aware of its role in educating the public and dispelling common misconceptions and prejudices. Hence good communication skills are imperative for a Sociology graduate. Sociological communication takes three principal forms: oral, written and visual. A DU graduate in Sociology is trained to be conversant with all these modes via dedicated Skill Enhancement Courses on ‘Reading, Writing and Reasoning for Sociology’ and ‘Techniques of Ethnographic Film Making’.

Given the range of these core graduate attributes, Sociology graduates are well equipped to mobilize their sociological knowledge and generic skills for a variety of purposes apart from academic pursuit of the discipline. Sociology graduates are equipped to grasp vast quantities of diversely textured complex material and synthesise it into coherent and cogent arguments backed by evidence. Its class room practices inculcates an ability to engage in collaborative work and constructive, purposive and democratic conversations. They are well trained for critical thinking that matches their research skills which enables them to evaluate strengths and weaknesses of arguments in a scientific fashion.

Sociology is a worldly science that incessantly draws students beyond class rooms and harnesses the productive tension between library work, field work and a call to interventionist action.

A Sociology graduate is ideal for employment needs where a graduate from liberal arts would fit in for this rare blend. They are a perfect fit for the areas (but not limited to them alone) such as law, development studies, development practice, social work, bureaucracy and public institutions, women's studies, gender studies, area studies, international relations, policy studies, policy implementation, advocacy, management, marketing, social psychology, vi industrial organization, election studies, data sciences, journalism, criminology, and careers in fine and performing arts. Sociology is both a profession and a vocation. A lifelong commitment to learning, critical thinking and to the cause of the collective well-being rather than narcissistic self-indulgence. It is a cosmopolitan science that is positive and normative at once.

A Sociology graduate would make an enlightened leader and an informed follower. The chief attribute of a Sociology graduate from Delhi University is that she is well prepared in discharging her responsibilities as a conscious citizen while having a productive career and leading a meaningful life.

18.COURSE : B.A (HONOURS) STATISTICS

Programme Outcomes

This course exposes the students to the beautiful world of Statistics and how it affects each and every aspect of our daily life. The course is designed to equip students with all the major concepts of Statistics along with the tools required to implement them. Introduction to computer software help them in analysis of data by making optimum usage of time and resources. These sofware give them the necessary support and an edge when progressing to their professional careers. Exposure to plethora of real life data helps in honing their analytical skills. 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 start-ups /jobs in near future. The structure of the course also motivates/helps the students to pursue careers in related disciplines, especially the data sciences, financial statistics and actuarial sciences.

19.COURSE : B.SC (HONS) ZOOLOGY

Department: Zoology

Program Outcomes

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 which will provide them 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 nonchordates 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, biostatistics, bioinformatics 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 7 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 and apiculture will inculcate skills involved in rearing fish, bees and silk moth which would help them in starting their own ventures and generating self employment making them successful entrepreneurs. Acquired skills **in** diagnostic testings, 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 physiological charts will help to find their career options. Students undertaking wild life management courses would gain expertise in identifying key factors of wild life management and be aware about different techniques of estimating, remote sensing and Global positioning of wild life. This course will motivate students to pursue a career in the field of wildlife conservation and management.

Core Courses (CC):

Paper title: Non-Chordates I: Protists to Pseudocoelomates

Upon completion of the course, students were able to:

1. Learn about the importance of systematics, taxonomy and structural organization of animals.
2. Appreciate the diversity of non-chordates living in varied habit and habitats.
3. Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
4. Critically analyse the organization, complexity and characteristic features of non-chordates which made them familiarize with the morphology and anatomy of representatives of various animal phyla.

5. Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
6. Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

Paper title: Principles of Ecology

Upon completion of the course, students were able to:

1. Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors.
2. Comprehend the population characteristics, dynamics, growth models and interactions.
3. Understand the community characteristics, ecosystem development and climax theories.
4. Know about the types of ecosystems, food chains, food webs, energy models, and ecological efficiencies.
5. Apply the basic principles of ecology in wildlife conservation and management.
6. Inculcate scientific quantitative skills, evaluate experimental design, read graphs, and analyse and use information available in scientific literature.

Paper title: Non-Chordates II: Coelomates

Upon completion of the course, students were able to:

1. Learn about the importance of systematics, taxonomy and structural organization of animals.
2. Appreciate the diversity of non-chordates living in diverse habit and habitats.
3. Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
4. Critically think about the organization, complexity and characteristic features of non-chordates.
5. Familiarize themselves with the morphology and anatomy of representatives of various animal phyla.
6. Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.
7. Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

Paper title: Cell Biology

Upon completion of the course, students were able to:

1. Understand fundamental principles of cell biology.
2. Explain structure and functions of cell organelles involved in diverse cellular processes.
3. Appreciate how cells grow, divide, survive, die and regulate these important processes.
4. Comprehend the process of cell signalling and its role in cellular functions.
5. Have an insight of how defects in functioning of cell organelles and regulation of cellular processes can develop into diseases.
6. Learn the advances made in the field of cell biology and their applications.

Paper title: Diversity of Chordates

Upon completion of the course, the students were able to:

1. Understand different classes of chordates, level of organization and evolutionary

relationship between different subphyla and classes, within and outside the phylum.

2. Study about diversity in animals which made students understand about their distinguishing features.

3. Appreciate similarities and differences in life functions among various groups of animals in Phylum Chordata.

4. Comprehend the circulatory, nervous and skeletal system of chordates.

5. Know about the habit and habitat of chordates in marine, freshwater and terrestrial ecosystems.

Paper title: Physiology: Controlling and Coordinating Systems

Upon completion of the course, the students were able to:

1. Know the basic fundamentals and understand advanced concepts which helped them develop a strong foundation that will aid them in acquiring skills and knowledge to pursue advanced degree courses.

2. Comprehend and analyze problem-based questions.

3. 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.

4. Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body. Synthesize ideas to make connection between knowledge of physiology and real-world situations, including healthy life style decisions and homeostatic imbalances.

