Department of Botany

Course Outcomes and Programme outcome

(Honours and General)

Course Outcome B.Sc. Botany (Honours)

Phycology (Semester I, Paper- BOT-A-CC-1-1-TH, BOT-A-CC-1-1-P)

- To give the general overview of General characteristics like ultrastructure of algal cell.
- To be able to understand the concept of origin and evolution of sex and life cycle patterns found in different species of algae including classification of Lee (2008)
- To provide thorough knowledge about various algal groups including their Life History.

Microbiology (Semester I, Paper- BOT-A-CC-1-1-TH, BOT-A-CC-1-1-P)

- To give a brief overview on Discovery and understanding the concept of Transmission and Translocation of Plant virus and a detailed account on TMV Characteristics and Multiplication.
- To be able to understand a detailed analysis of Lytic cycle of T4 phage and Lysogenic cycle of Lambda phage.
- To give a basic concept on Viroids and Prions and one step growth curve.
- To be able to understand the idea behind the discovery analyzing the distinguish features of Archaea and Bacteria and discussing the characteristics of major group of Bacteria.
- To give an understanding the concept of Bacterial growth curve and generation time.
- To provide an overview on the ultrastructure of Flagella and Pilli with a brief concept of Cell wall structure of Gram +ve and Gram –ve bacteria with a major focus on the differences between the two.
- To study the basic concept on Bacterial genome & Plasmid and Endospore.
- To give a detailed account of Genetic Recombination, emphasizing Transformation, Conjugation and Transduction.

Mycology (Semester I, Paper- BOT-A-CC-1-2-TH, BOT-A-CC-1-2-P)

- To study detailed structure of fungus, different types of fungal spores and their mode of liberation
- To gather knowledge about different types of sexual reproduction in fungus, degeneration of sex, parasexuality and fungal lifecycle pattern.
- To develop overall idea on classification of fungus and learn about the general characteristics of each class with suitable examples.
- To know the life history of some typical class representatives of common Indian fungal species.
- To study symbiotic association between algae and fungi (lichen) and higher angiosperms (mycorrhiza) and their practical applications.
- To acquire practical experiences about the vegetative and reproductive structures, spore measurement of the above said class representative fungal specimen.
- To get an idea about the diversity of fungal flora of different localities, knowledge about their growing season, their habit and habitat, morphology of different types of fruit body etc. through field excursion.
- To teach the difference between edible and poisonous mushroom through field study which is of immense importance in practical life.

Phytopathology (Semester I, Paper- BOT-A-CC-1-2-TH, BOT-A-CC-1-2-P)

- To gain knowledge about the concept, scope and importance of Plant pathology
- To impart understanding about the general symptoms of plant diseases; geographical distribution of diseases; etiology and symptomology and understand the courses of disease development.
- To study the host-pathogen relationships; disease cycle and environmental relation.
- To impart Knowledge about prevention and control of plant diseases, and role of quarantine and Bio-control and Integrated Pest management.
- To give students hands on training on preparation of culture media, sterilization process, isolation of pathogen from diseased leaf, inoculation of fruit and identification of different plant diseases.

Anatomy (Semester II, Paper- BOT-A-CC-2-3-TH, BOT-A-CC-2-3-P)

- To study the ultra-structure, growth and thickening of typical cell wall.
- To be able to understand concept of movement of water through the cell wall by various means (apoplast, symplast etc.).
- To gather knowledge about the types of stomata in monocot and dicot plant.
- To understand the different types of stellar organizations and their evolution along with the concept of leaf trace and leaf gap.
- To understand the basic internal primary structure, root, stem and leaf of monocot and dicot plant.
- Students will be able to successfuly explain the normal and anomalous secondary growth depending upon the primary structure and understand the types and principle of mechanical tissue in plant.
- To impart the basic concepts of the theories of developmental sequences of root apex, shoot apex and adaptive anatomical structures f hydrophytes and xerophytes.
- To learn about scope of anatomy in systematics, forensic science and pharmacognosy.
- To gather the practical knowledge through the study of primary, secondary and anomalous structures along with some external and internal cell inclusions.

Archegoniate (Semester II, Paper- BOT-A-CC-2-4-TH, BOT-A-CC-2-4-P)

- To explain the Fundamentals of Archegoniate and understanding the general characteristics and adaptations to land habit.
- To understand concepts of classification with diagnostic characters and their various phases, understanding the phylogeny and their origin and an overview of plant succession, pollution monitoring, economic importance.
- To conduct excursion to familiarize with the natural habitats of these groups.

Palaeobotany and Palynology (Semester III, P- BOT-A-CC-3-5-TH, BOT-A-CC-3-5-P)

- To know the scope and application of Palaeobotany.

- To gain knowledge about plant fossils (pteridophyte and gymnosperm) and methods of fossilization.
- Students will also gather knowledge about the geological time scale and the origin of life on earth.
- Students will be able to understand the knowledge of palynology helps them to come across the various fossil records (fossil pollen and spores) and they can grow interest in the geological and palynological studies to know the past and present of our earth in a better way and also gather knowledge on the different applications of palynology.
- To study the morphological and microscopical slide studies of megafossils and microfossils which will help the students to acquire practical understanding of a fossil.

Reproductive biology of Angiosperms (Semester III, Paper- BOT-A-CC-3-6-TH, BOT-A-CC-3-6-P)

- To understand the different types of inflorescence and flowers with proper examples.
- To learn about the genetic and molecular details of flower development.
- To understand the types of fruits and seeds with suitable examples.
- To gather practical knowledge on inflorescence, flower, fruit, seed and embryo from fresh samples, collected from localities that enables the students to draw, describe and identify the plants properly.

Plant Systematic (Semester III, Paper- BOT-A-CC-3-7-TH, BOT-A-CC-3-7-P)

- To gather an overview of Nomenclature, Identification, classification and studying the concept of taxonomy and its phases, system of classification with merits and demerits
- To learn the techniques of effective and valid publication and knowledge about ICN and its principles.
- To learn the subject with systematic in practice of Herbaria and Botanical Gardens of India and world
- The students will learn and master various techniques to create dichotomous keys, phonetics, and cladistics and use the data sources from various subjects and interpret the

evidences in taxonomy.

- They will be able to learn the diagnostic features and characters of various families, their key and formula, systematic position, economic importance and herbarium preparation methods.
- Various local and long excursions in this course will help to familiarise the students with the methods of collection, preservation of plants and learning about them in their natural habitat and also prepare them for the field training on the subject. They will also form a strong idea about the field work involved in this subject as a whole.

Phytogeography and Ecology and Evolution (Semester IV, Paper- BOT-A-CC-4-8-TH, BOT-A-CC-4-8-P)

- In phytogegraphy students will learn about the phytogeographical regions of India.
- Students will gain basic understanding of endemism, factors of endemism, preliminary ideas on ecology, community ecology dealing with ecological succession and seral stages.
- The students will learn about the metalophytes and phytoremediation and develop an idea on the biodiversity conservation and the different types of biodiversity.
- Long and short excursions help the students to familiarize the students with the different types of biodiversities in India in their natural habitat and in various bioreserves, botanical garden, laboratories (*in-situ*) and national parks.
- They will gather practical knowledge and will be able to practically determine the dissolved oxygen of water samples from different sources, determination of free carbon dioxide and comparative anatomical studies of leaves from polluted and non-polluted leaves and therefore have a real life data of the hazards of pollution.
- They will be successfully able to determine the minimal quadrat size for the study of herbaceous vegetation which is one of the most important aspects of botany and related subjects.
- Students will be able to understand the concept evolution and various theories related to it and the theories of gradualism, equilibrium and stasis.
- To give a brief idea on selection types, the relationship of man and environment,

speciation, co-evolution of various organisms on earth and concept of adaptive radiation and reproductive isolation.

- They will also study the phylogeny of bacteria, algae, fungi, bryophyte, pteridophyte and gymnosperm and creation of phylogenetic tree.

Economic Botany (Semester IV, Paper-BOT-A-CC-4-9-TH, BOT-A-CC-4-9-P)

- Students will understand an overview of origin of cultivated crops, genetic diversity, and evolution of new varieties and importance of germplasm diversity.
- To learn about the morphology, processing and use of important cereals, legumes, plant source of sugar and starch, spices and beverage.
- To study general discussion, classification, extraction process, use and health implications of some oil and fat sources (mustard, soybean, coconut) and also some essential oil sources.
- They will understand the detailed concept of some therapeutic and habit forming drugs, their morphology, uses and health hazards.
- To learn the general account of timber with special reference to shaal and teak.
- To learn about the morphology, extraction, uses and role in economy of some fibre yielding plants (jute, cotton).
- To gather the practical experiences by studying the morphology and dissection of the specimen mentioned in the theoretical syllabus, to identify their specific anatomical structures of economic importance.

Genetics (Semester IV, Paper-BOT-A-CC-4-10-TH, BOT-A-CC-4-10-P)

- They will develop an overview of the Mendel's principles with emphasis on Mendelian genetics.
- To acquaint students with the concept of Linkage and Crossing Over and the concept of molecular mapping in brief -ISH, FISH and Gene Mapping along with the idea of co-efficient of coincidence and interference and mapping function.

- Students will get an idea about the concept of Epistasis and Polygenic inheritance in plants and various aspects of Aneuploidy, Polyploidy (role in Speciation and Evolution) and Chromosomal aberration and the concept of Mutation (types and example).
- To acquaint students with the process of DNA repair in brief, Transposon (Ac-Ds system) and homoeotic gene in plants (ABCE Quartet model of flowering).
- To discuss the One Gene- one polypeptide concept, Split Gene, Overlapping Gene and Repetitive DNA (briefly).
- To understand the basic technique of chromosome preparation in *Allium cepa.*
- Student will develop the ability to study of various aspects of mitotic chromosome from root tips of *Allium cepa, Aloe vera, Lens esculenta*, chromosomal aberrations and meiotic chromosome from flower buds: *Allium cepa* and *Setcreasea s*p.
- They will also develop capability to identify different stages from permanent slides: Normal and Abnormal stages Meiosis and Mitosis and assess it on the basis of Classroom performance (Laboratory Records and slides).
- Viva- voce on *Practical* experiments help students to visualize the various concepts of Genetics.

Cell and Molecular Biology (Semester V, Paper-BOT-A-CC-5-11-TH, BOT-A-CC-5-11-P)

- Student will develop an understanding the concept of Origin and Evolution of Cells including Evolution of nucleic acid (from RNA to DNA) along with the Concept of RNA world, Ribozymes and First cell.
- They will get familiarise with the concept of origin of eukaryotic cell (endosymbiotic theory).
- To discuss the basic concept of small RNA and organellar DNA (chloroplast and mitochondrial DNA).
- To give an idea on Nuclear envelope, Nuclear lamina and Nuclear pore complex with an emphasis on Nucleolus and ribosome biogenesis including the structure of Centromere type and function and Chromatin ultrastructure and DNA packaging in eukaryotic chromosome.

- They will underst the basic concept of Cell cycle and its regulation and mechanism of cell cycle control in Yeast (checkpoints and role of MPF),
- To discuss yhe structure of Kinetochore, spindle apparatus, Microtubules and Apoptosis (brief idea), concept of DNA Replication, Transcription and Translation (Prokaryotes & Eukaryotes) including Central Dogma.
- Students will be able to understand in detail, the various processes happening inside a living organism such as DNA replication, Eukaryotic replication including telomerase concept including fidelity of DNA replication, Transcription, RNA processing, Aminoacylation of tRNA and Translation.
- They will be familiarized with the concept of Lac-operon, properties of Genetic Code with evidences & exceptions, Restriction endonuclease role in Recombinant DNA Technology.
- Students will understand the various processes and techniques involved in plant biotechnology which includes explaining the structure of Vector (plasmid pBR 322), and Marker gene and the steps of cloning technique, concept of PCR and its application and overview of Genomic DNA and cDNA library.
- Students will be taught the basic idea on the Development and causes of Cancer (in general and brief) including tumor suppressor gene and oncogene.
- They will be able to develop capability to Study the plant cell structure of *Onion/Rhoeo/Crinum* and measuring cell size and counting cells per unit volume using haemocytometer in Yeast or pollen grain along with the understanding f the process of Cytochemical staining of DNA.and be able to estimate the DNA and RNA content and determination of nucleolar frequency.
- To cultivate interest among students concerning the subject through preparation of models/ charts on different topics of relevant areas along with Assessment on the basis of Classroom performance (Laboratory Records and slides) and Viva voce.

Biochemistry (Semester V, Paper- BOT-A-CC-5-12-TH, BOT-A-CC-5-12-P)

- To give a brief idea on covalent and non-covalent bonds; Hydrogen bonds; Vander Waal's forces.

- To give an overview of structure and properties of water, pH and buffer (Inorganic and Organic), Handerson-Hasselbach equation and isoelectric point.
- To understand the detailed structure of Nucleic Acids, B & Z form of DNA, RNA, ATP, NADP, structure of Proteins and Amino Acids, Carbohydrates, Lipids and Fatty Acids.
- Students will be able to understand the detailed account of bioenergetics and inter-relationship between redox potentials and biological redox reactions and develop a comprehensive account of enzymes and classification.
- They will understand the mechanism of enzyme action, inhibition, kinetics and related problems and get a detailed account of membrane chemistry, transport and mechanism and mechanism of ATP synthesis, various types of photophosphorylation.

Plant Physiology (Semester VI, Paper- BOT-A-CC-6-13-TH, BOT-A-CC-6-13-P)

- They will understand the concept of plant-water relations, potential and its components.
- To impart an understanding the soil-plant-atmosphere continuum concept and stomatal physiology and the mechanisms along with the antitranspirant
- They will be able to learn about mechanisms of mineral nutrition, organic translocation and various plant growth regulators and their biosynthesis and bioassay.
- Students will understand the concept of photomorphogenesis, phytochrome, vernalization, biological clock and biorhythm.
- To give a comprehensive idea on seed dormancy, its types, causes and biochemistry of germination, senescence and ageing.
- Students will have hands on training to determine the physiological experiments related to plants and their seeds.

Plant Metabolism (Semester VI, Paper- BOT-A-CC-6-14-TH, BOT-A-CC-6-14-P)

- To give a comprehensive idea on the concept of metabolism, pathways and their regulation, various cycles/pathways in plants like Calvin, HSK, C3, C4, CAM etc
- To learn about the photosynthesis in plants and bacteria, biological significance, photosystems, electron transport and water splitting mechanisms.
- To comprehensively understand the efficiency and productivity of plants and discussing

photorespiration, respiration with EMP pathway, glycolysis, TCA cycle, PP Pathway, ETS system, stoichiometry of glucose oxidation.

- They will learn in extreme detail about the nitrogen and lipid metabolism in plants highlighting all the assimilation, biochemical, biosynthetic and signal transduction pathways
- They will have hands on training of various chromatography techniques; biochemical and measurement test and learn elaborate calculation techniques.

Applied Mycology, Applied Phycology, Applied Microbiology (Semester III, Paper- BOT-A-SEC-A-3-1)

- To study the importance of fungi as food and their role in the industrial production of fermented food (cheese, ethanol).
- To give a brief idea about the fungal source of some common enzymes, amino acids, vitamins, antibiotics, aflatoxins and pharmaceuticals.
- To discuss usage of algae as food and source of phycocolloid (Agar Agar, Carrageenan), Diatomite and Algal Toxin and to understand the idea of various concepts of algal biotechnology.
- To give a brief outline of industrial production of Vinegar and Streptomycin.
- To familiarize the students with the various microbial sources and uses of Enzyme (Amylase, Protease), Amino Acid (Glutamic Acid, Lysine), Polysaccharides (Dextran).
- To give a brief account on the use of microbes as Biofertilizer and Biopesticides
- Students will be taught a comprehensive account on the use of microbes in mineral processing.

Biofertilizer (Semester III, Paper-BOT-A-SEC-A-3-2)

- To give a comprehensive idea on the concept of biofertilizer.
- To study the general account of microbes used as biofertilizers.
- Students will gain knowledge about myccorhizal association, concept about Vesicular Arbuscular Mycorrhizal (VAM) and its influence on crop plants.
- They will develop concept of organic farming.

Plant Breeding (Semester IV, Paper- BOT-A-SEC-B-4-3)

- To familiarize with the concept of plant breeding and its objectives.
- To explain the method of breeding systems along with the modes of reproduction in crop plants including achievements and undesirable consequence of plant breeding.
- To understand different methods and various aspects of crop improvement.
- Students will get an idea about different selection methods and procedure and hybridization including their advantages and limitations.
- To imparting knowledge about maintenance of germplasm, Mass selections and Pure line selection including Back cross method and the concept of Heterosis with hybrid seed production.
- To describe the concept of Male sterility and its use and understanding the process of Inbreeding and inbreeding depression (brief idea on effect of outcrossing) and Molecular Breeding including the use of DNA markers in plant breeding).
- To understand the role of mutations, polyploidy, distant hybridization and biotechnology in crop improvements.

Mushroom Culture Technology (Semester IV, Paper-BOT-A-SEC-B-4-4)

- To explain the fundamentals of mushroom culture technology describing the nutritional medicinal value of edible mushrooms, i.e. *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus.*
- To develop a brief concept of poisonous mushrooms.
- To give a detailed account on the cultivation of the edible mushrooms emphasizing on the infrastructure, preparation and factors affecting the process, storage and drying of mushrooms.
- To give an overview on the nutritional value of mushrooms and percentage of the nutritional contents with a brief knowledge on the types of foods prepared from mushroom.
- Students will acquire knowledge on the Research Centre working on mushroom at the national level and regional level as well.

Biostatistics (Semester V, Paper- BOT-A-DSE-A-5-1-TH, BOT-A-DSE-A-5-1-P)

- To explain the Definition, statistical methods, basic principles and variables- with measurements with emphasis on its functions, limitations and uses in various fields.
- To familiarize the students with the concept of Biometry and Central tendency and Probability (multiplicative and additive rules, application and importance).
- To impart knowledge about the Test of significance by chi- square test for goodness of fit.
- To develop an understanding the method of Measurement of gene frequency using Hardy-Weinberg equilibrium with conditions applied for its implications, calculation of genotypic and allelic frequencies.
- Students will develop the basic capability to work out and calculate Univariate analysis of various statistical data, correlation coefficient values,'F' value and probability value for the F value.
- Developing the capability to determine of goodness of fit in Mendelian and modified mono-and dihybrid ratios by Chi-square analysis also with comment on the nature of inheritance.
- Emphasizing basic idea of computer programme for statistical analysis of correlation coefficient,'t' test, standard error and standard deviation.
- Assessment on the basis of class performance (laboratory records) and Viva voce.