5. Know the role of regulatory systems *viz.* endocrine and nervous systems and their amalgamation in maintaining various physiological processes.

Paper title: Fundamentals of Biochemistry

Upon completion of the course, the students were able to:

1. Gain knowledge and skill in the fundamentals of biochemical sciences, interactions and interdependence of physiological and biochemical processes

2. Get exposure to various processes used in industries and gained skills in techniques of chromatography and spectroscopy.

3. Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation.

4. Know about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments, and analyze the resulting data.

5. Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

Paper title: Comparative Anatomy of Vertebrates

Upon completion of the course, the students were able to:

1. Explain comparative account of the different vertebrate systems.

2. Understand the pattern of vertebrate evolution, organisation and functions of various systems.

3. Learn the comparative account of integument, skeletal components, their functions and modifications in different vertebrates.

4. 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.

5. Learn the evolution of brain, sense organs and excretory organs to a complex, highly evolved form in mammals.
6. Learn to analyze and critically evaluate the structure and functions of vertebrate systems, which helped them discern the developmental, functional and evolutionary history of vertebrate species.
7. Understand the importance of comparative vertebrate anatomy to discriminate human biology.

Paper title: Physiology: Life Sustaining Systems

Upon completion of the course, the students were able to:

1. Have a clear knowledge of basic fundamentals and understanding of advanced concepts which helped them develop a strong foundation that will aid them in acquiring skills and knowledge to pursue advanced degree courses.
2. Comprehend and analyse problem-based questions on physiological aspects.
3. 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.
4. Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.

Paper title: Biochemistry of Metabolic Processes

Upon completion of the course, the students were able to:

1. Gain knowledge and skill in the interactions and interdependence of physiological and biomolecules.
2. Understand essentials of the metabolic pathways along with their regulation.
3. Know the principles, instrumentation and applications of bioanalytical techniques.
4. Get exposure to various processes used in industries.
5. Become aware about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments and analyze the resulting data.
6. Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

Paper title: Molecular Biology

Upon completion of the course, the students were able to:

1. Describe the basic structure and chemistry of nucleic acids, DNA and RNA.
2. Compare and contrast DNA replication machinery and mechanisms in prokaryotes and eukaryotes.
3. Elucidate the molecular machinery and mechanism of information transfer processes– transcription and translation-in prokaryotes and eukaryotes.
4. Explain post-transcriptional modification mechanisms for the processing of eukaryotic RNAs.
5. Discuss general principles of transcription regulation in prokaryotes by exploring the structure and function of lactose and tryptophan metabolism operons.
6. Get an overview of gene expression regulation in eukaryotes.
7. Explain the significance of DNA repair mechanisms in controlling DNA damage.
8. Recognise role of RNAs (riboswitches, siRNA and miRNA) in gene expression regulation.
9. Gain practical knowledge of raising, handling, maintenance and special features such as antibiotic resistance of a simple prokaryotic model organism, *Escherichia coli*.
10. Quantitatively estimate concentration of DNA and RNA by colorimetric methods.

Paper title: Principles of Genetics

Upon completion of the course, the students were able to:

1. Have a deeper understanding of the varied branches of the biological sciences like microbiology, evolutionary biology, genomics and metagenomics.
2. Gain knowledge of the basic principles of inheritance.
3. 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.
4. Know the mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day-to-day life.
5. Find out the effects of indiscriminate use of various chemicals, drugs or insecticides in nature by studying their effect on various bacterial species in soil and water samples from different industrial or polluted areas.

Paper title: Developmental Biology

Upon completion of the course, the students were able to:

1. Understand the events that lead to formation of a multicellular organism from a single fertilized egg, the zygote.
2. Acquire basic knowledge of the cellular processes of development and the molecular mechanisms underlying these.
3. 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.
4. Discuss the general mechanisms involved in morphogenesis and explain how different cells and tissues interact in a coordinated way to form various tissues and organs.
5. Understand about the evolutionary development of various animals.
6. Know the process of ageing leading to interventions that can improve the overall health
and quality of life in aged people.
7. Learn the importance of latest techniques like stem cell therapy, *in vitro* fertilization and amniocentesis etc. to be applied for human welfare.
8. Develop the skill to raise and maintain culture of model system; *Drosophila* in the laboratory.

Paper title: Evolutionary Biology

Upon completion of the course, the students were able to:

1. Acquire problem solving and high order analytical skills by attempting numerical problems as well as performing simulation studies of various evolutionary forces in action.
2. Apply knowledge gained, on populations in real time, while studying speciation, behaviour and susceptibility to diseases.
3. Gain knowledge about the relationship of the evolution of various species and the environment they live in.
4. Get motivated to work towards mitigating climate change so that well adapted species do not face extinction as a result of sudden drastic changes in environment.
5. Use knowledge gained from study of variations, genetic drift to ensure that conservation efforts for small threatened populations are focused in right direction.

6. Predict the practical implication of various evolutionary forces acting on the human population in the field of human health, agriculture and wildlife conservation.
7. Use various software to generate interest towards the field of bioinformatics and coding used in programming language.

Discipline Specific Electives (DSE):

Paper title: Animal Behaviour and Chronobiology

Upon completion of the course, the students were able to:

1. Understand types of animal behaviour and their importance to the organisms.
2. Enhance their observation, analysis, interpretation and documentation skills by taking short projects pertaining to Animal behaviour and chronobiology.
3. Relate animal behaviour with other subjects such as Animal biodiversity, Evolutionary biology, Ecology, Conservation biology and Genetic basis of the behaviour.
4. Understand various process of chronobiology in their daily life such as jet lag.
5. Learn about the biological rhythm and their application in pharmacology and modern medicine.
6. Realize, appreciate and develop passion to biodiversity; and will respect the nature and environment.

Paper title: Animal Biotechnology

Upon completion of the course, the students were able to:

1. Use the basic techniques of biotechnology like DNA isolation, PCR, transformation, restriction digestion etc.
2. 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.
3. Understand better the ethical and social issues regarding GMOs.
4. Use the knowledge for designing a project for research and execute it.

Paper title: Immunology

Upon completion of the course, the students were able to:

1. Describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity.
2. Define the cellular/molecular pathways of humoral/cell-mediated adaptive responses including the role of Major Histocompatibility Complex.
3. Explain the cellular and molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory.
4. Understand the molecular basis of complex, humoral (Cytokines and Complement) and cellular processes involved in inflammation and immunity, in states of health and disease.
5. Describe basic and state-of-the-art experimental methods and technologies.
6. 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.

Paper title: Wildlife Conservation and Management

Upon completion of the course, the students were able to:

1. Become aware about the importance of wildlife in general, and its conservation and management in particular.

2. Comprehend the application of the principles of ecology and animal behaviour to formulate strategies for the management of wildlife populations and their habitats.
3. Understand the management practices required to achieve a healthy ecosystem for wildlife population along with emphasis on conservation and restoration.
4. Know the key factors for loss of wildlife and important strategies for their *in situ* and *ex situ* conservation.
5. Recognize the techniques for estimation, remote sensing and Global Position Tracking for wildlife.
6. Gain knowledge about the wildlife diseases and the quarantine policies.
7. Know about the Protected Area Networks in India, Ecotourism, Ecology of perturbation and Climax persistence.
8. Perform critical thinking, literature review; scientific writing as well as presentations; and participate in citizen science initiatives with reference to wildlife.

Skill Enhancement Courses (SEC):

Paper title: Medical Diagnostics

Upon completion of the course, the students were able to:

1. Gain knowledge about various infectious, non-infectious and lifestyle diseases, tumors and their diagnosis.
2. Understand the use of histology and biochemistry of clinical diagnostics and learn about the molecular diagnostic tools and their relation to precision medicine.
3. Develop their skills in various types of tests and staining procedure involved in hematology, clinical biochemistry and acquired knowledge about the basics of instrument handling.
4. Learn scientific approaches/techniques used in the clinical laboratories to investigate various diseases and be skilled to work in research laboratories.
5. Gain knowledge about common imaging technologies and their utility in the clinic to diagnose a specific disease.

Paper title: Research Methodology

Upon completion of the course, the students were able to:

1. Describe basic concepts of research and its methodologies.
2. Identify appropriate research topics and set up hypothesis.
3. Perform literature review using library (print) and internet (online) resources.
4. Design experiments/surveys, collect data and represent data in tables/figures.
5. Analyze data with appropriate software tools, interpret results and draw conclusion.
6. Write scientific report/ review/ thesis and prepare seminar/ conference presentations – oral as well as poster.
7. Understand the methods of citation and referencing styles, check plagiarism and get insight of intellectual property right.

Generic Electives (GE):

Paper title: Aquatic Biology

Upon completion of the course, students were able to:

1. Know the physico-chemical environment, and its role in aquatic ecosystem.
2. Learn about adaptations exhibited by organisms to survive in these typical conditions.

3. Realize how human activities influence the physicochemical environment of water bodies, and devastating impact it has on aquatic organisms.
4. Learn about the laws governing the use of freshwater systems, as well as the local, state, federal, and international agencies that enforce these laws to protect endangered and vulnerable species.
5. Understand and apply relevant scientific principles in the area of aquatic biology and educate others or work to conserve our natural resources.

Paper title: Food, Nutrition and Health

Upon completion of the course, students were able to:

1. Have a better understanding of the association of food and nutrition in promoting healthy living.
2. Think more holistically about the relationship between nutrition science, social and health issues.
3. 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.
4. Specialize in various fields of nutrition.

Paper title: Human Physiology

Upon completion of the course, students were able to:

1. Know the principles of normal biological function in human body.
2. Outline basic human physiology and correlate with histological structures.
3. Understand how animals maintain an internal homeostatic state in response to changes in their external environment.

Paper title: Insect Vector and Disease

Upon completion of the course, students were able to:

1. Identify different insects and classify them based on their morphology and behaviour.
2. Describe the host-pathogen relationships and the role of the host reservoir on transmission of parasite.
3. Explain various modes of transmission of parasite by insect vectors.
4. Recognize various possible modern tools and methodologies for laboratory diagnosis, surveillance and treatment of diseases.
5. Define various terms related to insect transmitted diseases such as vectorial capacity, mechanical and biological transmission, host specificity etc.
6. Identify the risk groups and characterize them on the basis of exposure risk.
7. Explain control methods of insect vector diseases including spreading awareness on public health programs and mitigating insect borne diseases.
8. Employ the use of advanced management strategies in disease control with respect to parasite evolution.

20.COURSE : B.A (PROGRAMME)

DEPARTMENT OF TAMIL

Course Outcomes

Introduction to the Programme

The Tamil Syllabus for Under Graduate programme has been designed adopting the latest Literature and Language Teaching methodologies adopted across the world in order to enable learners to attain the required language competency levels and the competency to understand literature critically. Each module aims at imparting specific critical ability as well as life skills that would help learners to develop their ability to use the language in critical and domain specific modes, and use the critical approach adopted in literary studies. The curriculum intends to integrate critical thinking and critical writing in the class rooms with the help of concrete tasks and project based collaborative teaching-learning.

B.A (Prog) I Semester

Paper -I: History of Indian Language (MIL Tamil- A)

Course objectives:

This course aims at introducing the history of Tamil language beginning from the origin of the Tamil script available from the cave inscriptions and archeological excavations to the modern developments of 20th century. The earliest available literature of Tamil, the *Sangam* Anthology and *Tolkāppiyam* are taken as the source to discuss the structure of ancient Tamil. The latter texts of grammatical treatises, epics, commentaries etc., stand as the resource for the study of evolution of Tamil during the medieval period. It discusses phonological, morphological, semantic, and syntactic changes taken place in the language.

Course learning outcomes:

This course would enlighten the students the place of Tamil in Dravidian family of languages, various dialects of Tamil and the impact of Sanskrit and other languages in Tamil.