Industrial and Environmental Microbiology (Semester V, Paper- BOT-A-DSE-A-5-2-TH, BOT-A-DSE-A-5-2-P)

- This course is intended to teach the applications and scope of microbiology in industries and environment with Concepts on Bioreactors/Fermenters and microbial fermentation process.
- After taking this course the student will be able to get an overview of Solid-State Fermentation (SSF) and Liquid-State Fermentation (LSF) and basic differences between Batch and Continuous Fermentation process.

- To provide students with basic knowledge & understanding about the components of a typical bioreactor and different types of bioreactors-laboratory. Assessing the importance of pilot-scale and production fermenters.
- To provide an in depth knowledge about Constantly Stirred Fermenters, Tower Fermenters, Fixed-bed and Fluidized bed Bioreactors and Air-lift Fermenters.
- To know about various kinds of microbial production of industrial products- Involvement of microorganisms, media; Know about the role and procedure of filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, liophilisation, spray drying, hands on microbial fermentations for the production and estimation of enzymes amylase or lipase activity, organic acids(citric or glutamic acid), alcohol (ethanol) and antibiotics (Penicillin).
- To impart the knowledge about a broader view of microbial enzymes of industrial products and immobilization of enzymes- Role of microorganisms for industrial applications, advantages and applications of immobilization, large scale application of immobilized enzymes (glucose isomerase and penicillin acylase).
- To know about different association and Co-relations between microbes and quality of environment.Techniques of isolation method of microorganisms from soil, air and water.
- To know about different different types of microbial flora of water and relation between flora and water pollution. Determination of BOD, COD of water samples, Understanding the role of microbes as indicators of water quality. Learn to check coliform and fecal coliform in water sample.
- To learn role of microbes in agriculture and remediation of contaminated soils with concept of biological fixation, mycorrhizae, bioremediation of contaminated soils, isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.

Medicinal and Ethnobotany (Semester VI, Paper- BOT-A-DSE-A-6-3-TH, BOT-A-DSE-A-6-3-P)

- To develop an overview of history, scope and importance of medicinal plants and brief knowledge about our traditional medicinal systems – Ayurveda, Sidhha and Unani.
- Detailed concept of crude drugs, chemical and pharmacological classification and different aspects of evaluation of drugs.

- To learn about the primary and secondary metabolites, biosynthesis of secondary metabolites and mode of action of terpenoids, phenolics, flavonoids and alkaloids against pathogenic microbes and herbivores.
- To learn about some important pharmacologically active constituents under steroids, tannins, resins, alkaloids and phenol.
- To get a brief idea about ethnobotany-definition, method of study, application and Indian scenario.
- To study the importance of folk-medicine and its application in certain diseases.
- To study the histological and histochemical tests of certain drug plants to make the student capable of screening the adulterant and also to gain knowledge on differentiating between alkaloid and tannin through the chemical test.

Stress Biology (Semester VI, Paper- BOT-A-DSE-A-6-4-TH, BOT-A-DSE-A-6-4-P)

- To learn the concepts of Plant stress, acclimation and adaptation
- To provide an in depth knowledge about the environmental factors and the stress conditions faced by a plant.
- To study of pathogenesis related to PR proteins, systemic acquired resistance, mediation of insect and disease resistance.
- To emphasizing the significance of stress sensing mechanisms in plants and signaling processes.
- To study the developmental and physiological mechanisms that protect plant from various stresses their adaptation, physiological changes, ROS generation and their scavenging mechanism.
- To impart hands on training in quantitative estimation of enzyme activity, comparative studies of plants under various degrees and type of stress.

Plant biotechnology (Semester V, Paper- BOT-A-DSE-B-5-5-TH, BOT-A-DSE-B-5-5-P)

- To understand the fundamentals of plant tissue culture techniques and its application like callus culture, haploid culture and protoplast culture.

- To impart the knowledge about the basic concepts of genetic engineering, its achievement in crop biotechnology, environment and industry, different methods of gene transfer, familiarize with the basic equipments of plant tissue culture.
- To impart hands on training on the preparation of basal media, sterilization techniques and tissue culture techniques.

Horticultural Practices and Post-Harvest Technology (Semester V, Paper- BOT-A-DSE-B-5-6-TH, BOT-A-DSE-B-5-6-P)

- To give a brief idea about the scope and importance, role in rural economy, employment generation, nutritional security and ecotourism of horticulture.
- To learn about the types, classification, identification and salient features of some common ornamental plants (herbs, shrubs and trees).
- To develop the concept of origin, distribution, morphology, production and marketing of some vegetable and fruit crops.
- To become familiar about the method of application of suitable manures, chemical fertilizers, biofertilizers, nutrients, PGRs, biocontrol agents, irrigation methods, hydroponics and various methods of propagation.
- To learn about the importance of cut flower, bonsai, their aesthetic and commercial role in society.
- To understand the different post-harvest technology, preservation, transportation of fruits, vegetables, cut flowers etc. along with food irradiation and food safety.
- To have a sound knowledge on symptoms of some common diseases and pests, their control measures and management, IPM, quarantine practices.
- To develop the concept of conservation and management of best traits, documentation of germplasm, role of micropropagation and tissue culture technique in crop improvement, IPR issues.
- To learn about some national, international and professional societies of horticultural science.
- Students will get accustomed with field visit to garden, nurseries, horticultural field and in some cold storage for giving an overall idea to the students on cultivation process,

maintenance, preservation and packaging of horticultural products before marketing successfully.

Research methodology (Semester VI, Paper- BOT-A-DSE-B6-7-TH, BOT-A-DSE-B-6-7-P)

- To impart the knowledge about the concept of research and different types of research in the context of biology.
- Students will develop a fundamental understanding of research methodology will help students to read about and correctly interpret the results of research in any field of science.
- To develop laboratory experiment related skills.
- To learn competence on data collection and process of scientific documentation.
- Students will learn to analyze the ethical aspects of research and evaluate the different methods of scientific writing and its presentation.
- They will gain practical Knowledge on research based calculations, plant microtechnique experiments.
- They will practically learn powerpoint presentation, poster presentation etc.

Natural Resource Management (Semester VI, Paper- BOT-A-DSE-B-6-8-TH, BOT-A-DSE-B-6-8-P)

- To discuss basic concepts of Natural resources, sustainable utilization, biological resources, significance, threats, management strategies and their bio prospecting.
- To study the management of agricultural, pastoral, horticultural, silvicultural utilisation and soil degradation.
- Students will study of all types of freshwater sources, their threats and management strategies; forest cover and its significance, its depletion and management; renewable and non-renewable sources of energy.
- Students will learn about the contemporary practices in resource management, EIA, GIS, ecological footprint, carbon footprint, waste management.
- Understanding National and International efforts in resource management and conservation.

- To impart hands on training in estimation, determination of chemical properties, physiological properties of water, soil, dust, carbon.

Program Specific Outcomes, B.Sc. Botany (Honours)

- **Govt. Department:** After completion of the courses, a botanist can avail job opportunities in government departments (like planning and developmental commissions, forestry, environmental, agricultural, stress management organization, botanic garden and disaster management departments etc.
- **Laboratory Technician/ Laboratory Instructor:** Knowledge about the various types of microscopy, preparing solutions, stains, pre-treatment techniques, basic understanding of different plant families and identification of plant taxa will help a student in achieving jobs as laboratory technician or laboratory instructor.
- **Private Agencies:** There are opportunities in private agencies also such as travel agencies requiring data of flora of an area. Prior knowledge of Industrial and Environmental Microbiology helps in the research related fields and in the Pharmaceutical Industries, Private Hospitals, Environmental agencies, Food Industry, Beverage Industry, Chemical Industry and also in Agriculture Department. With further knowledge, students can become a Biochemist in public as well as private sector. They can engage in research related works, quality control and safety section in the companies like food, pharmaceuticals, health and beauty care.
- **Entrepreneur:** There are opportunities to get engaged into mushroom farming and agri-based industry and to start up a business.
- **Medical Field**: Due to the bio-science background, they can go for various private or governmental agencies where they can work as surveyor, instrument handler, collector of samples for medical testing and also may work as technician in departments like X-Ray, data collector etc.
- **Surveyor:** Many others with a degree in Botany can also opt to work as a surveyor in disaster management, forest, environment agencies, NGOs etc.
- **Tourism:** There is some scope for the students of Botany (After further study in the relevant field i.e., taxonomy, palaeobotany) in the field of Tourism.

- **Researcher:** In several research institutes there are enormous job openings as Research Assistant, Research Associate, Research Consultant, Project Fellow etc. With further knowledge student can become Food, Industrial or Environmental Microbiologists, Biomedical Scientists or Clinical Research Associate.
- **Teacher/Professor:** After completing higher studies in Botany, there are scopes to opt for state or national level college teacher position (CSC, PSC, and UGC), school teachers (SSC, MSC, PSC, KVS, Army Public School etc.) and university teacher.
- **Govt. Job:** After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, Stuff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.
- During this Covid-19 pandemic situation in absence of any specific drug in hand, the knowledge of pharmacognosy and ethnobotany can act as an armour to boost up our body immunity, the primary weapon to fight against the virus. The AYUSH Mantrak of India caters to popularise the use of herbal drugs as a mass safety venture till a proper remedy comes out.

Course Outcome B.Sc. Botany (General)

Semester	Course name	Course type	Course outcome
I	Plant Diversity I (Phycology, Mycology, Phytopathology, Bryophytes And Anatomy) BOT-G-CC-1-1-TH and BOT-G-CC-1-1-P	CORE COURSES (CC-1-4)	• Students will develop a basic knowledge of algae, fungi and their life cycles. • They will develeop concepts on understanding the plant diseases. • Students will get a basic knowledge of bryophytes with their life cycle. • To give a general concept of plant anatomy.
II	Plant Diversity II (Pteridophytes, Gymnosperms, Palaeobotany, Morphology and Taxonomy) BOT-G-CC-2-2-TH and BOT-G-CC-2-2-P	CORE COURSES (CC-1-4)	• They will know the basic knowledge of pteridophytes, gymnosperms and their life cycles. • To impart a basic knowledge of fossils and understanding the past. • To knowl plant taxa, plant families, plant morphology.
III	Cell Biology, Genetics And Microbiology BOT-G-CC-3-3-TH and BOT-G-CC-3-3-P	CORE COURSES (CC-1-4)	• To impart an overview of cell biology and genetics with emphasis on nucleus, chromosome, transcription, translation, mutation, split gene and transposons. • To develop their understanding of Virus and Bacteria in brief with their general structure.

	SEC A Plant breeding and biometry (BOT-G-SEC-A-3/5-1)	SKILL ENHANCEMENT COURSE (SEC-1-4)	• To give basic knowledge of plant breeding and role of biotechnology in crop improvement. • To make them understand the basic concept of biometry including teaching them the various mathematical calculations involved in it.
IV	Plant Physiology And Metabolism BOT-G-CC-4-4-TH and BOT-G-CC-4-4-P	CORE COURSES (CC-1-4)	• To help them understand and develop good concepts about proteins and physiology of plants like respiration, transpiration, photosynthesis, nitrogen metabolism, hormones, photoperiodism, senescence
	SEC B Plant biotechnology (BOT-G-SEC-B-4/6-3)	SKILL ENHANCEMENT COURSE (SEC-1-4)	• To elaborately understand plant tissue culture techniques and its theory. • To be able to understand the recombinant DNA technology in detail.
V	SEC A Biofertilizers (BOT-G-SEC-A-3/5-2)	SKILL ENHANCEMENT COURSE (SEC-1-4)	• To develop their understanding on the concept of biofertilizer and microbes used as biofertilizers • To be able to know VAM and its future aspect as in crop improvement.

	DSE A Phytochemistry and medicinal botany- BOT-G-DSE-A-5-1-TH and BOT-GDSE-A-5-1-P Natural resource management- BOT-G-DSE-A-5-2-TH and BOT-G-DSE-A-5-2-P	DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE-1&2)	• To get an overview of history, scope and importance of medicinal plants and brief knowledge about our traditional medicinal systems. • To impart knowledge on the basic concepts of Natural resources, sustainable utilization, biological resources, significance, threats. • To develop skills and elaborate management strategies about bio prospecting
VI	SEC B Mushroom culture technology (BOT-G-SEC-B-4/6-4)	SKILL ENHANCEMENT COURSE (SEC-1-4)	• To elaborately explaining the fundamentals of mushroom culture technology. • To develop the basic ideas of the edible and poisonous mushrooms.
	DSE B Economic botany- BOT-G-DSE-B-6-3-TH and BOT-G-DSE-B-6-3-P Horticultural practices and post harvest technology – BOT-G-DSE-B-6-4-TH and BOT-G-DSE-B-6-4-P	DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE-1&2)	• To learn about the economically important plants like cereals, pulses, spices, beverages, oil yielding plants, fibre yielding plants, timber yielding plants and fruits. • To give a brief idea about the scope and importance, role in rural economy, employment generation. • To help them understand the nutritional security and ecotourism opportunity in

			horticulture. • To learn about the types, classification, identification and salient features of some common ornamental plants (herbs, shrubs and trees). • To develop elaborate concept of origin, distribution, morphology, production and marketing of some vegetable and fruit crops. • To have a general idea about short scale industries related to the course.

Program Specific Outcomes, B.Sc. Botany (General)

- **Govt. Department:** After completion of the courses, a bioscience student can avail job opportunities in government departments (like planning and developmental commissions, forestry, environmental, agricultural, stress management organization, botanic garden and disaster management departments etc.
- **Laboratory Technician/ Laboratory Instructor/Field Assistant:** Knowledge about the various types of microscopy, preparing solutions, stains, pre-treatment techniques, basic understanding of different plant families and identification of plant taxa will help a student in achieving jobs as laboratory technician or laboratory instructor.
- **Private Agencies:** There are opportunities in private agencies also such as travel agencies requiring data of flora of an area. Prior knowledge of Industrial and Environmental Microbiology helps in the research related fields and in the Pharmaceutical Industries, Private Hospitals, Environmental agencies, Food Industry, Beverage Industry, Chemical Industry and also in Agriculture Department. With further knowledge, students can become a Biochemist in public as well as private sector. They can engage in research related works, quality control and safety section in the companies like food, pharmaceuticals, health and beauty care.
- **Medical Field**: Due to the bio-science background, they can go for various private or governmental agencies where they can work as surveyor, instrument handler, collector of samples for medical testing and also may work as technician in departments like X-Ray, data collector etc.
- **Entrepreneur:** There are opportunities to get engaged into mushroom farming and agri-based industry and to start up a business.
- **Surveyor:** Many others with a degree in Botany can also opt to work as a surveyor in disaster management, forest, environment agencies, NGOs etc.
- **Tourism:** There is some scope for the students of Botany (After further study in the relevant field i.e., taxonomy, palaeobotany) in the field of Tourism.
- **Researcher:** In several research institutes there may be job openings for a Bio-Science graduate as Laboratory Assistant, Project Fellow and Field Assistants etc.

- **Teacher/Professor:** After completing higher studies in Botany, there are scopes to opt for teaching positions in school after completing teachers' training and by clearing SSC (School Service Commission).
- **Govt. Job:** After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, Stuff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.

Department of Chemistry
Course Outcomes and Program Outcomes

COURSE OUTCOMES

B.Sc 1ST SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
INORGANIC CHEMISTRY-1	CEMA-CC-1-1-TH	Students will come to learn about the following:- 1. Extra nuclear Structure of atom 2. Acid-Base reactions 3. Redox Reactions
ORGANIC CHEMISTRY-1A		1. Students shall acquire the knowledge about the basic of organic chemistry. 2. They will learn about the bonding and physical properties 3. General Treatment of Reaction Mechanism I
1) INORGANIC CHEMISTRY: I(1)LAB 2) ORGANIC CHEMISTRY: O (1A) LAB	CEMA-CC-1-1-P	Students will acquire practical knowledge of the following: 1. Acid and Base Titrations by demonstration. 2. Oxidation-Reduction Titrations. 3. Separation
PHYSICAL CHEMISTRY-1	CEMA-CC-1-2-TH	Students will acquire practical knowledge of the following: 1. Kinetic theory and gaseous state 2. Transport Process 3. Chemical Kinetics
ORGANIC CHEMISTRY-1B		Students will acquire practical knowledge of the following: 1. Stereochemistry I 2. General Treatment of Reaction Mechanism II
PHYSICAL CHEMISTRY P(1) LAB	CEMA-CC-1-2-P	This topic shall enlighten the students about:- 1. Study of Kinetics of decomposition of H2O2 2. Study of Kinetics of acid catalyzed hydrolysis of methyl acetate.