B.A (Prog) I Semester

Paper-I: Functional Grammar of the Language (MIL Tamil-B)

Course objectives:

Functional grammar has a number of features which makes it suitable for studying language variation. It looks closely at the different contribution made by clause, phrase and word structure to a group.

Course learning outcomes:

The primary objective of this paper is to provide essential principles of Tamil grammar with prescriptive rules and exercises to bring the learner as quickly as possible to the point where he/she can understand the imperative features of forms and structures of words (morphology) with their customary arrangements in phrases and sentences and to serve as a reference for consolidating the grasp of the language.

B.A (Prog) III Semester

Paper - II: History of Ancient Tamil Literature (MIL Tamil - A)

Course objectives:

The aim of the course is to give a complete survey of Tamil literature in chronological order. Since Tamil has a vast collection of literature from the ancient to modern time, it is necessary to introduce to the students of language and literature with literary texts in historical background. This course explains the types of Tamil literature, their social and historical background of Sangam period.

Course learning outcomes:

This course will enable students to understand the ancient, medieval, and modern literary history in a comprehensive method. The evolution, changes, and transition in literary production, emergence, and development of various literary genres are discussed with specific examples.

B.A (Prog) III Semester

Paper - II: History of Modern Tamil Literature (MIL Tamil - B)

Course objectives:

The aim of the course is to give a complete survey of Modern Tamil literature in chronological order. Since Tamil has a vast collection of literature from the ancient to modern time, it is necessary to introduce to the students of language and literature with literary texts in historical background.

Course learning outcomes:

This course explains the types of Tamil literature, their social and historical background from Modern period. The evolution, changes, and transition in literary production, emergence, and development of various literary genres are discussed with specific examples.

B.A (Prog) I Semester (DSC Tamil)

Paper - I: Oral Traditions: Folk Tales, Songs and Myths

Course objectives:

The aim of the course is to teach the students to read literature as the source to understand and explain the Folklore, songs and myths of a society. It will train the students to write on the specialized subject of Folklore and Culture with the help of literary texts and to incorporate this knowledge in understanding of literature and other studies. This course will enhance the ability in language usage by developing the technical terminology of the specific fields of knowledge. The teaching method of this course includes the identification of texts which contains the elements of Folklore and Culture in Tamil.

Course learning outcomes:

The intense study of select texts will equip the students to understand the particular field of knowledge in Tamil and inculcate an ability to write on these disciplines. This study shall explain the role of literature to understand Folklore and Culture and the need of these disciplines in understanding and production of literary texts.

B.A (Prog) II Semester (DSC Tamil)

Paper - II: Study of Important Authors

Course objectives:

The study of an important author will enable the students to understand the significant contribution made by the author to the society, the impact of his philosophy and writings on the society and the far reaching changes brought out by his path breaking and revolutionary ideas.

Course learning outcomes:

This course will enable the students to critically examine his life and works in a focused manner and to understand the underlying forces that shaped his life and philosophy and such an analysis will be a source of inspiration for the students.

B.A (Prog) III Semester (DSC Tamil)

Paper - III: Cultural Behavior of the Tamils

Course objectives:

The aim of the course is to acquaint the students with the meaning of culture and the various manifestations of culture such as social customs, clan traditions, family customs, rituals, festivals, belief on comen etc. The study will enable the students to understand the social, religious and cultural significance of the behavioral patterns exhibited by the people in the society, based on cultural beliefs.

Course learning outcomes:

The study will enable the students to know the evolution of culture and to understand the various cultural issues facing the present society.

B.A (Prog) IV Semester (DSC Tamil)

Paper - IV: Study of Important Texts: Tamil

Course objectives:

The aim of the course is to enable the students to analyze the work of an author intensively so that the students can have a deep insight into the period in which the work was written, the life styles of the people, historical information such as kings, forts and palaces, description of nature, knowledge of fauna and flora, various forms of love and above all the message of the author as embodied in the work.

Course learning outcomes:

The study will motivate the students to develop their literary interests, tastes and creative abilities.

B.A (Prog) V Semester (DSE Tamil)

Paper - I: Selected Texts: Novel & Short Story

Course objectives:

Introduction of European thoughts in Tamil land - impact of missionaries and European administration - introduction of print medium and modern education - emergence of

modernity in Tamil - development of new literary genres: prose, non-fiction, novel, short story and modern poetry - development of novel and short stories as narratives in Tamil.

Course learning outcomes:

The study will motivate the students to develop their Tamil literary heritage of storytelling - socio-political issues in fiction writings - emergence of various genres in Novel - representation of novels from the first Tamil novel to contemporary novels - trends and various approaches in fiction writing.

B.A (Prog) VI Semester (DSE Tamil)

Paper - II: Selected Texts: Tamil Poetry & Play

Course objectives:

Emergence of modernity in Tamil - development of new literary genres - prose, non-fiction, novel, short story and modern poetry - emergence and development of modern poetry - earlier attempts and various schools of modern poetry - major poets and their contribution - contemporary developments.

Course learning outcomes:

This study will enable the students to understand the Ancient forms of Tamil Drama – *Kūttu*, a traditional Tamil theatre - Tamil theatre tradition - European drama and Tamil dramatists - emergence of new theatre performance - dramatic works in modern period - post independent Tamil drama - emergence of new theatre movements - reading and analysis of modern plays.

B.A (Hons) I Semester (G.E)

Paper- I: Practical translation of knowledge based text books & Documents

Course objectives:

The aim of the course is to enable the students to understand the process and nuances of translation from one language to another to not only develop their skills of translation but also to create an interest to read great translated works in other languages, so that they have a wider perspective of world literature.

Course learning outcomes:

The course will equip the students with the theories of translation as Techniques of translation well as practical aspects of translation.

B.A (Hons) II Semester (G.E)

Paper - II Creative Writing

Course objectives:

Writing is the most potent and yet the simplest form of human expression. Unlike speech, writing transcends the barriers of space and time. The craft of writing has multiple

dimensions - novels, short stories, essays, stage plays, fiction, non-fiction, screen-writing, mainline print and visual media, profile-writing, interviews, blogs, web-writing, travelogues and experimental pieces. The Course is intended to help students express ideas through a medium that has appreciable aesthetic appeal.