		3. Study of viscosity of unknown liquid. 4. Determination of solubility of sparingly soluble salt in water.

B.Sc 2ND SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
ORGANIC CHEMISTRY-2 INORGANIC CHEMISTRY-2	CEMA-CC-2-3-TH CEMA-CC-2-4-TH	Students will acquire the knowledge about the following:- 1. Stereochemistry-II 2. General Treatment of Reaction Mechanism III 3. Chemical Bonding-I and II 4. Radioactivity
ORGANIC INORGANIC	CEMA-CC-2-3-P CEMA-CC-2-4-P	Students will acquire the knowledge about the following:- 1. Organic Preparations 2. Iodo-/Iodimetric Titrations 3. Estimation of metal content in some selective samples

B.Sc 3rd SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
INORGANIC CHEMISTRY-3 ORGANIC CHEMISTRY-3	CEMA-CC-3-6-TH CEMA-CC-3-7-TH	In this course students can know about the following:- 1. Chemical periodicity 2. Chemistry of s and p Block Elements 3. Noble Gases 4. Inorganic Polymers 5. Coordination Chemistry-I 6. Chemistry of Alkanes and Alkenes 7. Aromatic Substitution 8. Carbonyl and Related Compounds 9. Organometallics

INORGANIC CHEMISTRY-3 ORGANIC CHEMISTRY-3	CEMA-CC-3-6-P CEMA-CC-3-7-P	Students can become familiar with the following topics:- 1. Complexometric titration 2. Chromatography of metal ions 3. Gravimetry 4. Identification of a Pure Organic Compound 5. Quantitative Estimations
PHYSICAL CHEMISTRY-2	CEMA-CC-3-5-TH	The students will develop more advanced level of idea about 1. Chemical Thermodynamics-I 2. Chemical Thermodynamics-II 3. Electrochemistry 4. Ionic Equilibrium
PHYSICAL CHEMISTRY-2	CEMA-CC-3-5-P	Students can get accustomed with the following topics:- 1. Conductometric titration of dibasic, monobasic acid against a strong base. 2. Study of Saponification reaction conductometrically. 3. Potentiometric titration of Mohr salt against standard K2Cr2O7 4. Determination of solubility product of AgCl potentiometrically. 5. Determination of ionization constant of weak acid conductometrically.
SKILL ENHANCEMENT COURSES : SEC-A	1.SEC 1 2. SEC 2	To explore and develop their skills on the following:- 1.Mathematics and Statistics for Chemicals 2. Analytical Clinical Biochemistry

B.Sc 4th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
ORGANIC CHEMISTRY-4 INORGANIC CHEMISTRY-4	CEMA-CC-4-8-TH CEMA-CC-4-10-TH	The students will get accustomed with the following topic:- 1. Nitrogen Compounds 2. Rearrangements 3. The Logic of Organic Synthesis 4. Organic Spectroscopy 5. Coordination chemistry-II 6. Chemistry of d- and f- block elements i) transition element ii) Lanthanoids and Actinoids 7. Reaction Kinetics and Mechanism
ORGANIC CHEMISTRY-4 INORGANIC CHEMISTRY-4	CEMA-CC-4-8-P CEMA-CC-4-10-P	Students will understand the following: 1. Qualitative Analysis of Single Solid Organic Compounds 2. Inorganic preparations 3. Instrumental Techniques
PHYSICAL CHEMISTRY-3	CEMA-CC-4-9-TH	To impart the following ideas on: 1. Colligative Properties 2. Phase Equilibrium 3. Quantum Mechanics 4. Crystal Structure.
PHYSICAL CHEMISTRY-3	CEMA-CC-4-9-P	The students will be able to understand: 1. Kinetic Study of inversion of cane sugar by using digital polarimeter. 2. Study of phase diagram of phenol-water system. 3. pH metric titration of mono, dibasic and tribasic acid against a strong base. 4. Determination of partition coefficient for distribution of iodine between water and CCl4.

		5. Determination of pH of unknown buffer solution by color matching method.
SKILL ENHANCEMENT COURSES : SEC-B	1. SEC-3 2. SEC-4	To impart the knowledge of: 1. Pharmaceutical Chemistry 2. Pesticide Chemistry

B.Sc 5th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
ORGANIC CHEMISTRY-5	CEMA-CC-5-12-TH	Students will be able to understand the mechanism of the following reactions and stereochemistry. 1. Carbocycles and Heterocycles 2. Cyclic Stereochemistry 3. Pericyclic Reactions 4. Carbohydrates 5. Biomolecules
ORGANIC CHEMISTRY-5	CEMA-CC-5-12-P	To impart the knowledge of separation techniques and characterization of organic molecules 1.Chromatographic Separations 2.Spectroscopic Analysis of Organic Compounds
PHYSICAL CHEMISTRY-4	CEMA-CC-5-11-TH	The students will get idea about 1. Quantum mechanics-II 2. Statistical Thermodynamics 3. Numerical Analysis
PHYSICAL CHEMISTRY-4	CEMA-CC-5-11-P	Students will increase their skill of computer programming through 1. Computer programming to find roots of equation 2. Computer programming on numerical differentiation. 3. Computer programming on numerical integration.
DISCIPLINE SPECIFIC ELECTIVE COURSES	1. DSE-A(DSEA-1 & DSEA-2) 2.DSE-B (DSEB-1 & DSEB-2	Discipline Specific Effective courses will helpful for students to gather knowledge about industrial importance of various chemicals. DSEA-1 and Practical –DSE-A-1: Molecular Modelling and Drug Design DSE-A-2 and Practical –DSE-A-2: Applications of Computers in Chemistry DSE-B-1 and Practical-DSE-B-1: Inorganic

		Materials of Industrial Importance DSE-B-2 and Practical-DSE-B-2: Novel Inorganic Solids

B.Sc 6th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
INORGANIC CHEMISTRY-5	CEMA-CC-6-13-TH	Students will be able to understand the qualitative analysis and will get brief idea about different metallobiosites. 1. Theoretical Principles in Qualitative Analysis 2. Bioinorganic Chemistry 3. Organometallic Chemistry 4. Catalysis by Organometallic Compounds
INORGANIC CHEMISTRY-5	CEMA-CC-6-13-P	Students can get accustomed with the following topics:- • Qualitative semimicro analysis of mixtures containing Cation Radicals, Anion Radicals, Insoluble Materials
PHYSICAL CHEMISTRY-5	CEMA-CC-6-14-TH	Students can get accustomed with the following topics:- • Molecular Spectroscopy • Photochemistry • Surface Phenomenon.
PHYSICAL CHEMISTRY-5	CEMA-CC-6-14-P	Students can get familiar with the following topics: Determination of surface tension of a liquid using Stalagmometer. • Determination of indicator constraint of an

		acid base indicator spectrophotometrically. • Verification of Beer and Lambert law • Study of kinetics of $K_2S_2O_8$+KI reaction spectrophotometrically. • 5. Determination of CMC of a micelle from surface tension measurement.
DISCIPLINE SPECIFIC ELECTIVE COURSES	1. DSE-A(DSEA-3& DSEA-4) 2.DSE-B (DSEB-3 & DSEB-4)	• Students can apply their knowledge of these following topics in research and familiar with different laboratory technique. DSE-A-3: Green Chemistry and Chemistry of Natural Products PRACTICALS-DSE-A-3: Green Chemistry DSE-A-4: Analytical Methods in Chemistry PRACTICALS-DSE-A-4: Analytical Methods in Chemistry DSE-B-3 & PRACTICALS- DSE-B-3: Polymer Chemistry DSE-B-4: Dissertation

PROGRAMME OUTCOMES

- After completing three years of Bachelor Degree in Science (B.Sc) programme, students would gain a thorough conception in basic science in the field of Chemistry.
- They will gain systematic subject skills in the areas of Inorganic Chemistry, Organic Chemistry and Physical Chemistry.
- Students will also be able to recognise and handle different chemical Instruments required during their practical classes.
- The students will learn to handle and use chemicals in the laboratory.
- After completing the course it is expected that they will be able to show their efficiency to qualify different competitive exams like NET, SET, and GRE etc.
- This course opens the field of higher education and advance research in India as well as in Abroad for every student.

CHEMISTRY (GENERAL ELECTIVE COURSE)

COURSE OUTCOMES

SEM	COURSE CODE [CEM-G]	PAPER	OBJECTIVES
1	CC1/GE1	PAPER 1 (Theory)	Students will get the knowledge about organic, inorganic and physical chemistry in the following topics: 1.Kinetic theory of gases and real gases 2. Liquids 3. Chemical kinetics 4. Atomic structure 5. Chemical Periodicity 6. Acid and Bases 7. Fundamentals of Organic Chemistry 8. Stereochemistry 9. Nucleophilic substitution and elimination reaction
		PAPER 1 (practical)	Students will get to know about the quantitative estimation of metal ions and the topics as follows: 1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating it with $KMnO_4$. 3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$. 4. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator. 5. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$. 6. Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution.

2	CC2/GE2	PAPER 2 (theory)	To impart the knowledge on the following topics: 1. Chemical thermodynamics 2. Chemical equilibrium 3. Solutions 4. Phase equilibria 5. Solids 6. Aliphatic hydrocarbons 7. Error analysis and computer applications 8. Redox reactions
		PAPER 2 (practical)	Students will get the idea about kinetics of different chemical reaction in the following topics: 1.Study of kinetics of acid-catalysed hydrolysis of methyl acetate 2. Study of kinetics of decomposition of H_2O_2 (Clock Reaction) 3. Study of viscosity of unknown liquid (glycerol, sugar) with respect to water.4. Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator) 5. Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method 6. Determination of surface tension of a liquid using Stalagmometer.
3	CC3/GE3	PAPER 3 (Theory)	The students will develop more advanced level of idea about the following topics: 1.Chemical Bonding and Molecular Structure 2. Comparative study of p-block elements 3. Transition Elements (3*d* series) 4. Coordination Chemistry 5.ELECTROCHEMISTRY(I.Ionic Equilibria II.Conductance III.Electromotive force)6. Aromatic Hydrocarbons 7. Organometallic Compounds 8. Aryl Halides
		PAPER 3 (PRACTICAL)	The students will develop idea about acid radicals and basic radicals. Qualitative semimicro analysis of mixtures

			containing two radicals. Emphasis should be given to the understanding of the chemistry of different reactions.
4	CC4/GE4	PAPER 4 (Theory)	Students will get brief idea about organic substances, inorganic spectroscopy and quantum chemistry. 1.Alcohols, Phenols and Ethers 2. Carbonyl Compounds 3. Carboxylic Acids and Their Derivatives 4. Amines and Diazonium Salts 5. Amino Acids and Carbohydrates 6. Crystal Field Theory 6. Quantum Chemistry & Spectroscopy
		PAPER 4 (PRACTICAL)	Students will get idea about the following topics: 1. Qualitative Analysis of Single Solid Organic Compound(s) 2. Identification of a pure organic compound

DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE)

Discipline Specific Effective courses will helpful for students to gather knowledge about industrial importance of various chemicals and understanding of different chemical techniques.

DSE-A(Any one either in semester V)

DSEA-1 : Novel Inorganic Solids

DSEA-2: Inorganic Materials of Industrial Importance

DSE-B (Any one either in semester VI)

DSEB-1 : Green Chemistry and Chemistry of Natural Products

DSEB-2: Analytical Methods in Chemistry

SKILL ENHANCEMENT COURSES [SEC]

Students will explore and develop their skills on the following: -

SEC(A): (Any one either in semester III or V)

SEC1- Basic Analytical Chemistry

SEC2– Analytical Clinical Biochemistry

SEC(B) (Any one either in semester IV or VI)

SEC 3 – Pharmaceuticals Chemistry

SEC 4 – Pesticides Chemistry

PROGRAMME OUTCOME

- After completion of the general elective (GE) course in the area of Chemistry students will acquire depth knowledge about the subject.
- Practical works in laboratory will help them to become experts in the instrument handling as well as in chemical handling.
- It will also help the students to make them successful in any kind of competitive examination and to achieve a great success in their lives.

Department of Computer Science

COURSE OUTCOMES (Honours)

B.Sc (H) in Computer Sc : 1st Semester		
SUBJECT	**PAPER**	**OBJECTIVES**
Digital Logic	CMS-A-CC-1-1-TH	To be able to understand Computer Fundamentals, Number System, Boolean Algebra, Combinational and Sequential circuits in detail. Also, Integrated circuits are taught (qualitative study only).
Digital Circuits	CMS-A-CC-1-1-P	Students will be able to successfully implement the combinational circuits by their own.
Programming Fundamentals using C	CMS-A-CC-1-2-TH	To be able to understand theory behind C language and also can implement them to write, compile and debug programs in C language.
Programming with C	CMS-A-CC-1-2-P	Students will be able to successfuly write programs on their own. Sufficient programming skills will require use of good practice, e.g., good variable names, good use of computational units, appropriate commenting strategies and document them properly as assignment solving.
B.Sc (H) in Computer Sc : 2nd Semester		
SUBJECT	**PAPER**	**OBJECTIVES**
Data structure	CMS-A-CC-2-3-TH	1. To impart the basic concepts of data structures and algorithms 2. To understand concepts about searching and sorting techniques 3. To Understand basic concepts about stacks, queues, lists, trees and graphs 4. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures
Data structure	CMS-A-CC-2-3-P	1. Be able to design and analyze the time and space

using C		efficiency of the data structure · 2. Be capable to identity the appropriate data structure for given problem · 3. Have practical knowledge on the applications of data structures
Basic Electronic Devices and Circuits	CMS-A-CC-2-4-TH	1. Understand the current voltage characteristics of semiconductor devices, 2. Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation, 3. Design and analyze of electronic circuits, 4. Evaluate frequency response to understand behaviour of Electronics circuits.
Basic Electronic Devices and Circuits	CMS-A-CC-2-4-P	1. To study basic electronic components 2. To observe characteristics of electronic devices
B.Sc (H) in Computer Sc : 3rd Semester		
SUBJECT	**PAPER**	**OBJECTIVES**
Computer Organization & Architecture	CMS-A-CC-3-5-TH	1. To acquaint students with the basic architecture and organization of Modern Computer. 2. To develop insight into the students about how computer organization and architecture are linked with Software.
Computer Organization Lab	CMS-A-CC-3-5-P	1. This course is intended to teach the basics involved in data representation and digital logic circuits used in computer systems. 2. After taking this course the student will be able to identify and understand the general concepts of digital logic design , including logic elements and their use in combinational and sequential logic circuit design
Computational	CMS-A-CC-3-6-TH	1. To provide students with basic knowledge & understanding about set theory, probability and

Mathematics		Numerical analysis techniques of Computational Mathematics. 2. To provide an in depth knowledge in recurrences and graph theory to students so that they can understand the mathematical background of Computer.
Computational Mathematics Lab	CMS-A-CC-3-6-P	1. To give the students hands on training in different numerical analysis tools using C programming language.
Operating Systems	CMS-A-CC-3-7-TH	1. To impart the knowledge about different types of operating systems 2. To know about different functions of operating systems and to understand the configuration of different operating systems through case studies.
Operating Systems Lab	CMS-A-CC-3-7-P	1. To learn Shell scripting as a part of operating system lab
Theory Computer Graphics	CMS-A-SEC-A-3-1-TH	1. To demonstrate knowledge of modelling and representation of 3D shapes. 2. To understand hoe real time shading and lightning is implemente.
B.Sc (H) in Computer Sc : 4th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
Data communication, Networking and Internet technology.	CMS-A-CC-4-8-TH	1. To develop an understanding of modern network architectures from a design and performance perspective. 2. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). 3. To provide an opportunity to do network programming.
Computer Networking and Web Design Lab.	CMS-A-CC-4-8-P	

Introduction to Algorithms & its Application.	CMS-A-CC-4-9-TH	1. To learn how to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. 2. Through the complexity measures, different range of behaviours of algorithms and the notion of tractable and intractable problems will be understood.
Algorithms Lab	CMS-A-CC-4-9-P	
Microprocessor and its Applications	CMS-A-CC-4-10-P	1. To provide an opportunity to do Assembly level programming. 2. Interfacing design of peripherals like, I/O, A/D, D/A, timer etc. 3. To develop systems using different microcontrollers.
Programming with Microprocessor 8085.	CMS-A-CC-4-10-P	
E-Commerce	CMS-A-SEC-B-4-2-TH	To provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems
B.Sc (H) in Computer Sc : 5th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
Database Management system (DBMS)	CMS-A-CC-5-11-TH	To Enhance the knowledge in the area of Database Management Ssystem, Entity-Relationship Model, Relational Model, Integrity Constraints, Relational Database Design, SQL, Record Storage and File Organization.
RDBMS lab using My SQL & PHP.	CMS-A-CC-5-11-P	Students can write and run programs on RDBMS Lab using My SQL & PHP.
Object Oriented Programming (OOPs)	CMS-A-CC-5-12-TH	To Enhance the Concept of OOPs, Introduction to Java, Arrays, Strings and I/O, Object-Oriented Programming Overview, Inheritance, Interfaces, Packages, Enumerations, Auto boxing and

		Metadata. Exception Handling, Threading, Networking and Database Connectivity, Applets.
OOPs Lab using JAVA	CMS-A-CC-5-12-P	Students can write and run programs by OOPs concept using JAVA
Digital Image Processing	CMS-A-DSE-A-1-TH	Students will get iintroduction to Image Processing, Spatial Domain, Thresh-holding, Image Segmentation.
Image Processing LAB	CMS-A-DSE-A-1-P	Students will be able to write and run different Image Processing Functions based on Open CV & Python/Scilab.
Programming using Python	CMS-A-DSE-B-2-TH	Students will get Introduction to the Python, Strings, Lists, Tuples, Conditionals, Iterators, and Generators, User-defined Functions and Recursion, File Handling and Exception Handling, Unordered data types - Sets and Dictionaries, Dictionaries and Introduction to Object Oriented Programming.
Programming in Python Lab	CMS-A-DSE-B-2-P	Students will be able to write and run different programs using Python.
B.Sc (H) in Computer Sc : 6th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
Software Engineering	CMS-A-CC-6-13-TH	1. Goal 1 to help students to develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain 2. Goal 2 to foster an understanding of why these skills are important
Theory of Computation	CMS-A-CC-6-14-TH	1. Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm,

		decidability, complexity, and computability. 2. Enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.
Project	CMS-A-CC-6-14-P	A student can grow professionally by doing the course. The key to this involves learning (by doing) to *communicate with others. Seeking out information* supports communicating: one can always tell others about things learned.
Multimedia and its Application	CMS-A-DSE-A-4-TH	1. Students will understand multimedia in respect to many application including business, schools, home, education, and virtual reality. 2. Students will understand the hardware and software needed to create projects using creativity and organization to create them. 3. Student will develop multimedia skills understanding the principal players of individual players in multimedia teams in developing projects. 4. Students will work with all aspects of images. 5. Students will work with all aspects of sound. 6. Students will work with all aspects of video. 7. Students will learn copyright laws associated with multimedia. 8. Students will learn the cost involved in multimedia planning, designing, and producing. 9. Students will learn ways to present their multimedia projects.
Multimedia and its Applications Lab	CMS-A-DSE-A--4-P	Students will learn to write and practice practical problems on Multimedia.
Advance Java	CMS-A-DSE-B-4-TH	Develop error-free, well- documented Java programs test Java servlets while developing

		Java programs which incorporate advanced graphic functions. Learn how to write, test, and debug advanced-level Object-Oriented programs using Java.
Advance Java Lab	CMS-A-DSE-B-4-P	Designing Enterprise based applications by encapsulating an application's business logic. Designing applications using pre-built frameworks. Java Servlets: Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.