Course learning outcomes:

This course is designed to make understand creativity and attain a firm command over the medium. This creative writing course includes practical activity so that students are able to test and experiment with something they have learnt in the classroom.

B.A (Hons) III Semester (G.E)

Paper - II: Specific Literary Terms (Tamil)

Course objectives:

This course offers a glimpse into the exciting world of literary terms, critical theories and points of view that are commonly used in East and West to classify, analyze, interpret, and write the history of works of literature.

Course learning outcomes:

This purpose of the study is to help students identify and absorb the essential terms and devices used by authors to gain a thorough understanding of the works and to keep them current with the rapid and incessant changes in the literary and critical scene and to take into account new publications in literature, criticism and scholarship.

B.A (Hons) IV Semester (G.E)

Paper - V: Autobiography

Course objectives:

The aim of the course is to enable the students to know the history of the author, his struggles and significant achievements, the conditions and various forces of his period that shaped him and his everlasting contribution to the society. As the author portrays his life truthfully with an emotional and personal appeal, the study will enable the students to establish a personal rapport with the life and philosophy of the author as reflected in the autobiographical work.

Course learning outcomes:

The study of autobiographical works will guide the students to appreciate the higher ideals that need to be followed and the pitfalls that need to be avoided in their own lives.

B.Com (Prog) II Semester (MIL Tamil)

Paper -I: Business Communication-Tamil

Course objectives:

The course is designed to bring to the students the joy of learning Tamil Business communication with outmost ease and productivity. The carefully identified units lead them to step by step, giving such information only as is positively required, at the stage at which they have reached. The aim of the course is to enable the students to improve their communication skills in various practical day-to-day Business dealings and in their interactions with commerce and Banking.

Course learning outcomes:

This course will highlight the meaning, objectives and importance of Business communication, Effective Business Letter, Business Report Writing, Modern forms of Communications etc so that the students can avoid distortion in their communications and express clearly what they intend to convey.

B.Com (Prog) III Semester (MIL Tamil)

Paper - II: Modern Tamil Poetry and Prose

Course objectives:

The aim of the course is to give a complete survey of Tamil Modern Poetry and Prose in chronological order. Since Tamil has a vast collection of modern time, it is necessary to introduce to the students of language and literature with literary and Prose texts in historical background of modern period.

Course learning outcomes:

This course explains the types of Tamil modern literature, their social and historical background of modern period. It deals with and modern literary and prose history in a comprehensive method. The evolution, changes, and transition in literary production, emergence, and development of various modern literary genres are discussed with specific examples.

B.A (Prog) I Semester (AECC Tamil A & B)

Paper – I: MIL Communications (Tamil Communication)

Course objectives:

The course is designed to bring to the students the joy of learning Tamil language with utmost ease and productivity. The carefully selected lessons lead them step by step, giving such information only as is positively required, at the stage at which they have arrived. It presents English speaking students with a few lessons in which they may commence Tamil, and gradually acquire a thorough knowledge of the colloquial dialect, and afterwards an introductory knowledge of the grammatical dialect. The aim of the course is to enable the students to improve their communication skills in various practical day-today life situations and in their interactions with others.

Course learning outcomes:

The course will highlight the theories of communication, types of communication and language of communication so that they can avoid distortion in their communications and express clearly what they intend to convey.

DEPARTMENT OF TELUGU
COURSES & OUTCOMES

Program Outcomes

The Telugu Syllabus for Under Graduate programme has been designed adopting the latest Literature and Language Teaching methodologies adopted across the world in order to enable learners to attain the required language competency levels and the competency to understand literature critically. Each module aims at imparting specific critical ability as well as life skills that would help learners to develop their ability to use the language in critical and domain specific modes, and use the critical approach adopted in literary studies. The curriculum intends to integrate critical thinking and critical writing in the class rooms with the help of concrete tasks and project based collaborative teaching-learning.

B.A (Prog) I Semester
Paper -I: Functional Telugu Grammar and Skills in Language use (MIL Telugu- A)

Course objectives:
The Primary objective of this Paper is to provide a concise presentation of the essential principles of grammar of Telugu, with prescriptive rules and exercises to bring the learner as quickly as possible to the point where he/she can understand the imperative features of forms and structures of words (morphology) with their customary arrangement in phrases and sentences: and, to serve as a reference for consolidating the grasp of the language. The second part deals with basic language skills useful in modern time.
Course Learning Outcomes:
The Students will be able to develop the basic understanding of the imperative features of forms and structure of words with their customary arrangement in Phrases and Sentences. They will be able to fill variety of forms in daily use. Writing simple letters, understanding of the Comprehension, using of the Technical terms, Idioms and Proverbs, organizing a paragraph using appropriate linkers, Writing simple descriptive and narrative pieces.

B.A (Prog) II Semester
Paper: II Literary Criticism in Telugu ((MIL Telugu- A)
Course objectives:
Literary criticism is very important tool to understand literary texts. Telugu critics have followed ancient Sanskrit literary theories in their writings in the beginning and after English education; critics have applied western literary theories in their literary writing. In this course students are going to study both Indian and western literary theories in Telugu.
Course Learning Outcomes:

After learning this course students will understand about the ancient Indian literary theories in Telugu and influence of modern western literary theories in Telugu literature.

B.A (Prog) III Semester

Paper – III: Introduction to Prosodic Systems in Telugu (MIL Telugu- A)

Course objectives:

Poetry carries to the reader vast cognitive and aesthetical information, which is distributed throughout its structural, lexical, stylistic and other information layers. It requires profound knowledge and special skills for its complete and exhaustive deciphering. The course is designed to equip modern student comprehend and appreciate the basic features of Prosody as a literary technique and its multiple functions in poetry and prose.