PROGRAMME OUTCOMES

A graduate with a B.Sc (H). in Computer Science will have the ability to

1. Demonstrate mastery of Computer Science in the following core knowledge areas
    I) Data Structures and Programming Languages
    II) Databases, Software Engineering and Development o Computer Hardware and Architecture.
    III) Operating system, Database management system and computer networking
    IV) Object oriented programming using Java and Python
    V) Assembly language programming
2. Apply problem-solving skills and the knowledge of computer science to solve real world problems.
3. Develop technical project reports and present them orally among the users.
4. After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, Stuff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.

B.Sc (General) in Computer Science

COURSE OUTCOMES

B.Sc (Gen.) in Computer Sc : 1st Semester		
SUBJECT	**PAPER**	**OBJECTIVES**
Computer Fundamentals and Digital Logic Design	CMS-G-CC-1-1-TH	To be able to understand Computer Fundamentals, Number System, Boolean Algebra, Combinational and Sequential circuits in detail. Also, Integrated circuits are taught (qualitative study only).
Word Processing, Spreadsheet, Presentation and Web design by HTML	CMS-G-CC-1-1-P	Students will be able to successfully use Word Processing, Spreadsheet, Presentation and Web design by HTML for solving various problems and will learn to document them properly.
B.Sc (Gen.) in Computer Sc : 2nd Semester		
SUBJECT	**PAPER**	**OBJECTIVES**
Algorithm and Data Structure	CMS-G-CC-2-2-TH	Understanding basic data structures and algorithms
Programming with C	CMS-G-CC-2-2-P	The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.
B.Sc (Gen.) in Computer Sc : 2nd Semester		
SUBJECT	**PAPER**	**OBJECTIVES**
Theory Computer Organization	CMS-G-CC-3-3-TH	1. To acquaint students with the organization of Modern Computer. 2. To develop insight into the students about how computer organization is linked with Software.

Practical Programming using PYTHON	CMS-G-CC-3-3-P	1. To master the fundamentals of writing Python scripts. 2. To discover how to work with list and data dictionary in Python.
Communication, Computer Network and Internet	CMS-G-SEC-A-X-1-TH	1. To Understand the concept of resource sharing in through computer 2. To learn about computer network organization and implementation and to obtain a theoretical understanding of data communication.
B.Sc (Gen) in Computer Sc : 4th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
Operating Systems	CMS-G-CC-4-4-TH	1. To learn the mechanisms of OS to handle processes and threads and their communication. 2. To learn the mechanisms involved in memory management in contemporary OS. 3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
Shell Programming (Linux)	CMS-G-CC-4-4-P	1. To provide introduction to UNIX Operating System and its File System 2. To gain an understanding of important aspects related to the SHELL and the process 3. To provide a comprehensive introduction to SHELL programming, services and utilities.
Multimedia and its Applications	CMS-G-SEC-B-X-1-TH	To provide students with a basic understanding of multimedia systems. This course focuses on topics in multimedia information representation and relevant signal processing aspects, multimedia networking and communications, and multimedia standards especially on the audio, image and video compression. All of these topics are important in multimedia industries.

B.Sc (Gen.) in Computer Sc : 5th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
Software Engineering	CMS-G-SEC-A-X-2-TH	1. To develop a broad understanding of the discipline of software engineering. 2. To aims to set these techniques in an appropriate engineering and management context.
Data base Management System (DBMS)	CMS-G-DSE-A-5-1-TH	1. To present an introduction to DBMS. 2. To learn how to organize, maintain and retrieve efficiently and effectively information from a DBMS.
DBMS Lab using SQL	CMS-G-DSE-A-5-1-P	1. To master the fundamentals of writing SQL commands. 2. To discover how to work with Relational Algebra and Relational Calculus in SQL.
Operation Research	CMS-G-DSE-A-5-2-TH	1. To be able to use quantitative methods and techniques for effective decision making. 2. To formulate the models and applications that are used in solving business decision problems.
Operation Research Lab using C	CMS-G-DSE-A-5-2-P	1. To implement the concepts and models of operations research using C Programming language.
B.Sc (Gen.) in Computer Sc : 6th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
Object Oriented Programming	CMS-G-DSE-B-6-2-TH	1. To understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. 2. To Understand fundamentals of **object-oriented programming in Java**, including defining classes, invoking methods, using class libraries, etc.
Object Oriented Programming by Java	CMS-G-DSE-B-6-2-P	
Computational Mathematics	CMS-G-DSE-B-6-3-TH	1. To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the

Computational Mathematics Lab using C	CMS-G-DSE-B-6-3-P	problems. 2. To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering this requires computing of numerical results using certain raw data. 3. To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations. 4. To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, and solution of matrix problems.
Information Security	CMS-G-SEC-B-X-2-TH	It focuses on the three objectives, confidentiality, integrity, and availability, which are collectively known as CIA: Confidentiality—preventing the disclosure of information to unauthorized users. Data integrity—ensuring the accuracy and authenticity of data.

PROGRAM OUTCOMES

A graduate with a B.Sc (Pass). in Computer Science will have the ability to

1. Demonstrate mastery of Computer Science in the following core knowledge areas
   VI) Data Structures and Programming Languages
   VII) Databases, Software Engineering and Development o Computer Hardware.
   VIII) Object oriented programming using Python
   IX) Different types of Application software
2. Apply problem-solving skills and the knowledge of computer science to solve real world problems.

- After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, Stuff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.

Department of Economics

Course Outcomes and Program Outcomes

Honours Course Outcome

SUBJECT	SEMESTER (PAPER)	OBJECTIVES
Introductory Microeconomics	SEM – I (CC – I) Economics Core Course –I (ECO-A-CC-1-1-TH-TU) And	• To provide students an introduction to the central idea of micro-economic analysis and decision making such as scarcity, allocation of resources, demand and supply. • To familiarize students with the reality at the micro or individual level.
Mathematical Methods for Economics-I	Economics Core Course –II (ECO-A-CC-1-2-TH-TU)	• To acquaint students with the basic tools and techniques of mathematics that are applied/used in the domain of economics. • To impart the knowledge of various mathematical concepts and methods that help understand the subject(economics) more objectively
Introductory Macro economics	SEM – II (CC – III) Economics Core Course – III (ECO-A-CC-2-3-TH-TU)	• To enable the students to get a broad overview of economics at aggregate or macro level. • To help students to analyze the economy in the quantitative term by using employment and national income statistics.
Mathematical Methods for Economics-II	Economics Core Course – IV (ECO-A-CC-2-4.TH-TU)	• To introduce more advanced mathematical concepts that help explain the complexities of the economies in a simplified way. • To instill the knowledge of various mathematical methods and techniques

		that builds the foundation for the subject (economics).
Intermediate Microeconomics-I	SEM – III (CC – VI) Economics Core Course –V (ECO-A-CC-3-5-TH-TU)	• To provide basic concepts and understanding of economics at the individual or micro level. • To enable the students to identify the real micro issues in the economy through the applications of the theories or the case studies.
Intermediate Macroeconomics-I	Economics Core Course – VI (ECO-A-CC-3-6-TH-TU)	• To acquaint students with various tools and ideas necessary to understand the aggregate economy and to make opinions about different economic policies. • To enhance student's ability to apply models in different sectors of the economy.
Statistics for Economics	Economics Core Course – VII (ECO-A-CC-3-7-TH-TU)	• Statistics in economics is concerned with the connection, processing and analysis of specific data. It helps the students to understand and analyse the economic theories.
Data Analysis [Theory]/ Rural Development [Theory]	Skill Enhancement Course-I (A Group) (ECO-A-SEC-3-1A-TH)	• To provide all students a basic idea of rural development, agricultural development, role of NGOs in rural development, non-farm sectors and rural development, role of panchayats and rural development , rural credit SHG. • To develop elaborate concepts on the role of NABARD, concept of micro credit and role of Gramin Bank, in addition to critical evaluation of selected government programmes for rural development.

Intermediate Microeconomics-II	SEM – IV (CC – IX) Economics Core Course – VIII (ECO-A-CC-4-8-TH-TU)	• To help the students acquire the knowledge of the Market Economy and its imperfection. • To provide a comprehensive knowledge of the advanced issues in Microeconomics
Intermediate Macroeconomics-II	Economics Core Course – IX (ECO-A-CC-4-9-TH-TU)	• To introduce modern theories of consumption and their application in day to day life. • To explore the knowledge of cross country differentials in standards of living and policies aimed at improving growth and standards of living.
Introductory Econometrics	Economics Core Course –X (ECO-A-CC-4-10-TH-TU)	• Econometrics is crucial for establishing trends between data base. So, our students can forecast future financial and economic trends.
Research Methodology [Theory]/ Managerial Economics [Theory]	Skill Enhancement Course-II (B Group) (ECO-A-SEC-4-2B-TH)	• Student's skill enhancement through empirical study of managerial economics. • Developing basic idea of demand forecasting, cost estimation technique, cost benefit analysis, pricing policies and practice. • Imparting concept of capital budgeting, cost of capital and different aspects of inventory management
International Economics	Economics Core Course – XI (ECO-A-CC-5-11-TH-TU)	• To introduce the students to the different ideas of Absolute and Comparative advantages of Trade 1. The Building Blocks of Trade Theory 2. Factor Endowment and Trade (Heckscher-Ohlin-Samuelson Model) 3. Applications of Neo-classical Trade Models for developing countries 4. Trade Policy 5. Open Economy Macroeconomics and

		Balance of Payments
Indian Economy **1. Applied Econometrics (AE)** **And**	Economics Core Course – XII (ECO-A-CC-5-12-TH-TU) (ECO-A-DSE-5-A(1)-TH-TU/P) And	• Enhance student's ability to understand different aspects of Indian economy. For example: ➢ economic development since independence, ➢ objectives, achievements and failures of planning, ➢ economic crisis during late 1980s, ➢ structural changes in post reform periods, ➢ regional variation of growth and development, ➢ demographic trends and issues, ➢ education and health problems and government measures, and, ➢ growth poverty and inequality in addition to economic reform measures.
2. Economic History of India (1857-1947) (EHI)	(ECO-A-DSE-5-B(1)-TH-TU)	• To help the students to acquire the knowledge on: ➢ Impact of British rule on India ➢ Deindustrialization ➢ Commercialization of agriculture ➢ Economic Drain and Aspects of Economic Policies in British India
1. Comparative Economic Development (1850-1950) (CED) **And**		• To introduce to the students the aspects of Strategies and Policies for Economic Development and Regions of contemporary development with Success stories of Asia : Japan, South East Asia and China and Crisis and failures of Latin America and Africa
2. Financial Economics (FE)		• To teach about financial market analyse. • The use and distribution of resources in

		the economy. It evaluates how time, risk, opportunity cost, information can create incentive or disincentive for particular decision.
1.Public economics	Economics Core Course – XIII (ECO-A-CC-6-13-TH-TU) Economics Core Course – XIV (ECO-A-CC-6-14-TH-TU)	• To make the students aware of ➢ Government in a Market Economy ➢ Choice and Public Economics ➢ The Revenue and Expenditure of the Government ➢ Public Finance
2.Economic History of India (1857-1947) (EHI **1.Comparative Economic Development (1850-1950) (CED)**	(ECO-A-DSE-6-A(2)-TH-TU/P) And	• To impart knowledge with the students to gauge the impact of the British rule on India. • To develop critical thinking on the aspects of economic policies in British India.
2.Envioronmental Economics (FE)	(ECO-A-DSE-6-B(2)-TH-TU)	• To enable students to understand the basic understanding of relationship between: ➢ environment and economics, ➢ market failure and the presence of externalities ➢ property rights and Coase theorem ➢ Pigouvian Fees in case of single polluter ➢ multiple polluters and Fees vs. subsidies ➢ command and control ➢ economic incentives regulating pollution ➢ The basic theory of tradable pollution permits in addition to international environmental problems.

General Course Outcome

SUBJECT	SEMESTER (PAPER)	OBJECTIVES
Introductory Micro economics	SEM – I (CC – I) (ECO-G-CC-1-1-TH-TU)	• To provide students an introduction to the central idea of micro-economic analysis and decision making such as scarcity, allocation of resources, demand and supply. • To familiarize students with the reality at the micro or individual level. • It has both theoretical and practical importance. • It helps students formulate economic policies which enhance productive efficiency and results in greater social welfare.
Introductory Macro economics	SEM – II (CC – III) (ECO-G-CC-2-2-TH-TU)	• To enable the students to get a broad overview of economics at aggregate or macro level. • To help students to analyze the economy in the quantitative term by using employment and national income statistics. • Basic issues of macroeconomics are introduced to provide an aggregative view of the economy and deal with the important issues such as inflation, trade, balance of payment etc.
Issues in Economic Development and India	SEM – III (CC – VI) (ECO-G-CC-3-3-TH-TU)	• To acquaint students with various tools and ideas necessary to understand the aggregate economy and to make opinions about different economic policies. • To enhance student's ability to apply models in different sectors of the economy. • To understand the basic developmental issues in India, such as poverty, inequality etc. • To teach the students how to measure them and to understand the dualistic nature of development in the country.
Elementary Rural Development	SEM-III (SEC 3 1A/ SEC 5 2A)	• To provide basic ideas on rural development and help understand the role of NGOs, Panchayats, NABARD and other Gramin Banks in microfinancing and rural credit supply for rural development in India.

Indian Economic Policies	SEM – IV (CC – IX) (ECO-G-CC-4-4-TH-TU)	• To introduce modern theories of consumption and their application in day to day life. • To explore the knowledge of cross country differentials in standards of living and policies aimed at improving growth and standards of living. • To understand the impact of macroeconomic policies on the Indian economy • To critically evaluate the policies and performance in Indian agriculture, industry and trade.
Entrepreneurship and Development	SEM-IV (SEC 4 1B/ SEC 6 2B)	• To understand the basic issues of Entrepreneurship and its linkage with economic development. • To impart the knowledge on the sources of finance for new ventures of an entrepreneur, the growth strategies of small businesses and the causes and consequences of sickness in small businesses.
Sustainable Development	SEM-V (DSE 5 1A/ 2A) ECO-G-DSE-5-1A/2A-TH-TU	• To provide introductory ideas on the approach towards Sustainability • To understand the meaning of Sustainable Development • To introduce the basic objectives, goals and visions of Sustainable Resource Management Policies in India.
Economic History of India	SEM-VI (DSE 6 1B/2B) ECO-G-DSE-6-1B/2B-TH-TU	• To gauge the impact of the British rule on India and to develop • To develop and discuss critical thinking on the aspects of economic policies in British India.

Program Outcomes

- Economics is one of the most important subjects in the area of the industry, trade and commerce. Preferably it is called social science. Mainly day to day economic activities of the people of the country are being discussed in this subject. It examines kind of work people do and how much time they spend during it.
- Study of this subject also provides valuable knowledge for making decisions in everyday life.
- Apart from this, after completing the degree course with economics, students can acquire many opportunities in future.
- There are many career options as well. Students can go for teaching in various educational institutions.
- Students can apply for internship programme at various educational institutions. Students of economics can prepare for various competitive exams like WBCS, SSC, IES, and IAS etc.

Department of Electronics

Course Description of Electronics General (ELTG)

Paper	Course Description		Topic	Objective
1ST SEMESTER				
CC-1A	Core Course-1	Theory	Network Analysis and Analog Electronics	To acquaint students about different simple to medium complex analog electronic components and devices, their working principles along with advantages and disadvantages.
	Core Course-1	Practical	Network Analysis and Analog Electronics Lab	To develop skill among the students for preparing few simple to moderately complex circuits in their own hands by using those analog components and devices to visualize the proper functioning of them and also to identify any defect for preparing those circuits.
2nd SEMESTER				
CC-1B	Core Course-4	Theory	Linear and Digital Integrated Circuits	To familiar students about digital signals, Boolean Algebra, Boolean logic, different digital components and circuits and their operations, working principles etc.
	Core Course-4	Practical	Linear and Digital Integrated Circuits Lab	To develop proficiency between the students so that they can build different logical and other simple to complex digital circuits by using different digital components and IC chips as well as they can detect any fault while preparing those circuits

3rd SEMESTER				
CC-1C	Core Course-7	Theory	Communication Electronics	To aware students regarding both Analog and Digital Communication principles and techniques which are now used in different communication methods and also to familiar them about different digital and analog circuits used for preparing those systems.
	Core Course-7	Practical	Communication Electronics Lab	To visualize the nature, composition and noises of the communicated or modulated signals in both analog and digital modes of communication, to get familiar with different demodulation techniques and also to make the students accustomed to operate those systems.
Paper	**Course Description**		**Topic**	**Objective**
SEC –A-1	Skill Enhancement Course A1		Computational Physics	To improve computational skill among students so that they can be able to do educational or research projects by developing their own programmes with high level programming language and to express their findings with the help of scientific word processing software like LATEX and also to visualize the computational data with graphical analyzing software like GNUPlot.
SEC-A-2	Skill Enhancement Course A2		Renewable Energy and Energy Harvesting	To develop idea among the students about different kinds of renewable

				energy sources, their origins and how they can be collected from different natural sources or natural phenomenon and to enhance their skill regarding the techniques or instruments require for those purposes.
4th SEMESTER				
CC-1D	Core Course-10	Theory	Microprocessor and Microcontroller	To give students a clear view about the architecture and working principle of 8085 Microprocessor and 8051 Microcontroller so that they can be familiar with its operation and hence to do different programs with help of them to acquire a complete knowledge about its memory allocation, interrupts and interfacing.
	Core Course-10	Practical	Microprocessor and Microcontroller Lab	To develop a programming skill of low level programming language among the students so that they can be able to develop programs by using dynamic memory allocation, different interrupts and interfacing between PC or other devices.
SEC –B-1	Skill Enhancement Course B1		Electrical Circuits and Network Skills	In the core course students may acquire their knowledge about different electrical components and circuits required in different networks but in this SEC they can enhance their skill and acquaintance about the operations and working principles of

				those apparatuses as well as technical knowhow about electrical wiring.
SEC-B-2	Skill Enhancement Course B2		Technical Drawing	In previous syllabus there was no option for the general science stream students to know about technical drawing which is compulsory for engineering students. In this SEC option they can have an idea about technical drawings using different instruments and software like Auto CAD.
5th SEMESTER				
DSE-A-1	Discipline Specific Elective-1	Theory	DSE-A-1 Semiconductor Devices Fabrication	In core course, students can be familiar with operations and uses of different semiconductor devices but in this DSE they can know about different fabrication techniques which are used to prepare those semiconductor and memory devices and also they can be familiarized with Very Large Scale Integration (VLSI) processing and Micro Electromechanical Systems or MEMs devices.
	Discipline Specific Elective-1	Practical	DSE-A -1 Lab Semiconductor Devices Fabrication lab	To give practical experience to the students to operate few instruments required to develop or simulate small portion of such devices like p-n junction, thin film, ceramic etc. and to study their operations practically.

DSE-A-2	Discipline Specific Elective-1	Theory	DSE-A-2 Photonic Devices and Power Electronics	In this DSE students can have option to study about more advanced electronic devices like photodetectors, optoelectronic devices, power electronic devices like thyristors, SCR etc.
	Discipline Specific Elective-1	Practical	DSE-A -2 Lab Photonic Devices and Power Electronics lab	In different assignments students can study the operations of those devices.
6th SEMESTER				
DSE-B-1	Discipline Specific Elective-4	Theory	DSE-B-1 Electronic Instrumentation	In this DSE students can be acquaint with operations and functions of different electronic instruments which are used in different measurement like CRO, Signal Generator, Data acquisition systems including various biomedical instruments and measurements.
	Discipline Specific Elective-4	Practical	DSE-B-1Lab Electronic Instrumentation lab	In this course students can get hand on experience to operate different instruments and sensors for measurement of different kind of signals including biomedical, light and heat.
DSE-B-2	Discipline Specific Elective-4	Theory	DSE-B-2 Transmission line, Antenna and Radio wave Propagation	Student may opt this DSE to do more advance level of study regarding communication process and principles to know how the signal can transfer or propagate through different medium or how they can be received in different radio stations etc.

	Discipline Specific Elective-4	Practical	DSE-B-2 Lab Transmission line, Antenna and Radio wave Propagation lab	In this paper students may implement or simulate different aspects of waveguides, transmission lines or antenna theory.

PROGRAMME OUTCOME

After completion of 3 years B.Sc. General Course students can have:-

1. A thorough knowledge about different branches of Electronics including practical skill to develop and testing different hardware as well as software tools for implementation of different components or devices.
2. Students can serve as technician in different Space or defense laboratories or in any R&D wings of manufacturing companies.
3. They can also setup their own business to manufacture different electronics components and instruments.
4. As graduate students they can also appear in different government service entrance examinations like IAS, WBCS, IPS, IRS etc.
5. They can also join in school or college service as academicians.
6. If anyone want to do higher study then they can join any professional courses like MBA,MCA, PGDM, PGDCM or any other technical courses like Mobile App Development, Machine Learning, Cloud Security, VLSI designing, circuit designing etc. offered by different technical institutes in India and abroad.

DEPARTMENT OF GEOGRAPHY

COURSE AND PROGRAMME OUTCOMES

COURSE SPECIFIC OUTCOMES

SL. NO.	*SEMESTER*	*PAPER CODE*	*PAPER NAME*	*FULL MARKS*	*CREDITS*	*COURSE OUTCOMES*
1	**I**	GEO-A-CC-1-**01**	**GEOTECTONICS & GEOMORPHOLOGY**	100	6	To help students understand the following: • Fundamentals of physical geography • Interior of the earth • Process and resultant landforms of inertial forces • Morphological processes and changes • Critical appraisal of the theories of landscape evaluation
2	**I**	GEO-A-CC-1-**02**	**CARTOGRAPHIC TECHNIQUES**	100	6	To teach the students about the following: • The concept of map and its elements • Overview and preparation of the projections • The data representation through thematic diagrams • Reference scheme of toposheets published by soil
3	**II**	GEO-A-CC-2-**03**	**HUMAN GEOGRAPHY**	100	6	The following can be achieved on this course: • The fundamentals of human geography • Overview of structural knowledge and evolution of

						human society • Critical analysis of man environment relationship • Understanding of rural and urban settlement and its morphology
4	**II**	GEO-A-CC-2-**04**	**THEMATIC MAPPING & SURVEING**	100	6	To discuss the following: • Fundamental concepts and preparation of thematic maps i.e. geological map, weather map, lulc map • Information about different national agencies of thematic mapping • Basic concept and hands on different survey equipment i.e. Dumpy level, theodolite, laser distance measurer
5	**III**	GEO-A-CC-3-**05**	**CLIMATOLOGY**	100	6	To develop the following idea and concept in the students regarding: • Fundamental concepts of weather and its components • Critical overview of climate change • Atmospheric disturbances • Monsoon and its impact on India • Overview of climate classifications • Measurement of weather elements through analogue instruments and mapping of observed climatic data
6	**III**	GEO-A-CC-3-**06**	**HYDROLOGY & OCEANOGRAPHY**	100	6	To be able to understand the following:- • The fundamentals of hydrology and oceanography

						• Critical overview of hydrological cycle and its impact • Concept and importance of ground water • Features of ocean floor and properties of ocean water • Basic concept of marine resources, coral reefs and sea level change • Construction and interpretation of rating curves, hydrographs and unit hydrographs and different quantitative methods.
7	**III**	GEO-A-CC-3-**07**	**STATISTICAL METHODS IN GEOGRAPHY**	100	6	To be able to get idea about the following topics: • The importance and significance of statistics in geography • Overview on construction of frequency distribution and sampling • Introduction to basic numerical data analysis like, central tendency, measure of dispersion, regression, time series analysis. • Practical knowledge of tabulation, sampling and statistical inferences
8	**IV**	GEO-A-CC-4-**08**	**ECONOMIC GEOGRAPHY**	100	6	Students will be able to successfully understand the following: • Understanding the fundamental principles of economic geography

						• Assessing the importance of economic activities around the world • Critical understanding of locational approache to different economic activities • Critical review of different economic activities along with international economic and trade blocks • Quantitative analysis of economic data
9	**IV**	GEO-A-CC-4-**09**	**REGIONAL PLANNING AND DEVELOPMENT**	100	6	To acquaint students with the: • Concept and components of region and regional planning with special reference to india • Critical overview of concepts and theories of regional development • Concept and measures of regional development in india • Delineation on different regions and measures of regional disparity
10	**IV**	GEO-A-CC-4-**10**	**SOIL AND BIOGEOGRAPHY**	100	6	To understand the following: • The processes of soil formation, types of soil, and properties of soil • Critical review of principles of soil classification schemes • Concepts of bio-geography • Concept and management of deforestation and bio-

						diversity • Hands on soil testing and plant diversity measurement
11	**V**	GEO-A-CC-5-**11**	**RESEARCH METHODOLOGY & FIELDWORK**	100	6	To impart knowledge on the following: • Understanding different components and procedure of research methodology in geography • Critical overview on techniques of writing scientific reports • Pre-field knowledge of fieldwork in geographical studies. • Collection of field data by using different field techniques and tools • Post field tabulation, analysis, diagrammatic representation and report writing
12	**V**	GEO-A-CC-5-**12**	**REMOTE SENSING, GIS & GNSS**	100	6	To develop idea on: • Understanding the principles of remote sensing, gis and global navigation system • Critical understanding of principles of image interpretation • Theoritical understanding of diiferent gis applications • Hands on image acquisition, classification, digitisation and use of gps
13	**VI**	GEO-A-	**EVOLUTION**	100	6	To teach about the:

		CC-6-**13**	**GEOGRAPHICAL THOUGHT**			• Philosophical framework of geography • Overview of the contribution of different school of thoughts • Critical understanding of foundation of modern geography and recent trends in geography
14	**VI**	GEO-A-CC-6-**14**	**HAZARD MANAGEMENT**	100	6	To gain knowledge on: • Understanding of classification, approaches and responses to hazards • Critical overview of hazards mapping • Factors, vulnerability, consequences and management of different types of hazards with focus on west bengal and india • Preparation of hazard management report

PROGRAMME SPECIFIC OUTCOMES

GRADUATIION IN GEOGRAPHY

ACADEMIC SECTORS	GOVERNMENT SECTORS	OTHER SECTORS
TEACHING IN SCHOOLS WITH B.ED THROUGH SSC, PSC, MSC, KVS AND ARMY PUBLIC SCHOOLS	**DIFFERENT POST IN GOVERNMENT SECTORS** THROUGH STAFF SELECTION COMMISSION, UPSC, WBCS, PSC & OTHERS	**TOWN PLANNER** EMPLOYED BY BOTH PUBLIC AND PRIVATE SECTORS WITH SPECIFIC QUALIFICATIONS
M.A/M.SC IN GEOGRAPHY IN DIFFERENT BRANCHES		**GEOSAPTIAL ANALYST** WITH COURSES ON GIS AND REMOTE SENSING
NET/SET FOR ELIGIBILITY IN LECTURERSHIP	**JOBS IN RAIL AND BANKING SECTORS** THROGH RRBs & IBPS EXAMS	**CARTOGRAPHER** ENGAGED IN MAP MAKING
Professor IN COLLEGES THROUGH CSC & PSC	**SCIENTISTS** IN DIFFERENT INSTITUTES THROUGH STAFF SECTION COMMISSION	**DATA ANALYST** IN DIFFERENT PRIVATE SECTORS WITH FIRM KNOWLEDGE IN DATA MANAGEMENT
M.PHIL.	**REGIONAL AND URBAN PLANNER** WITH SPECIFIC COURSES ON REGIONAL AND URBAN PLANNING	**DEMOGRAPHER** SPECIALIZED IN POPULATION GEOGRAPHY ENGAGED IN BOTH PUBLIC AND PRIVATE SECTOR
RESEARCH IN DIFFERENT FIELDS WITH NET/SET	**ENVIRONMENTAL CONSULTANT** WITH COURSES ON ENVIRONMENTAL MANAGEMENT	**PROJECT MANAGER** HIRED BY BOTH PUBLIC OR PRIVATE FUNDED AGENCIES
	DISASTER MANAGEMENT PERSONNEL WITH SPECIFIC COURESE ON DISASTER MANAGEMENT	**IT SECTORS** WITH GOOD COMMUNICATION SKILLS
	SURVEYOR IN SURVEY OF INDIA, NATMO THROUGH DIFFERENT EXAMS AND SPECIFIC COURSES	**NGOs** AS A SOCIAL WORKER
	HYDOLOGIST, SOIL AND WATER CONSERVATION OFFICERS	

Department of Mathematics

COURSE OUTCOMES (HONOURS)

B.Sc. (HONOURS) 1ST SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
CALCULUS	MTM-A- CC-1-1-TH	To be able to understand the following:- • Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications. • Curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences. • Reduction formulae, area and volume of surface of revolution.
GEOMETRY		To be able to acquire the knowledge about the following: • Rotation of axes and second degree equations • Classification of conics • Equation of Plane • Straight lines in 3D. • Spheres. Cylindrical surfaces. Central conicoids, paraboloids • Tangent and normals of conicoids.
VECTOR ANALYSIS		Students will be able to successfully implement regarding the following: • Triple product, vector equations, applications to geometry and mechanics • Vector Functions. • Plotting of graphs of function e ax+b , log(ax + b), 1/(ax + b), sin(ax + b), cos(ax + b), |ax + b|
ALGEBRA	MTM-A- CC-1-2-TH	They will understand the • Complex Numbers • Theory of equations • Inequality • Linear difference equations with constant coefficients • Relation, Mapping, • Principles of Mathematical induction, Congruence relation between integers • Rank of a matrix

B.SC (HONOURS) 2ND SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
REAL ANALYSIS	MTM-A-CC-2-3- TH	To acquaint students with the basic knowledge of • countable sets, un-countable sets and uncountability of R • Concept of bounded and unbounded sets in R • Limit point and isolated point of a set. • Real sequence • Infinite series
GROUP THEORY-I	MTM-A-CC-2-4- TH	To familiarize the students with the concepts of: • Group, Subgroup, Normalizer, centralizer • Cyclic Groups, Permutations, Alternating Group, Normal subgroup, Quotient group. Group homomorphisms.
B.SC (HONOURS) 3rd SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
LIMIT & CONTINUITY OF FUNCTIONS	MTM-A-CC-3-5- TH	This course is intended to teach the basics involved in • Limits of functions. • Continuity of a function • Bounded functions. • Discontinuity of functions. • Uniform continuity.
DIFFERENTIABILIT YOF FUNCTIONS		This course is intended to teach the basics involved in • Differentiability of a function at a point and in an interval • Darboux theorem, Rolle's Theorem, Mean value theorems of Lagrange and Cauchy L' Hospital's rule and its consequences.
RING THEORY	MTM-A-CC-3-6- TH	To impart the knowledge about Rings, Subrings, Ring homomorphisms, Congruence on rings
LINEAR ALGEBRA		To impart the knowledge about : • Vector spaces, Subspaces, Linear span, Basis and Dimension, Geometric significance of subspace. • Linear transformations, Isomorphisms • Eigen values, Eigen vectors.

ORDINARY DIFFERENTIAL EQUATION	MTM-A-CC-3-7- TH	To impart the knowledge about • First order differential equations. • Linear equations and equations reducible to linear form, Clairaut's equations and singular solution. • Homogeneous linear systems with constant coefficients. • Wronskian, Euler equation • System of linear differential equations, Differential operators. • Power series solution of a differential equation about an ordinary point.
MULTIVARIATE CALCULUS-I		To know about • Concept of neighborhood of a point in R n (n > 1) • Partial Derivatives, Extrema of functions of two variables, Lagrange multipliers.
C PROGRAMMING LANGUAGE	MTM-A-SEC-A-TH	To have an overview of • Theoretical computers, history of computers, overview of architecture of computer, compiler, assembler, machine language, high level language • Decision Making and Branching • Control Statements
OBJECT ORIENTED PROGRAMMING IN C++		To understand about the Library functions To know about the • Brief history of C++, structure of C++ program, differences between C and C++, basic C++ operators, • Template class in C++, copy constructor, subscript and function call operator, concept of namespace and exception handling.

B.SC(HONOURS) 4th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
RIEMANN INTEGRATION	MTM-A-CC-4-8- TH	To impart the knowledge of • Partition, Upper integral and lower integral, Riemann's definition of integrability. • Concept of negligible set (or zero set), Riemann integrable functions. • Logarithmic function, Fundamental theorem of Integral Calculus.
IMPROPER INTEGRAL		To demonstrate knowledge of • Condition for convergence of improper integral. • Tests of convergence • Beta and Gamma function
SETIES OF FUNCTIONS		To develop an understanding of • Sequence of functions defined on a set, Point wise and uniform convergence. • Series of functions defined on a set, Boundedness, continuity, integrability, differentiability of a series of functions. • Power series • Fourier series.
PARTIAL DIFFERENTIAL EQUATION	MTM-A-CC-4-9- TH	To develop an understanding of • Partial differential equations of the first order, Lagrange's solution, non linear first order partial differential equations. • Derivation of heat equation, wave equation and Laplace equation. • Cauchy problem of finite and infinite string.
MULTIVARIATE CALCULUS-II		To learn about the • Multiple integral, Determination of volume and surface area by multiple integrals • Divergence and curl, Line integrals • Green's theorem, surface integrals, Stoke's theorem.

MECHANICS	MTM-A-CC-4-10- TH	To introduce the student to the major concepts involved in: • Coplanar forces in general, an arbitrary force system in space, an arbitrary force system in space. • Virtual work, Stability of equilibrium. • Kinematics of a particle, Newton laws of motion and law of gravitation. • Problems in particle dynamics, planar motion of a particle, Motion of a particle in three dimensions. • The linear momentum principle, the angular momentum principle, the energy principle.
MATHEMATICAL LOGIC	MTM-A-SEC-B- TH	To introduce the student to the major concepts involved in • Propositions, truth table, negation, conjunction and disjunction. • Propositional Logic • Predicate Logic
SCIENTIFIC COMPUTING WITH SAGEMATH & R		To impart knowledge on the following: • Installation Procedure, Use of SageMath & R as a Calculator, Numerical and symbolic computations using mathematical functions. • Programming in SageMath & R

B.SC (HONOURS) 5th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
PROBABILITY & STATISTICS	MTM-A-CC-5-11- TH	To provides an introduction to the following: • Probability axioms, probability space. Finite sample spaces. Conditional probability, Bayes theorem • Discrete distributions : uniform, binomial, Poisson, geometric, negative binomial, Continuous distributions : uniform, normal, exponential • Bivariate normal distribution. • Markov and Chebyshev's inequality, Convergence in Probability • Sampling and Sampling Distributions • Estimation of parameters • Method of Maximum likelihood. • Statistical hypothesis, Bivariate frequency Distribution.

GROUP THEORY	MTM-A-CC-5-12- TH	To provides an information to the following: • Automorphism, Automorphism Groups • External direct product and its properties. • Fundamental theorem of finite abelian groups.
LINEAR ALGEBRA		To impart elaborate knowledge on • Inner product spaces and norms, Gram-Schmidt orthonormalisation process, Bessel's inequality • Diagonalisation of symmetric matrices, Hessian matrix, Sylvester's law of inertia • Dual spaces, dual basis, Eigenspaces of a linear operator.
GHEOROUP TRY	MTM-A-DSE-A-5- 1-TH	To give an idea about the following: • Group actions, stabilizers, • Permutation representation associated with a given group action, • Applications of group actions
RING THEORY		To understand the : • Principal ideal domain, principal ideal ring, prime element, irreducible element, greatest common divisor (gcd), least common multiple (lcm) • Polynomial rings • Ring embedding and quotient field, regular rings
BIO MATHEMATICS		To give an idea about the integration of Maths and Biology in the following topics: • Mathematical biology and the modeling process • Activator-inhibitor system, insect outbreak model • Discrete models
INDUSTRIAL MATHEMATICS		To provide an opportunity to do practical on • Medical Imaging and Inverse Problems • Mathematics of X-ray and CT scan based on the knowledge of calculus, elementary differential equations, complex numbers and matrices. • X-ray behavior and Beers Law • Radon Transform • Back Projection

DISCRETE MATHEMATICS	MTM-A-DSE-B-5- 1-TH	To provide a deeper understanding of • Graph Theory • Weighted graphs and Travelling salespersons Problem • Pigeon hole Principle • Number Theory
LINEAR PROGRAMMING & GAME THEORY		To Enhance the knowledge on : • Formation of L.P.P. from daily life involving in equations • Basic solutions and Basic Feasible Solution (B.F.S) with reference to L.P.P • Hyperplane, Convex set • Simplex method, Duality theory • Transportation and Assignment problems • Concept of game problem
BOOLEAN ALGEBRA & AUTOMATA THEORY		To Enhance the concept of: • Lattices as ordered sets , modular and distributive lattices, Karnaugh diagrams, Logic gates • Context free grammars and pushdown automata • Turing Machines • Undecidability

B.SC (HONOURS) 6th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
METRIC SPACE	MTM-A-CC-6-13- TH	To Enhance the knowledge : • Metric spaces. Open ball. Open set, Subspace of a metric space. • Convergent sequence. Cauchy sequence , Cantor's intersection theorem • Compactness, Sequential compactness, Heine- Borel theorem in R • Concept of connectedness , connected subsets of R, C • Contraction mappings, Banach Fixed point Theorem.