B.A (Prog) IV Semester

Paper – IV: History of Telugu Literature (Ancient to Medieval) (MIL Telugu- A)

Course Objectives:

This course gives an outline of Telugu literature from Ancient period to Medieval and introduces different phases of writing in Telugu literature. After reading the prescribed texts, students will acquire knowledge about some of the greatest poets and their compositions in Telugu. Student would read the essence of the texts from Pre-Nannaya period to South Indian School of literature comprising from 11th to 18th century. The endeavor would be to make students realize the cultural history of the Telugu people through prescribed texts.

Course Learning Outcomes:

Students will understand about the history of Telugu literature from the begging to 18th century and get the idea of different ancient Telugu genres.

B.A (Prog) V Semester

Paper – V: History of Telugu literature (Modern period up to 1980) (MIL Telugu- A)

Course objectives:

The aim of the course is to introduce Modern Telugu literature from the second half of 19th Century to present times. This would help students learn the import of various literary movements in recent literary history. This course would look at the concept of modernity in Telugu literature and through light on some of the influential literary movements like Bhava Kavitvam and Abhyuda Kavitvam.

Course Learning Outcomes:

Students will be familiar with all modern literary movement in Telugu literature upto 1980.

B.A (Prog) VI Semester

Paper – VI: Language varieties in Telugu (MIL Telugu- A)

Course Objectives:

The course aims at creating an awareness of varieties in linguistic usage and their successful application in creative literature. It looks at various aspects of high literary language and rules of grammar in Telugu alongside the common conversational/colloquial language. The language of earl y commentaries and prose books in Telugu, the emergence of 'Chaste Telugu' movement and the language of poetry in terms of the choice of words and the grammatical forms would be enunciated in detail .

Course Learning Outcomes:

It is expected that the Students will be able to develop the basic understanding of the difference between literary language and spoken language in pre modern era in Telugu and the influence of Sanskrit and Prakrit languages o Telugu and Language Varieties in modern Telugu literature.

B.A (Prog) I Semester

Paper – I: A progressive grammar of Telugu language (MIL Telugu- B)

Course Objectives:

The primary objective of this Paper is to provide essential principles of Telugu grammar with prescriptive rules and exercises to bring the learner as quickly as possible to the point where he/she can understand the imperative features of forms and structures of words (morphology) with their customary arrangement in phrases and sentences; and, to serve as a reference for consolidating the grasp of the language.

Course Learning Outcomes:

It is expected that the Students will be able to develop the basic understanding of the imperative features of forms and structure of words with their customary arrangement in Phrase and Sentences.

B.A (Prog) II Semester

Paper – II: History of Telugu Language (MIL Telugu- B)

Course objective:

The course intends to furnish a comprehensive account of the origin and development of Telugu language in the light of studies during modern time. It is broadly divided into three main periods: (i) Influence of Prakrit and Dravidian languages up to A.D. 1100, (ii) Influence of Sanskrit from A.D. 1100 to 1800 and (iii) European influence and modern trends from A.D.1800. It discusses phonological, morphological, semantic and syntactic changes taken place in the language.

Course Learning Outcomes:

This course would enlighten the students the place of Telugu in Dravidian family of languages, various dialects of Telugu and the impact of Sanskrit and other languages in Telugu.

B.A (Prog) III Semester

Paper – III: Critical appreciation of Telugu Poetry: Select Texts (MIL Telugu- B)

Course objectives:

The aim of the Paper is to introduce students to some of the best works of poetry from medieval and modern periods in Telugu literature and teach the essential beauty and meaningfulness of each of the poems. Students would read excerpts from the earliest text Andhra Mahabharatamu, medieval Prabandha Texts like Sri Kalahasti Mahatmyamu, Molla Ramayanamu and, from two well-known modern works: Nagatichalu and Kavya Homamu.

Course Learning Outcomes:

After learning the course students will be able to evaluate critically and appreciate prescribed literary texts.

B.A (Prog) IV Semester

Paper – IV: Contemporary trends in Telugu literature (MIL Telugu- B)

Course objectives:

After 1980s, there is radical change in the Telugu society and it reflected on Telugu literature too. Several new literary movements have began in the Telugu literature. This course is to teach Telugu literature from 1980 to 2015 and it will give an idea of the present position of the society which is depicted in contemporary literature .

Course Learning Outcomes:

After studying this course Students will critically examine the issues highlighted in the texts and express their ideas and observations.

B.A (Prog) V Semester

Paper – V: Telugu Literature and other Arts (MIL Telugu- B)

Course objectives:

This course looks closely at the relationship of art, Architecture, Music, Dance and literature, focusing most specifically upon the complementary nature of the forms from a historical perspective, i.e., how this relationship has changed the art forms since their inception. The course discusses the manner in which different arts were depicted in medieval and modern Telugu literature and the place of music and metre in literature. It will focus on the origin and development of Andhra traditional dance, its importance in the qualitative life of human beings, and how the different dance forms reflected in art, architecture and literature of the region

Course Learning Outcomes:

This course will give the outline of interaction between literature and other arts and Students will be able to understand the multidisciplinary approach method in literature.

B.A (Prog) VI Semester

Paper – VI: Study of Telugu Folklore (MIL Telugu- B)

Course objectives:

The aim of the course is to teach Telugu folklore and culture. In this course, students will read, discuss and write about folk studies and cultural studies since colonial times. Students would find out the relation between folklore and culture and context through Literature. This course also intends students to discuss the influence and impact of the folk literature on Telugu literary forms. The course focuses on themes such as Oral Telugu literature, Material culture, Festivals etc. Students will also understand the necessity of collection, preservation and printing of folklore in the modern age.

Course Learning Outcomes:

By reading select prescribed texts, students would develop an understanding of the characteristics and purpose of folklore and culture. Students would also understand ancient culture and traditions preserved in Telugu folklore and develop faculties of critical observation and analysis.