COMPLEX ANALYSIS		Students will get introduction to: • Stereographic projection ,Continuity of functions of complex variable • Derivatives, differentiation formulas, Cauchy- Riemann equations, Möbius transformation. • Power series • Contours, complex integration along a contour, Cauchy integral formula.
NUMERICAL METHODS	MTM-A-CC-6-14-TH	It will elaborately introduce the students to the following: • Representation of real numbers, Machine Numbers - floating point and fixed point. • Sources of Errors, Rounding of numbers, significant digits and Error Propagation in machine arithmetic operations. Numerical Algorithms - stability and convergence. • Approximation, Interpolation, Stirling's and Bessel's formulas, Hermite interpolation. • Numerical differentiation , Numerical Integration, Gaussian quadrature formula • Transcendental and polynomial equations, Numerical solution of system of nonlinear equations - Newton's method. • Gaussian elimination and Gauss Jordan methods, Pivoting strategies, • Gauss Jacobi method, Gauss Seidel method and their convergence analysis. LU decomposition method (Crout's LU decomposition method). • Gaussian elimination and LU decomposition method (Crout's LU decomposition method) • Ordinary differential equations
NUMERICAL METHODS LAB	MTM-A-CC-6-14-P	This paper helps the student to solve different type of numerical problems which arises many practical fields.
DIFFERENTIAL GEOMETRY	MTM-A-DSE-A-6- 2-TH	Enhance/develop students' ability to understand • Tensor , theory of space curves, theory of surfaces • Developable associated with space curves and curves

		on surfaces • Torsion of a geodesic. Geodesic curvature
MATHEMATICAL MODELLING		This course will impart knowledge on:- • Power series solution of Bessel's equation and Legendre's equation • Laplace transform and inverse transform • Monte Carlo simulation modeling
FLUID STATICS & ELEMENTARY FLUID DYNAMICS		This will help to understand the following: • Distinction Between Solid and Fluid, Concept of Continuum, Fluid Properties • Newtonian fluid, Non-Newtonian Fluids. Ideal Fluid, Compressibility • Hydrostatic Thrusts on Submerged Plane Surface • Kinematics of Fluid • Conservation Equations
POINT SET TOPOLOGY	MTM-A-DSE-B-6- 2-TH	It will develop students' ability to understand : • Topological spaces, basis and sub-basis for a topology • First countability, T1 and T2 separation axioms of topological spaces, Heine's continuity criterion. • Connected spaces, connected sets in R, components, Compact spaces
ASTRONOMY & SPACE SCIENCE		To enhance/develop students' ability to understand • Celestial Sphere, various Coordinate Systems • Formulae of spherical triangle • Light and its properties • Various magnitudes of stars, Solar system • Morphological classification of galaxies • Space agencies around the world Rocket Propulsion
ADVANCED MECHANICS		To teach the methods of • Degrees of freedom, reactions due to constraints • Hamilton's principle for non-holonomic system • Poincare-Cartan integral invariant; Principle of stationary action; Fermat's principle; • Canonical transformation

		• Generating function; Poisson Bracket; Equations of motion; Action-angle variables; Hamilton- Jacobi's equation.

PROGRAMME OUTCOMES

- Bachelor's degree in Mathematics Hons. is the culmination of in-depth knowledge of algebra, calculus, geometry, differential equations, numerical analysis and several other branches of mathematics.
- This also leads to study of related areas like computer science, financial mathematics, statistics, mathematical physics and many more. Thus, this programme helps learners in building a solid foundation for higher studies in mathematics.
- After the completion of B.Sc. degree one can go for M.Sc. And PhD in Mathematics.
- Also, completion of this programme will enable the learners to join teaching profession in primary, secondary schools, colleges, universities, NIT's, IIT's etc.
- This programme will help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

COURSE OUTCOME (General Course)

B.Sc. (GENEREL) 1ST SEMESTER		
SUBJECT	**PAPER**	**OBJETIVES**
ALGEBRA-I	**MTM-G-CC-1-1-TH**	To impart the knowledge on • Complex Numbers • Polynomials • Rank of a matrix • Curve tracing in Cartesian coordinates, tracing in polarcoordinates of standard curves, • L'Hospital's rule, applications in business, economics andlife sciences. • Reduction formulae. • Area and volume of surface of revolution.
DIFFERENTIAL CALCULUS-I		To impart the idea on • Rational , Irrational number • Algebra of limits. Continuity of a function at a point and in aninterval. • Successive derivative - Leibnitz's theorem and its application. • Functions of two and three variables. • Applications of Differential Calculus
DIFFERENTIAL EQUATION-I		And • First order equations • Second order differential equation
COORDINATE GEOMETRY		To learn about the • Transformations of Rectangular axes • General equation of second degree in x and y : • Pair of straight lines • Sphere and its tangent plane. Right circular cone.

B.Sc. (GENEREL) 2ND SEMESTER		
DIFFERENTIAL CALCULUS-II	**MTM-G-CC-2-2-TH / MTM-G-GE-2-2-TH**	To impart the idea on • Sequence of real numbers • Infinite series of constant terms • Indeterminate Forms • Maxima and minima of functions
DIFFERENTIAL EQUATION-II		To impart the information on • Linear homogeneous equations with constant coefficients,Linear non-homogeneous equations • Linear and non-linear partial differential equations • Lagrange's method, Charpit's method.
VECTOR ALGEBRA		And • Collinear and Coplanar Vectors. • Scalar and Vector products of two and three vectors. • Simple applications to problems of Geometry
B.Sc. (GENEREL) 3RD SEMESTER		
INTEGRAL CALCULUS	**MTM-G-CC-3-3-TH / MTM-G-GE-3-3-TH**	To impart the knowledge on • Definite Integrals , Reduction formulae , • Improper Integrals double integral.
NUMERICAL METHOD		And • Significant figures, rounding off numbers. Error • Operators - Δ, A and E • Solution of Numerical Equation
DISCRETE MATHEMATI		Students will get an idea on • Integers , Congruences, Application of Congruences • Boolean algebra
LINEAR PRGRAMMING		To make the student understand about the • Formation of L.P.P. from daily life involving inequations • Basic solutions and Basic Feasible Solution (B.F.S) withreference to L.P.P • Hyperplane, Convex set

		• Simplex method, Duality theory • Transportation and Assignment problems
C-PROGRAMMING LANGUAGE	**MTM-G-SEC-A-TH**	To impart an overview of • theoretical computers, history of computers, overview of architecture of computer, compiler, assembler, machinelanguage, high level language • Decision Making and Branching • Control Statements • Library functions

B.Sc. (GENEREL) 4TH SEMESTER		
ALGEBRA-II	**MTM-G-CC-4-4-TH / MTM-G-GE-4-4-TH**	To introduce the student to the concept of • Group Theory • Ring, (ii) Field, (iii) Sub-ring, (iv) Sub- field. • Vector space over a Field • Characteristic equation of square matrix
COMPUTER SCIENCE & PRGRAMMING		To introduce the student to the idea of • Computer Science and Programming • Positional Number System • Programming Language • Algorithms and Flow Charts
PROBABILITY & STATISTICS		To impart an overview of • Conditional probability and Statistical Independence. • Baye's Theorem. • Probability Distribution Discrete and Continuous • Census and Sample Survey. • Tabulation Chart and Diagram, Graph, Bar diagram, Pie diagram • Sampling Theory • Statistical Hypothesis - Null Hypothesis and AlternativeHypothesis. • Level of significance
MATHEMATICAL LOGIC	**MTM-G-SEC-B-TH**	And • Propositions, truth table, negation, conjunction and disjunction. • Propositional Logic, Predicate Logic

B.Sc. (GENERAL) 5TH SEMESTER		
OBJECT ORIENTED PROGRAMMING IN C++	**MTM-G-SEC-A-TH**	To develop an understanding of • Brief history of C++, structure of C++ program, differencesbetween C and C++, basic C++ operators, • Template class in C++, copy constructor, subscript and functioncall operator, concept of namespace and exception handling.
PARTICLE DYNAMICS	**MTM-G-DSE-A-TH**	To impart the knowledge on • Velocity and Acceleration of a particle • Concept of Force • Motion in two dimensions • Central orbit. Kepler's laws of motion.
ADVANCED CALCULUS	**MTM-G-DSE-B-TH**	To impart the knowledge on • Uniform convergence of sequence of functions and series offunctions • 2 Power Series • Periodic Fourier series on $(-\pi,\pi)$ • Laplace Transform and its application to ordinary differentialequation
B.Sc. (GENERAL) 6TH SEMESTER		
GRAPH THEORY	**MTM-G-DSE-A-TH**	To impart the knowledge on • Properties of graphs, pseudographs, complete graphs, • Bi-partite graphs, isomorphism of graphs • Paths and circuits, Eulerian circuits, Hamiltonian cycles, • Dijkstra's algorithm, Floyd-Warshall algorithm • Trees and their elementary properties. Definition of Planargraphs, Kuratowski's graphs.

MATHEMATICAL FINANCE	**MTM-G-DSE-B-TH**	To impart the basic idea on the • Basic principles, Interest , time value of money, inflation, netpresent value, internal rate of return • Comparison of NPV and IRR • Markowitz model.

PROGRAMME OUTCOMES

- The key areas of study in mathematics as general subject are Algebra, Geometry, Differential Equations, numerical analysis.
- This course familiarizes the students with suitable tools of mathematical analysis to handle issues and problems in mathematics and related sciences.
- It also encourages the students to develop a range of generic skills helpful in employment, internships and social activities.
- This programme will help students to enhance their employability for government jobs, jobs in primary schools, high schools, banking, insuranceand investment sectors, data analyst jobs and jobs in various other public and private enterprises.
- After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, Staff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.

Department of Physics

Course Description of Physics Honours (PHSA)

Paper	Course Description		Topic	Objective
1ST SEMESTER				
CC-1	Core Course-1	Theory + Practical	Mathematical Methods 1	To develop a strong mathematical concepts among the students and to familiar them with vector algebra, vector Calculus, Matrices etc. To emphasis on developing programming skill with introduction of Python programming language and graphical analyzing software Gnu plot.
CC-2	Core Course-2	Theory + Practical	Mechanics	Students will acquaint about different kind of motions like linear, rotational, gravitational, fluid and to formulate and solve their equations. In the practical assignments students can study and determine general properties of matter from their motion.
2nd SEMESTER				
CC-3	Core Course-3	Theory + Practical	Electricity & Magnetism	In this paper students can know about Electrostatic magnetic and magneto-static properties of matter including basic concepts of electrical components and circuits, their uses and measuring techniques.
CC-4	Core Course-4	Theory + Practical	Wave and Optics	In this course students can familiar with the properties and behavior of both sound and light waves when they pass different medium. They also learn how to use different

				instruments required to study these properties and phenomenon.
3rd SEMESTER				
CC-5	Core Course-5	Theory + Practical	Mathematical Methods II	To develop more advanced level of mathematical concepts among students and also to enhance their programming skill to compute more complex mathematical models or equations.
CC-6	Core Course-6	Theory + Practical	Thermal Physics	Students can accustomed with various thermodynamic properties of matter, heat waves and thermal states. They can study those thermal states by experiment and also estimate thermal parameters.
CC-7	Core Course-7	Theory + Practical	Modern Physics	To give an basic idea of quantum mechanics, nuclear physics, particle physics and to do few basic experiments to get an idea of this.
SEC A-1	Skill Enhancement Course A1	Theory	Scientific Writing	To improve computational skill among students so that they can be able to do educational or research projects by developing their own programs with high level programming language and to express their findings with the help of scientific word processing software like LATEX
SEC A-2	Skill Enhancement Course A2	Theory	Renewable Energy and Energy Harvesting	To develop idea among the students about different kinds of renewable energy sources, their origins and how they can be collected from different natural sources or natural phenomenon and to enhance their skill regarding the techniques or

				instruments require for those purposes.
4th SEMESTER				
CC-8	Core Course-8	Theory + Practical	Mathematical Methods III	To explore and develop more advanced mathematical concepts and computational skill among the students
CC-9	Core Course-9	Theory + Practical	Analog Electronics	To acquaint students about different simple to medium complex analog electronic components and devices, their working principles along with advantages and disadvantages. To develop skill among the students for preparing few simple too moderately complex circuits in their own hands.
CC-10	Core Course-10	Theory + Practical	Quantum Mechanics	This is the fundamental or building block of all modern physical concepts like atomic structure, hydrogen bond, semiconductor physics, nuclear physics, particle physics, optics etc. Students must know this to learn these advance topics.
SEC B-1	Skill Enhancement Course B1	Theory	Arduino (Project type).	This is a new programming platform and students can develop their own project with this software by preparing mobile app or some controlling devices or tools.
SEC B-2	Skill Enhancement Course B2	Theory	Electrical Circuits and Network skills (Theory).	In this SEC students can enhance their skill and acquaintance about the operations and working principles of t different electrical components and circuits required to develop different networks and circuits as well as

				technical know how about electrical wiring.
5th SEMESTER				
CC-11	Core Course-11	Theory + Practical	Electromagnetic Theory	To develop more advance concept among students about both theoretical and practical know how of EM theory.
CC-12	Core Course-12	Theory + Practical	Statistical Physics	This portion contains different statistical concepts and theory involved in different physical phenomenon and student can accustom with these theoretical and practical concepts.
DSE-A1	Discipline Specific Elective-op1	Theory + Practical	Advanced Mathematical Methods	If student want to learn most advanced mathematical concepts and models they can choose this DSE.
	Discipline Specific Elective-op2	Theory + Practical	Laser & Fiber Optics	Students can opt this DSE if they want to learn more advance level of wave and optics.
DSE-B1	Discipline Specific Elective-op1	Theory+ Practical	Astronomy & Astrophysics	This is also optional. If student want to explore the solar objects they can go through it.
	Discipline Specific Elective-op2	Theory+ Practical	Nuclear Physics	This is most modern and interesting part of Physics. If students want to acquire knowledge regarding hydrogen bomb, nuclear reaction and different instruments related with this they can opt this DSE.
6th SEMESTER				
CC-13	Core Course-13	Theory + Practical	Digital Electronics	To familiar students about digital signals, Boolean Algebra, Boolean logic, different digital components and circuits and their operations, working principles etc. and also to

				develop proficiency between the students so that they can build different logical and other simple to complex digital circuits.
CC-14	Core Course-14	Theory + Practical	Solid State Physics	To familiar students with different features and properties involved in the solid materials and also to measure few such parameters with help of simple experiments.
DSE-A2	Discipline Specific Elective-op1	Theory + Practical	Nano Materials and Applications	To know about nano scale, nano structure, nano materials and their applications students may opt for this DSE.
	Discipline Specific Elective-op2	Theory + Practical	Advanced Classical Dynamics	It is more advance part of classical mechanics. Student may choose this to know more about rigid body motion, small oscillation, nonlinear dynamics etc.
DSE-B2	Discipline Specific Elective-op1	Theory + Practical	Communication Electronics	To aware students regarding both Analog and Digital Communication principles and techniques which are now used in different communication methods and also to familiar them about different digital and analog circuits used for preparing those systems.
	Discipline Specific Elective-op2	Theory + Practical	Advanced Statistical Mechanics	This paper contain more advance part of statistical mechanics To get a thorough knowledge about this student may opt this DSE

PROGRAMME OUTCOME

1. After completion of this 3 years B.Sc. major Course students can have a thorough knowledge about different branches of Physics including practical skill
2. They can join any advance level of study or master degree courses in Physics, Electronics, Computer Science, Radio physics, Instrumentation science, Biophysics and molecular biology, Astrophysics or Astronomy.
3. They can join any professional courses like MBA, MCA, PGDM, and PGDCM.
4. They can go for other technical courses offered by different technical institutes in India and abroad.
5. As graduate students they can also appear in different government service entrance examinations like IAS, WBCS, IPS, IRS etc.
6. They can also join in school service.

Course Description of PHYSICS General (PHSG)

Paper	Course Description		Topic	Objective
1ST SEMESTER				
CC-1/GE-1	Core Course-1	Theory + Practical	Mechanics	Students will acquaint about different kind of motions like linear, rotational, gravitational, fluid and to formulate and solve their equations. In the practical assignments students can study and determine general properties of matter from their motion.
2nd SEMESTER				
CC-2/GE-2	Core Course-2	Theory + Practical	Electricity & Magnetism	In this paper students can know about Electrostatic magnetic and magneto-static properties of matter including basic concepts of electrical components and circuits, their uses and measuring techniques.
3rd SEMESTER				
CC-3/GE-3	Core Course-3	Theory + Practical	Thermal Physics	Students can accustomed with various thermodynamic properties of matter, heat waves and thermal states. They can study those thermal states by experiment and also estimate thermal parameters.
SEC –A-1	Skill Enhancement Course A1	Theory	Scientific Writing	To improve computational skill among students so that they can be able to do educational or research projects by developing their own programs with high level programming

				language and to express their findings with the help of scientific word processing software like LATEX
SEC-A-2	Skill Enhancement Course A2	Theory	Renewable Energy and Energy Harvesting	To develop idea among the students about different kinds of renewable energy sources, their origins and how they can be collected from different natural sources or natural phenomenon and to enhance their skill regarding the techniques or instruments require for those purposes.
4th SEMESTER				
CC-4/GE-4	Core Course-4	Theory + Practical	Wave and Optics	In this course students can familiar with the properties and behavior of both sound and light waves when they pass different medium. They also learn how to use different instruments required to study these properties and phenomenon.
SEC B-1	Skill Enhancement Course B1	Theory	Arduino (Project type).	This is a new programming platform and students can develop their own project with this software by preparing mobile app or some controlling devices or tools.
SEC B-2	Skill Enhancement Course B2	Theory	Electrical Circuits and Network skills (Theory).	In this SEC students can enhance their skill and acquaintance about the

				operations and working principles of t different electrical components and circuits required to develop different networks and circuits as well as technical know how about electrical wiring.
5th SEMESTER				
DSE-A1	Discipline Specific Elective-op1	Theory + Practical	Analog Electronics	To acquaint students about different simple to medium complex analog electronic components and devices, their working principles along with advantages and disadvantages. To develop skill among the students for preparing few simple to moderately complex circuits in their own hands.
DSE-A2	Discipline Specific Elective-op2	Theory + Practical	Modern Physics	To give an basic idea of quantum mechanics, nuclear physics, particle physics and to do few basic experiments to get an idea of this.
6th SEMESTER				
DSE-B1	Discipline Specific Elective-op1	Theory + Practical	Digital Electronics	To familiar students about digital signals, Boolean Algebra, Boolean logic, different digital components and circuits and their operations, working principles etc. and also to

				develop proficiency between the students so that they can build different logical and other simple to complex digital circuits.
DSE-B2	Discipline Specific Elective-op2	Theory + Practical	Nuclear Physics	This is most modern and interesting part of Physics. If students want to acquire knowledge regarding hydrogen bomb, nuclear reaction and different instruments related with this they can opt this DSE.

PROGRAMME OUTCOME

1. After completion of this 3 years B.Sc. General Course students can have a thorough knowledge about different branches of Physics including practical skill.
2. They can join any advance level of study or courses in Physics, Electronics, Computer Science, and Instrumentation Science.
3. They may go for various professional courses like MBA, MCA, PGDM, PGDCM or other technical courses offered by different technical institutes in India and abroad.
4. They can join R&D sector of any technical company or as a technician in scientific or technical laboratories.
5. As graduate students they can also appear in different government service entrance examinations like IAS, WBCS, IPS, IRS etc.
6. They can also join in school service.

DEPARTMENT OF PHYSIOLOGY

COURSE OUTCOMES

Course Code and Subject	Outcome of the course
SEMESTER I	
Course CC1.1 Cellular basis of Physiology and Genetics	1. To understand the structure and purpose of basic components of eukaryotic cells and to know how these cells can respond to environmental and physiological change. 2. To earn the basic principles of inheritance at the molecular, cellular and organismal level.
Course CC1.2 Bio-physical principles, Enzymes and Chemistry of Bio-molecules	To analyse and understand the basic concepts of physical processes and chemical reactions that occurs in living system.
Course CC1.3 Digestion, Absorption and Metabolism	To understand the human digestive system. 2. To know the mechanism of absorption of digested foods through alimentary canal. 3. To understand the liver and its central role in metabolism.
CC1P/GEN1P (PRACTICAL) **Course CC1.1P**: Examination and staining of fresh tissues	To understand the important features of the living tissues and their functioning in human body.
Course CC1.2P Qualitative test for identification of unknown samples	To provide key knowledge base and awareness about the laboratory resources so that the students may prepare themselves as professional in the field of biochemistry.
Course CC1.3 Quantitative estimation of amino nitrogen by titration method.	To have a designing and applying knowledge in the analysis related to a question of relevance based on experience in the laboratory and research.

SEMESTER II	
Course CC-2.1 Blood and body fluid	To have a knowledge about the composition and functions of blood.
Course CC-2.2: Cardio-vascular system	To know about the functioning of heart and its role in maintaining the homeostasis inhuman body.
Course CC2.3 Respiratory system	1. To have an idea about the air movement and gaseous ex-change in and out of the lungs. 2. To summaries the process of oxygen and carbon-dioxide transport in respiratory system.
Course CC2.1P Preparation and staining of Human blood film and identification of blood cells.	To determine the abnormality in the morphology and count of different blood cells in human.
Course CC2.2P Preparation of hemin crystals.	It will be applicable in forensic sciences in distinguishing a human blood sample from other mammal's blood sample**.**
Course CC2.3P Measurement of blood pressure, pulse rate and peak expiratory flow rate.	To identify the variable risk factors in human cardiovascular and respiratory system.
Course CC2.4P Pneumographic recording of respiratory movements on Human subjects.	To know whether there is any obstructive diseases in human respiratory passage or not i.e. asthma, bronchitis etc.
SEMESTER III	
Course CC 3.1 Nerve-muscle physiology	To identify the types of muscles and nerves in human body and also to understand their function in human body.
Course CC 3.2 Nervous system and Special senses	1. To know the various components of nervous system and also to find out the functions of different parts of brain in controlling activities in human body.

	2. To have an idea about the functions of different sense organs in human body.
Course CC3.1P Preparation of Nodes of Ranvier and Corneal cell space.	To know the structure and functions of Nodes of Ranvier and the cornea of eye.
Course CC3.2P: Examination of skeletal and cardiac muscle.	To know about the working of skeletal and cardiac muscles in human body.
Course CC3.3P Determination of visual acuity, colour blindness	To identify any abnormality or disease in vision.
Course CC3.4P Exploration of deafness by tuning fork	To identify any temporary or permanent auditory defects.
Course SEC-A1 Microbiology and immunology	1. To illustrate the nature of viruses, bacteria and fungi. 2. To understand their modes of infection and their preventive measures. 3. To know the cellular and molecular basis of responsiveness in human body.
Course SEC-A2 Clinical biochemistry	To acquire knowledge in the quantitative and qualitative estimation of biomolecules in the laboratory.
SEMESTER IV	
Course CC4.1 Endocrinology	To understand the role of the endocrine organs and their secretions (hormones) in maintaining homeostasis and health.

Course CC4.2 Reproductive functions	To provide knowledge about the male and female reproductive system, reproductive organs, reproductive glands and their functions, gametogenesis, fertilization, embryogenesis, pregnancy, lactation, child birth, reproductive defects and Assisted reproductive technologies**.**
Course CC4.3 Excretory Physiology	To have an idea about the structures and functions of kidney, nephron and other parts of human excretory system, mechanism of urine formation, nature of urine and any abnormalities in excretory system.
Course CC4.1P Study and identification of mammalian tissues.	To identify the structures and functions of different tissues in mammal.
Course CC4.2P Determination of normal and abnormal constituents of urine.	To identify any clinical disorder in relation to urine.
Course SEC-B1 Additives/ Adulteratives and Xenobiotics	1. To understand the role of additive manufacturing in the design process and also awareness of residual stresses that may occur during additive manufacturing. 2. To possess knowledge of biochemical processes of bioaccumulation, biotransformation and detoxification of pollutants in living organisms.
Course SEC-B2 Community health and formulation of diet chart.	1. To understand the role of food and nutrition in health and disease. 2. To enable to demonstrate counseling techniques to facilitate behavior change. 3. To identify and describe the roles of others with whom the registered dietitians collaborate in the delivery of food and nutrition services.

SEMESTER V	
Course DSE-A1TH (Theory) Biostatistics	1. To impart knowledge of basic statistical methods to solve problems. 2. To know the importance of statistics in research.
Course DSE-A1P (Practical): Computation of mean, median, mode, standard error of the mean using Physiological data and graphical representation of data in bar diagram, pie diagram, frequency polygon and histogram	To enable to understand the values of statistical applications in problem Solving and in research work.
Course DSE-A2TH (Theory) Haematology	1. To evaluate normal and abnormal cell morphology with associated diseases**.** 2. To enable to understand any abnormality and diseases in concerned with blood cell count.
Course DSE-A2P (Practical) Differential count of WBC, estimation of haemoglobin, blood group determination, bleeding and clotting time.	1. To enable the students to determine the blood group, WBC count, bleeding and clotting time of a given blood sample. 2. To enable the student to work in the laboratory of a professional diagnostic centre.
SEMESTER VI	
Course DSE-B1TH(Theory) Work, Exercise and Sports Physiology	1. To study the effect of work and exercise in detail and in application perspectives. 2. To enable to measure the changes and interpret them in the context of sports.
Course DSE-B1P(Practical) Measurement of heart rate and blood pressure before and after exercise,	1. To learn the changes in human body system due to exercise and sports activities. 2. To get knowledge about the sports training and the

determination of physical fitness and measurement of common anthropometric parameters.	fitness of sports person. 3. Through anthropometric measurements the students will be able to assess the level of obesity and body mass index.
Course DSE-B2TH(Theory) Human nutrition and dietetics	1. Enable to understand the role of food and nutrition in human health and disease. 2. To enable to locate, understand and apply established guidelines to a professional practice scenario.
Course DSE-B2P(Practical) Diet survey report of a family	To identify appropriate and actionable areas of change in a person's diet and life styles and to improve their health and well beings.

PROGRAMME OUTCOMES

Upon completion of programme students will be able to:

1. Demonstrate an understanding of the scientific method and the ability to use appropriate model to solve problems.

2. Acquire basic skills in the observation and study of nature and the knowledge to distinguish between observations, inferences, relationships and testimonials under investigation.

3. Demonstrate the ability to use scientific knowledge to assess personal and environmental health.

4. Use the scientific knowledge and skills necessary for active citizenship.

5. Discuss and understand the area of Biological sciences.

6. Develop positive attitude towards sustainable development.

PROGRAMME SPECIFIC OUTCOMES

Upon completion of programme students will be able to:

1. Explain the basic knowledge of human Anatomy and Physiology.
2. Define the main structure, composition and functions of human body.
3. Understand the functions of different organs and systems in human body.
4. Relates structures and functions of tissues and organs.
5. To develop practical biological skills introduced in human physiology.
6. Perform, analyze and report on experiments and observations in physiology.

Department of Zoology
Course Outcomes and Program Outcomes

Course Outcome B.Sc. Zoology (General)

Semester	Course name	Course type	Course outcome
I	Animal Diversity ZOOG-CC-1-1-TH PRACTICALS ZOOG-CC-1-1-P	CORE COURSES (CC-1-4)	1. To acquaint students with the concepts of classification of animal world. 2. To develop the knowledge about criteria and basis of classification along with different group of animals and their characteristics features. 3. To identify some representative animals from different taxa. 1. To acquaint students with anatomy of a live specimen. 2. To develop knowledge about the difference between venomous and non-venomous snakes
I	Comparative Anatomy & Developmental Biology ZOOG-CC-2-2-TH PRACTICALS BOT-G-CC-2-2-P	CORE COURSES (CC-1-4)	1. A student should become familiar with different physiological systems in different animal group. 2. To develop knowledge about early and late embryonic development. 1. To develop primary knowledge about osteology through practical classes. 2. To gather knowledge about different types of larval form. 3. To develop ability for identification of

			different stages of embryo. 4. To develop knowledge about different types of placenta found in animal kingdom.
III	Physiology and Biochemistry ZOOG-CC-3-3-TH	CORE COURSES (CC-1-4)	1. To have a comprehensive understanding of the basic physiological process like respiration, digestion, nerve impulse propagation, excretion, reproduction. 2. To acquire the knowledge of different biochemical processes like carbohydrate, protein and lipid metabolism.
	PRACTICALS ZOOG-CC-3-3-P		1. To develop knowledge about different endocrine gland and different internal organs of mammal. 2. To develop skill of qualitative test for carbohydrate sample.
	SEC A- Apiculture (ZOOG-SEC-A-3-1TH)	SKILL ENHANCEMENT COURSE (SEC-1-4)	1. To develop basic knowledge of biology of Honey bees with their diseases and enemies. 2. To develop basic skills on entrepreneurship in apiculture.
IV	Genetics and Evolutionary Biology ZOOG-CC-4-4-TH	CORE COURSES (CC-1-4)	1. To orient the learner towards GENETICS as a special tool for effectiveness in life. 2. To imbibe the ability of interconnecting the knowledge of genetics like mutation, Menedelian inheritance to different genetic diseases. 3. To provide basic knowledge about origin of life, process of evolution

	PRACTICALS ZOOG-CC-4-4-P		changes and evolutionary theories. 1. To learn about the identification of human aneuploidy. 2. Verification of Mendelian ratio using chi square test. 3. To study and identification of Darwin finches. 4. To gather knowledge about the phylogeny of horses.
	SEC B Aquarium Fish Keeping (ZOOG-SEC-B-4-2-TH)	SKILL ENHANCEMENT COURSE (SEC-1-4)	1. To provide basic knowledge about Aquarium fish biology. 2. To imbibe the ability of interconnecting the knowledge of aquarium fish to entrepreneurship.
V	SEC A Sericulture (ZOOG-SEC-A-5-3-TH)	SKILL ENHANCEMENT COURSE (SEC-1-4)	1. To develop basic knowledge of biology of Silk Worms and rearing of silkworms. 2.To develop basic skills on entrepreneurship in Sericulture
	DSE A Applied Zoology a) Theoretical- ZOOG-DSE-A-5-1-TH, b) Practical- ZOOG DSE-A-5-1-P Or Aquatic Biology a) Theoretical- ZOOG-DSE-A-5-2-TH,	DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE-A&B)	1. An overview of host parasite relationship. 2. To develop basic knowledge about different parasitic groups. 3. To develop skill on animal husbandry, poultry farming and fish technology. 1. To have a comprehensive understanding of the basic aquatic bionics, freshwater biology lakes, marine biology and management

			of aquatic resources.
	b) Practical- ZOOG-DSE-A-5-2-P		1. To develop skill of determination of the area of lake, amount of dissolved oxygen and free carbondioxide. 2. To provide basic knowledge about macrophyte, phytoplankton and zooplanktons present in a lake ecosystem.
VI	SEC B Medical Diagnosis (ZOOG-SEC-B-4/6-4)	SKILL ENHANCEMENT COURSE (SEC-1-4)	• Explaining the fundamentals of different Medical Diagnosis techniques along with clinical Biochemistry and clinical Microbiology.
	DSE B Biology of Insect a) Theoretical ZOOG-DSE-B-6-1-TH,	DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE-1&2)	1. Learn about the concept of vectors and gather knowledge about insects as vectors.
	b) Practical- ZOOG-DSE-B-6-1-P		1. To get Brief idea about the different species of insect vectors.
	Ecology and Wild life Biology) a)Theoretical-ZOOG-DSE-B-6-2-TH,		1. To learn about the types of ecosystem, community and population. 2. To get brief idea about wild life.
	b) Practical- ZOOG-DSE-B-6-2-P		1. To get brief idea about basic equipment needed in wild life studies. 2. To get familiar about animal evidences in the field.

			3. To acquire knowledge about phytoplankton, zooplankton and process of measurement of area, salinity, free carbondioxide, chemical oxygen demand of an aquatic ecosystem.

Program Specific Outcomes

- After completion of the courses, a student of Zoology can avail job opportunities in government departments (like planning and developmental commissions, forestry, environmental, zoological garden and disaster management departments etc.
- Knowledge about the various types of microscopy, preparing solutions, stains, pre-treatment techniques, basic understanding of different plant families and identification of vector insects, parasites will help a student in achieving jobs as laboratory technician or laboratory instructor or corporation.
- With further knowledge, students can become a Biochemist in public as well as private sector. They can engage in research related works, quality control and safety section in the companies like food, pharmaceuticals, health and beauty care.
- There are opportunities to get engaged into Apiculture, Sericulture, Aquaculture and Aquarium fish farming industry and to start up a business.
- After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, Staff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.

Department of Commerce

Course Outcomes and Program Outcomes

COURSE OUTCOMES (Honours and General)

B.COM 1ST SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
BUSINESS LAW	**CC 1.1 CHG**	1. To acquaint students with the basic concepts, terms and provisions of Mercantile and Business Laws. 2. To develop the awareness among the students regarding these laws affecting business, trade and commerce.
PRINCIPLES OF MANAGEMENT	**CC 1.2 CHG**	1. To provide basic knowledge & understanding about business management concept. 2. To provide an understanding about various functions of management.
FINANCIAL ACCOUNTING I	**CC 1.1 CH and CC1.1 CG**	1. To impart the knowledge of various accounting concepts 2. To instil the knowledge about accounting procedures, methods and techniques, that builds the foundation for this course as well as professional courses like CA, CMA, CS.

B.COM 2ND SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
E-COMMERCE AND BUSINESS COMMUNICATION	**GE 2.1 CHG**	1. A student should become familiar with mechanism for conducting business through electronic means. 2. To develop business communication skills through the application and exercises.
COMPANY LAW	**CC 2.1 CHG**	1. To impart students with the knowledge of fundamentals of Company Law. 2. To update the knowledge of provisions of the Companies Act of 2013.
MARKETING MANAGEMENT AND HUMAN RESOURCE MANAGEMENT	**CC 2.2 CHG**	1. To explain how marketing creates value for the consumer, the company, and society and why the customer is the cornerstone of marketing. 2. To make a clear understanding of the marketing concept 3. To help the students to understand the human resource functions in an organization.
COST AND MANAGEMENT ACCOUNTING I	**CC 2.1 CH and CC2.1 CG**	1. To impart the knowledge of basic cost concepts and elements of cost.

		2. To provide an understanding of various methods of costing and their applications.

B.COM 3rd SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
FINANCIAL ACCOUNTING II	**CC 3.1 CH and CC 3.1 CG**	1. To have a comprehensive understanding of the advanced issues in accounting. 2. To acquire the knowledge of specialised accounting areas as in hire purchase, partnerships, business acquisition, investment, department etc for a firmer grip of the accounting syllabus of professional courses like CA, CMA, CS.

B.COM 4th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS ETHICS	**CC 4.1 CHG**	1. To orient the learner towards entrepreneurship as a career option as well as creative thinking and behaviour for effectiveness in work and life. 2. To imbibe the ethical spirit of doing business.

TAXATION I	**CC4.1 CH and CC4.1 CG**	1.To provide basic knowledge about direct tax under provisions of Income Tax Act, 1961
COST AND MANAGEMENT ACCOUNTING II	**CC4.1 CH and CC4.1 CG**	1. To learn about the higher application of cost accounting techniques and methods. 2. To know the application of cost control techniques**.**

B.COM 5th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
AUDITING AND ASSURANCE	**CC 5.1 CH and CC 5.1 CG**	1. To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirement and professional standards.
TAXATION II	**CC 5.2 CH and DSE 5.1A**	1. To understand the computation of Total Income and learn Tax Management 2. To understand the provisions of GST and Customs.
CORPORATE ACCOUNTING	**DSE 5.2A**	1. To know the methods of valuation of goodwill and share. 2. To acquaint the students with the amalgamation and reconstruction procedures of Companies as well as

		preparation of Company Final Accounts. 3. To know the procedures of Redemption and Buy Back of Preference Shares and other Corporate Accounting issues that are fundamental in the CA, CMA, CS courses.