B.A (Prog) I Semester

Paper – I: Functional grammar and Skills in language use (MIL Telugu- C)

Course Objectives:

The Primary objective of this Paper is to provide a concise presentation of the essential principles of grammar of Telugu, with prescriptive rules and exercises to bring the learner as quickly as possible to the point where he/she can understand the imperative features of forms and structures of words (morphology) with their customary arrangement in phrases and sentences: and, to serve as a reference for consolidating the grasp of the language. The second part deals with basic language skills useful in modern time.

Course Learning Outcomes:

The Students will be able to develop the basic understanding of the imperative features of forms and structure of words with their customary arrangement in Phrases and Sentences. They will be able to fill variety of forms in daily use. Writing simple letters,

Organising a paragraph using appropriate linkers, Writing simple descriptive and narrative pieces.

B.A (Prog) II Semester

Paper – II: Study of literary texts: Telugu Short Stories (MIL Telugu- C)

Course Objective:

Short story became a one of the popular literary genre in Telugu literature. The main aim of the course is to introduce the influence of European thoughts on Telugu literature. This course will also discuss the Telugu literary heritage of storytelling - socio-political issues in Telugu short story and contemporary trends and various approaches in Telugu short story writing.

Course Learning Outcomes:

Students will be able to understand the history of Telugu short story, its unique features.
Students will get the knowledge of important short story writers in Telugu.
Students will be able to analyze the texts critically

B.A (Prog) III Semester

Paper – III: Study of Literary Text: Non-Fiction (Telugu) (MIL Telugu- C)

Course Objective:

The main aim of the course is to introduce select Non-Fictional writings to Telugu students i.e. Travelogue, Biographical sketches and essay.

Course Learning Outcomes:

Students will understand how to read and understand non fictional Telugu writings and also learn different literary wring methods in Telugu literature.

B.A (Prog) IV Semester

Paper – IV: Study of Important Authors (MIL Telugu- C)

Course objectives:

This course aims at introducing the authors whose path-breaking works have changed the perception of an individual and society. This makes the understanding of the society, ancient, medieval or modern, lucid through the stance taken according to the challenges faced by the authors.

Course Learning Outcomes:

The Paper also encourages comparisons among the authors to observe the patterns of development from ancient to modern. The study of authors, in that sense, provides an outlook for research needed at later stage.

B.A (Prog) V Semester

Paper – V: Study of Novel and Drama in translation (MIL Telugu- C)

Course objectives:

The aim of the course is to introduce select Indian important literary genres, authors and their writings through translation. This will give an understanding of the non Telugu speaking people literary culture.

Course Learning Outcomes:

This course would illuminate the students about Non Telugu writings tradition in vernacular literature and select author's place in Indian literature

B.A (Prog) VI Semester

Paper – VI: Introduction to Journalism (Telugu) (MIL Telugu- C)

Course objectives:

The aim of the course is to give the history of Telugu journalism and the role of journals and their editors and other communication methods in Telugu speaking areas. This course will explain the different features in news reporting items and other new communication methods and translations methods in Telugu.

Course Learning Outcomes: This course would elucidate the students about how the editors and writers played key role to educate the society and their writing methods and students will understand how to translate a news item from Telugu to English and vice versa .

B.A (Prog) I Semester (DSC Telugu)

Paper – I: Origin and development of Telugu language

Course objective:

The course intends to furnish a comprehensive account of the origin and development of Telugu language in the light of studies during modern time. It is broadly divided into three main periods: (i) Influence of Prakrit and Dravidian languages up to A.D. 1100, (ii) Influence of Sanskrit from A.D. 1100 to 1800 and (iii) European influence and modern trends from A.D.1800. It is generally believed that the earliest rulers of the Telugu region were Prakrit speaking Andhra Satavahana's. But the recently found early inscriptions confirm Telugu was in vogue then. During the next phase Sanskrit has considerably influenced its phonology, morphology, syntactic structure and grammatical system. The reign of Mohammadan rulers and later the Europeans further enriched the language and favoured the use of the living language as spoken by people instead of the old classical style. The course purposes as exegetic study of Telugu in the Dravidian family of languages, its linguistic structure, various dialects and the present day language movements.

Course Learning Outcomes:

This course would enlighten the students the place of Telugu in Dravidian family of languages, various dialects of Telugu, the impact of Sanskrit and other languages in Telugu.

B.A (Prog) II Semester (DSC Telugu)

Paper – II: A brief survey of Telugu Literature

Course objectives:

Telugu literature has more than thousand year's history and it is one of the classical languages in India. The main aim of the course is to introducce the important poets and their wrings to Telugu students from 11th century to modern period.

Course learning outcomes:

After completing the course, students will be able to understand the different genres and very well known poets and their wrings in Telugu literature.

B.A (Prog) III Semester (DSC Telugu)

Paper – III: Social and Cultural History of Telugu people

Course objectives:

The course proffers a glimpse into the cultural life of Telugu people from ancient times and the changes that have taken place until recent times.

Course learning outcomes:

The plan of study is divided into following parts and students will get to know about: the geographical location, early history, social fabric and the state of economy, village organization and customs and manners; Telugu society, their province, language, institutions of administration, religious practices, festivities and socio - cultural activities from Satavahana Age to Kakatiya Rule; from subservience to Sovereignty during Kakatiya - s, the role of feudatories, industry and trade, religion, cast and society, literature and art; the Vijayanagara Empire, the Golconda kingdom, South Indian spread of Andhra - s and, socio - cultural changes during English rule and after Independence are taken up for elucidation.

B.A (Prog) IV Semester (DSC Telugu)

Paper – IV: An exegetic study of Telugu Novel

Course objectives:

In fictional writings, novel is considered as one of the popular writing in Telugu. Though it was begun in Telugu with influence of western literature, it has been representing Telugu culture and society.

Course learning outcomes:

This course will give an understanding of Learning about varied techniques of fiction and socio-political issues in fiction writing.

B.A (Prog) V Semester (DSC Telugu)

Paper – V: Modern Telugu poetry and drama

Course Objective:

Emergence of modernity in Telugu – Development of new literary genres – Advent of Modernism and development of Modern Poetry – Earlier attempts and various Schools of Modern Poetry – Major Poets and their contribution- Contemporary developments.

Course Learning Outcomes:

This study will enable the students to understand the Ancient forms of Telugu Drama – Veethi as a traditional Telugu theatre – European Drama and Telugu dramatists – Emergence of New Theatre performance – Dramatic works in modern period – Post independent Telugu drama – Emergence of new theatre movements – Reading and analysis of Modern Plays.

B.A (Prog) VI Semester (DSC Telugu)

Paper – VI: Classical and Medieval Telugu poetry

Course Objective:

The main aim of the course is to introduce some of the important authors and their writings from 14th to 18th Century Telugu literature. In this course, Different genres i.e. Kavya, Shataka and Kirtanas selected to understand the diversity and continuity in Telugu literature.

Course Learning Outcomes:

This course will enable students to understand features of different Telugu genres and socio, economic political and cultural issues that are depicted in the texts.

B.A (Prog) I Semester (AECC Telugu A, B, C)

Paper – I: MIL Communications (Telugu Communication)

Course Objectives:

The course is designed to bring to the students the joy of learning Telugu language with utmost ease and productivity. The carefully selected lessons lead them step by step, giving

such information only as is positively required, at the stage at which they have arrived. It presents English-speaking students with a few lessons in which they may commence Telugu, and gradually acquire a thorough knowledge of the colloquial dialect, and afterwards an introductory knowledge of the grammatical dialect.

Course Learning Outcomes:

This course would enlighten the students about the language communication and different methods of Language communication.

B.A (Prog) Semester – III

SKILL ENHANCEMENT COURSE (SEC): Telugu (A) & (B)

Paper : Language in Printing and publishing

Course objectives

The course provides students an understanding of Telugu in Printing and Publishing. It will discuss how the Telugu Language is using differentl y in Print media. This course gives an outline of Telugu Language in Print from beginning days to till the date . After reading the prescribed text, student will acquire knowledge of Telugu Printing and Publishing Language.

Course Learning Outcomes:

This course would give knowledge of Telugu language, printing and publishing methods and its writing methods and style.

B.A (Prog) Semester – VI

SKILL ENHANCEMENT COURSE (SEC): Telugu (A) & (B)

Paper : Language in Films

Course objectives

The course will examine the use of Telugu language in select films and focuses on a multitude of changes in course of time. Students would be trained to critically examine available movie scripts and look at the screen adaptations of novels and short stories. This is purposed to understand and identify the refined use of language to initiate successful expression of aesthetic emotions on screen and how the culture and society influence its various manifestations.

Course Learning Outcomes:

This course will be enable students to understand the Telugu language in films from beginning to till the date and dialect of Andhra, Rayalaseema and Telangana in the Telugu films and poetics in Telugu film songs.

B.A (Hons) I Semester (G.E)
Paper I : Introduction to classical Telugu poetry (Telugu)

Course objectives:
The main aim of the course is to introduce some of the important authors and their writings in Telugu literature. In this course, students are going to study the Emergence of Telugu poetry during religious strife and political unrest – Purana – Kavya and didactic literature - Bhakti movement – The Age of Poet Trinity – Siva Kavi-s – Srinatha & Potana – Prabandha – Sataka – Genres during South Indian School of literature.
Course Learning Outcomes:
This course will enable students to understand features of different Telugu genres and socio, economic political and cultural issues that are depicted in the texts.

B.A (Hons) II Semester (G.E)
Paper II: Cultural Behavior of Telugu People (Telugu)

Course objectives
This Course endeavours to teach the student the cultural bearings of the Telugu speaking states of Andhra Pradesh and Telangana that share a common language but of different geographical, historical and socio-economic backgrounds. The diversity of customs and traditions, festivals, food habits, the local historic fairs and celebrations, clothing, and more significantly, the attitudes and behaviour of people are to be studied to understand the regional aspirations and political formations.
Course Learning Outcomes:
This course will enable students to understand the important dynasties and rulers of Andhra, Telangana and Rayalaseema. Students will also understand cultural differences among the Telugu people and how Telugu land was separated into different states.

B.A (Hons) III Semester (G.E)
Paper III: Specific Literary Terms (Telugu)
Course Objective:
This course offers a glimpse into the exciting world of literary terms, critical theories and points of view that are commonly used in East and West to classify, analyze, interpret, and write the history of works of literature.
Course Learning Outcomes:
The purpose of the study is to help students identify and absorb the essential terms and devices used by authors to gain a thorough understanding of the works and to keep them current with the rapid and incessant changes in the literary and critical scene and, to take into account new publications in literature, criticism, and scholarship.

B.A (Hons) IV Semester (G.E)

Paper IV: A Study of Autobiography and Biography (Telugu)

Course Objective:

The objective of the course is to introduce the genres Autobiography and Biography in Telugu. In this the students would read the life histories of some of the well-known personalities in Telugu either recalled by themselves or told by celebrated historians.

Course Learning Outcomes:

The course would help the Students closely look at the art of writing Autobiography or a Biography. After understanding the technique of writing and studying the essence of a few of the texts, students would be required to paraphrase a part of the biography or autobiography.

B.Com (Prog) II Semester (MIL Telugu)

Paper -I: Telugu Poetry, Short Story and Modern Prose

Course Objectives:

The main Objective of the course is to introduce select Telugu poetry, Short stories and drama to Telugu students.

Course Learning Outcomes:

Students will understand how to read and understand learn different literary wring methods in Telugu literature and students will examine critically the issues highlighted in the texts.

B.Com (Prog) III Semester (MIL Telugu)

Paper -II: Business Communication / Telugu

Course Objective:

Business Communication is for the specific purpose of communication and conducting business at the workplace. It involves an understanding of the communication structure, the ways in which messages are sent and received, how and why the speaker has to be careful of the words and also the means used to communicate. At the workplace, no work can get done without the message being suitably communicated to the person concerned.

Course Learning Outcomes:

In this paper students will learn about the effective ways to communicate, which channels should be used and when. By the end of this course students will learn what is business communication, types of communication, channels of communication and directions of communication.