B.COM 6th SEMESTER		
SUBJECT	**PAPER**	**OBJECTIVES**
COMPUTERISED ACCOUNTING AND E- FILING OF TAX RETURNS	**SEC 6.1 CHG**	1. To enable the students to develop skills for Computerized Accounting. 2. To enable the students to Prepare and submit the Income Tax Return (ITR) offline/online for individual taxpayer.
PROJECT WORK	**CC 6.1 CH**	1. This paper helps the students to understand the research techniques, sampling etc used in business research. It prepares them for more advanced academic research in masters and post-masters level.
FINANCIAL REPORTING AND FINANCIAL	**DSE 6.1 A**	1. This paper helps to explain how financial measures of corporate

STATEMENT ANALYSIS		performance are calculated and used to assess credit worthiness of a business.
FINANCIAL MANAGEMENT	**DSE 6.2A**	1. In this paper the students acquire the knowledge to manage the finance and financial requirements in business.

PROGRAMME OUTCOMES

- After completing three years of Bachelor in Commerce (B.Com) programme, students would gain a thorough grounding in the fundamentals of Commerce and Finance.
- They will also gain systematic subject skills in the areas of commerce, business, accounting, economics, and finance, auditing and marketing. Students will be able to recognise and sync with the features and roles of businessmen, entrepreneur, managers and consultant in the society.
- The base work to prove proficiency in competitive exams like CA, CS, CMA and other courses is also achieved by the advanced learners of this course.
- Additionally students imbibe the skills for effective communication, decision making, problem solving in day to day business affairs.
- They also acquire practical skills to work as tax consultant, audit assistant and other financial support services.
- This graduate course opens the field of higher education and advance research in commerce and finance.

বাংলা সাম্মানিক ও সাধারণ নতুন পাঠক্রম বিন্যাস ও তার মূল্যায়ন

২০১৮ সাল থেকে কলকাতা বিশ্ববিদ্যালয় নতুন সিলেবাস ও পরীক্ষা পদ্ধতি চালু করেছে। বর্তমানে সেমেস্টার ভিত্তিক স্নাতক সাম্মানিক বাংলা পাঠক্রমে Discipline Centric Core Course স্তরে ৮৪ ক্রেডিটের মোট ১৪ টি কোর্স ৬ টি সেমেস্টারে পড়তে হবে ।

প্রথম সেমেস্টার

এই সেমেস্টারে একজন বাংলা সাম্মানিকের ছাত্রকে দুটি কোর্স পড়তে হয়। BNGA-CC-1-1 এই কোর্সে বাংলা সাহিত্যের ইতিহাস সম্পর্কে প্রাথমিক ধারণা দেওয়া হয়। সাহিত্যের যুগবিভাগ কীভাবে করা হল এবং তার কারণ কি সেই বিষয়ে শিক্ষার্থীকে সম্যক ধারণা দেওয়ার চেষ্টা করা হয়। এরই সঙ্গে বাংলা ভাষার উদ্ভব ও তার গতিপ্রকৃতি নিদর্শন সম্পর্কে জানানো হয়। ১৮০০ খ্রি পর্যন্ত বাংলা সাহিত্যের বিভিন্ন কাব্য সম্মন্ধে প্রাথমিক ধারণা দেওয়া হয়।

BNGA-CC-1-2 এই কোর্সে শিক্ষার্থীকে বর্ণামূলক ভাষাবিজ্ঞানের জ্ঞান দেওয়া হয়। বাংলা ধ্বনির উচ্চারণ স্থান, শব্দভাণ্ডার, শব্দ ধ্বনি পরিবর্তনের রীতি, উপভাষা ও বাংলা ভাষার রূপতাত্ত্বিক পাঠের মাধ্যমে ভাষা বিজ্ঞানসম্মত রূপটি সম্পর্কে শিক্ষার্থীদের পরিচিত করা হয়।

দ্বিতীয় সেমেস্টার

BNGA-CC-2-3 এই কোর্সে বাংলা সাহিত্যের মধ্যযুগ পরবর্তী সাহিত্যধারা সম্মন্ধে আলোচনা করা হয়। ঔপনিবেশিক আধুনিকতার ছোঁয়ায় বাঙালি মননে, চিন্তায় যে পরিবর্তন এলো তা কীভাবে কাদের সাহিত্যরচনার মাধ্যমে ধরা থাকল যুগগত নানা লক্ষ্যণ উদাহরণ দিয়ে বিষয়টি বোঝানো হয়। প্রসঙ্গক্রমে কিছু কবি, নাট্যকার, কথাসাহিত্যিক, সমসাময়িক পত্রিকা ও প্রাবন্ধিকদের সম্মন্ধে আলোচনা ও তাদের রচনার সঙ্গে শিক্ষার্থীর পরিচয় করানো হয়। উনিশ শতকের শুরুতে আধুনিকতার সূচনা পর্ব সম্মন্ধে এখানে শিক্ষার্থীকে ওয়াকিবহাল করা হয়।

BNGA-CC-2-4 দ্বিতীয় সেমেস্টারের এই কোর্সে মধ্যযুগ থেকে আধুনিক যুগ পর্যন্ত বিভিন্ন কবি, কথাসাহিত্যিক, নাটককার ও প্রাবন্ধিকদের রচনার সঙ্গে শিক্ষার্থীকে পরিচিত করানো হয়। তাদের একটি করে রচনা পাঠের মাধ্যমে সেই সময় ও সেই লেখকের লেখার শৈলী, বিষয় নিয়ে আলোচনার মাধ্যমে শিক্ষার্থীরা,সাহিত্যের রসাস্বাদনের সুযোগ পায়। বিভিন্ন সময়ে রচিত বিষয় পাঠের ফলে ভাষার লেখার বিবর্তনের বিষয়টি সম্পর্কেও শিক্ষার্থীর মনে ধারণা তৈরি হয়।

তৃতীয় সেমেস্টার

BNGA-CC-3-5 এই কোর্সে বাংলা আধুনিক কবি, নাট্যকার, কথাসাহিত্যিক ও প্রাবন্ধিক সম্মন্ধে পড়ানো হয়। দ্বিতীয় সেমেস্টারে যেখানে আধুনিকতার সূচনা পর্ব শুরু হয়েছিল এই কোর্সে এসে সেই পর্বটিকে এগিয়ে নিয়ে যাওয়া হয়। এখানে বিশ শতকের সাহিত্যিকদের সম্মন্ধে শিক্ষার্থীদের ধারণা দেওয়া হয়।

BNGA-CC-3-6 এই কোর্সে প্রাচীন ভারতীয় ভাষা থেকে আধুনিক ভারতীয় ভাষার উদ্ভব, বাংলা ভাষার উদ্ভব, ভাষাতাত্ত্বিক লক্ষণ, নিদর্শন সম্মন্ধে আলোচনা করা হয়।

BNGA-CC-3-7 এই কোর্সে শিক্ষার্থীরা আধুনিক সাহিত্যিকদের কথাসাহিত্য পাঠের মাধ্যমে আধুনিক সময়ের জটিলতা, মনন, মানসিক দ্বন্দ্ব, সমাজে নারীর অবস্থান সম্মন্ধে ওয়াকিবহাল হবে।

এই সেমেস্টারেই শিক্ষার্থীরা এই তিনটি কোর্সের সঙ্গে Skill Enhancement Course ও পড়বে। এর মাধ্যমে বাংলা নিয়ে পড়াশোনা করার ব্যবহারিক দক্ষতা সম্মন্ধে পাঠ দেওয়া হবে শিক্ষার্থীকে। এই বিষয়টিকে সংক্ষেপে SEC বলা হয়। চারটি বিষয়ের মধ্যে শিক্ষার্থীরা পছন্দ মতো দুটি বিষয় বেছে নিতে পারবে। যথাক্রমে সেগুলি তৃতীয় ও চতুর্থ সেমেস্টারে পড়ানো হবে।

BNGA-SEC A-3-1 মুদ্রণ ও প্রকাশনা। এই কোর্সে শিক্ষার্থীকে মুদ্রণ ও প্রকাশনা সম্পর্কে পাঠ দেওয়া হয়। এতে করে শিক্ষার্থী চাইলে ভবিষ্যতে এই পেশায় নিজেকে নিযুক্ত করতে পারে। এই বিষয়ে পাঠ শিক্ষার্থীকে বাংলা নিয়ে পড়াশোনার ব্যাপারে উৎসাহিত ও পেশা নির্বাচনে অন্য দিগন্ত দেখাতে পারে।

BNGA SEC-A-3-2 এই কোর্সে শিক্ষার্থীকে গল্প থেকে নাটক নির্মাণ, চিত্রনাট্য নির্মাণ, আবৃত্তিচর্চ্চ সম্মন্ধে ধারণা দেওয়া হয়। পরবর্তী জীবনে পেশা,হিসেবে তারা নাটক রচয়িতা, সিরিয়াল সংলাপ রচয়িতা হিসাবে নিজেকে

উৎসাহিত করতে পারে। বাচিক শিল্পী বা আবৃত্তিকার হিসেবেও নিজেকে গড়ে তোলার রাস্তা দেখাতে পারে এই কোর্স।

চতুর্থ সেমেস্টার

BNGA-CC-4-8 এই কোর্সে মধ্যযুগের বিভিন্ন সাহিত্যপাঠ করানো হবে শিক্ষার্থীদের। পদাবলী সাহিত্য ও মঙ্গলকাব্য পাঠের মাধ্যমে মধ্যযুগের লেখকদের লেখার শৈলী, বিষয় সম্মন্ধে শিক্ষার্থীকে ওয়াকিবহাল করানো হবে।

BNGA-CC-4-9 এই কোর্সে বাংলা ছন্দ, অলংকার ও কাব্যতত্ত্ব সম্মন্ধে প্রাথমিক জ্ঞান দেওয়া হয় শিক্ষার্থীকে।

BNGA-CC-4-10 এই কোর্সে উনিশ শতকের মধ্যভাগ থেকে বিশ শতক পর্যন্ত বাংলার বিভিন্ন মনিষী দার্শনিকদের সমাজ, দেশ, শিক্ষা, বিজ্ঞান, সাহিত্য, ধর্ম, দর্শন, প্রকৃতি সম্মন্ধে চিন্তা চেতনার সঙ্গে শিক্ষার্থীর পরিচয় ঘটানো হয় তাদের লেখা বিভিন্ন প্রবন্ধ পাঠের মাধ্যমে। শিক্ষার্থীরাও বিভিন্ন প্রবন্ধ পাঠে নিজের মনন গড়ে তুলতে আগ্রহী হয়।

BNGA-SEC-B-4-1 এই কোর্সের মাধ্যমে শিক্ষার্থীরা সাহিত্য গবেষণার পদ্ধতি বিজ্ঞানসম্মতভাবে শিখতে পারে। ভবিষ্যতে কেউ গবেষণা করতে চাইলে এই কোর্সটি তাকে সাহায্য করবে। এই কোর্সে প্রতিবেদন রচনা, সাক্ষাৎকার নেওয়া, বিজ্ঞাপনের ভাষা শৈলী, গবেষণার বিভিন্ন পদ্ধতি সম্মন্ধে প্রাথমিক জ্ঞান দেওয়া হয়।

BNGA-SEC-B-4-2 এই কোর্সটিও শিক্ষার্থীরা চাইলে পছন্দ করতে পারে। বিভিন্ন সাহিত্যরূপ রচনার কলাকৌশল এই কোর্সের মাধ্যমে শেখানো হয়। যেমন গল্প, প্রবন্ধ। আধুনিক বাংলা বানানবিধি ও IPA সম্মন্ধে প্রাথমিক জ্ঞান প্রদান করা হয়।

পঞ্চম সেমেস্টার

BNGA-CC-5-11 এই কোর্সে শিক্ষার্থীকে সাহিত্যের বিভিন্ন সংরূপের সঙ্গে পরিচয় করানো হয়। এর মাধ্যমে শিক্ষার্থী সাহিত্যের বিবর্তন সম্মন্ধেও সম্যকভাবে বুঝতে পারে।

BNGA-CC-5-12 এই কোর্সে শিক্ষার্থী নাটকের সূচনা পর্ব থেকে আধুনিক পর্ব পর্যন্ত বিভিন্ন নাটককার, এবং তাদের নাটক পাঠের মাধ্যমে বাংলা নাটকের বিবর্তন ও নাটমঞ্চের বিকাশ সম্মন্ধে জ্ঞান লাভ করবে।

এরপর এই সেমেস্টারে Discipline Specific Elective স্তরে ২৪ টি ক্রেডিটের মধ্যে ৪ টি কোর্স করতে হবে। শিক্ষার্থীরা DSE A এই বর্গের ৪টি কোর্সের মধ্যে যেকোনো একটি বেছে নিতে পারবে। একই ভাবে B বর্গের থেকে যেকোনো একটি কোর্স বেছে নেবে।

BNGA-DSE-A-5-1 এই কোর্সের মাধ্যমে শিক্ষার্থীকে বাঙালি জাতির সাংস্কৃতিক গতিরেখা সম্মন্ধে পরিচয় করানো হবে। বাঙালি ভৌগোলিক, নৃতাত্ত্বিক পরিচয়, বাংলার ধর্ম, ঔপনিবেশিক পরবর্তী বাংলার সংস্কৃতির রূপবদল, বিভিন্ন সামাজিক আন্দোলন সম্মন্ধে। প্রাথমিক ধারণা দেওয়া হবে। সাহিত্য যেহেতু সমাজের দর্পন এই বাংলা সংস্কৃতি, সমাজ ইত্যাদির আলোচনা শিক্ষার্থীকে বাংলা সাহিত্য সম্মন্ধে বুঝতে সাহায্য করবে।

BNGA-DSE-A-5-2 এই প্রতিবেশী রাষ্ট্র বাংলাদেশের সাহিত্যের সঙ্গে পরিচয় ঘটানো হবে। বাংলাসাহিত্যের বিশ্বজনীন আবেদন ও বিস্তার সম্মন্ধে প্রাথমিক জ্ঞান প্রদান করা হবে এই কোর্সে।

BNGA-DSE-B-5-1 এই কোর্সের মাধ্যমে শিক্ষার্থীকে বাংলার শিশুসাহিত্যের ধারার সঙ্গে পরিচয় ঘটানো হবে নির্বাচিত কিছু রচনা পাঠের মাধ্যমে। সাহিত্যের নানা পরিসরে বিচরণ করাতে শিক্ষার্থী সাহিত্য বুঝতে সক্ষম হবে।

BNGA-DSE-B-5-2 এই কোর্সে বাঙালি জাতির ইতিহাসে দেশভাগের যে সুদুরপ্রসারী অভিঘাত বিভিন্ন সাহিত্য পাঠের মাধ্যমে শিক্ষার্থীকে সেই বিষয়ে ধারণা দেওয়া হবে।

ষষ্ঠ ***সেমেস্টার***

BNGA-CC-6-13 এই কোর্সে ঔপনিবেশিক আধুনিকতার ছোঁয়ায় বাংলাকাব্যে যে নবযুগের সূচনা ঘটল বিভিন্ন কাব্যকারের কাব্যপাঠের মাধ্যমে সেই বিবর্তনটি সম্মন্ধে শিক্ষার্থী জ্ঞান লাভ করবে। প্রসঙ্গক্রমে স্বাধীনতা পূর্ব্ববর্ত্তী ও পরবর্তী কবিদের কবিতাপাঠ ও আলোচনা প্রসঙ্গে আসবে।

BNGA-CC-6-14 এই কোর্সে বাংলা সাহিত্যের পাশাপাশি সংস্কৃত, ইংরাজি, হিন্দি সাহিত্য সম্পর্কে প্রাথমিক পরিচয় লাভ করে শিক্ষার্থীরা।।এবং তুলনামূলক সাহিত্য পাঠের সঙ্গে প্রাথমিকভাবে পরিচিত হতে পারে শিক্ষার্থী। অন্যান্য ভাষার সাহিত্যের ও বাংলা সাহিত্যের পারস্পরিক প্রভাবটিও আলোচনা করা হয়।

ফিফথ সেমেস্টারের মতো এখানেও Discipline Specific Elective স্তরে ৪ টি কোর্সের মধ্যে ২ টি কোর্স পড়ানো হয়। A বর্গের মধ্যে যেকোনো একটি কোর্স B বর্গ থেকে যেকোনো একটি কোর্স।

BNGA-DSE-A-6-3 এই কোর্সে সাহিত্যের রসাস্বাদনের অভ্যাস তৈরির জন্য শিক্ষার্থীকে গোয়েন্দা, কল্পবিজ্ঞান সাহিত্যের সঙ্গে পরিচয় করানো হয়। তাদের চেনা ক্ষেত্রকে পড়ুয়ারা বিদ্যায়তনিক পাঠ শৃঙ্খলায় অধ্যায়ন করতে শেখে।

BNGA-DSE-A-6-4 এই কোর্সে শিক্ষার্থী ধ্রুপদী সাহিত্যের সঙ্গে আধুনিক সাহিত্যের তুলনামূলক পাঠ আয়ত্ত করে।

BNGA-DSE-B-6-3 এই কোর্সে জীবনী, আত্মজীবনী পাঠের মাধ্যমে পড়ুয়ারা মধ্যযুগ, আধুনিক যুগের বিভিন্ন মনীষীর সময়কাল ও তাদের কার্যবিবরণী সম্মন্ধে জানতে পারে। তাদের বিচিত্র জীবন অভিজ্ঞতা শিক্ষার্থীদের নানাভাবে সমৃদ্ধ করতে সাহায্য করে।

BNGA-DSE-B-6-4 এই কোর্সে বাংলা ও তার সংস্কৃতিকে জানার জন্য শিক্ষার্থীকে লোকসংস্কৃতির পাঠ দেওয়া হয়।

স্নাতক বাংলা পাঠক্রম সাধারণ

বাংলা সাধারণ পাঠক্রম অনুসারে যথাক্রমে প্রথম, দ্বিতীয় ও তৃতীয় সেমেস্টারে BNGG-CC/GE-1-1, BNGG-CC/GE-2-2, BNGG-CC/GE-33 কোর্সে বাংলাসাহিত্যর ইতিহাস, ঐতিহাসিক ভাষাবিজ্ঞান, ছন্দ ও অলংকার, বাংলা কাব্য কবিতা ও নাটক পড়ানো হয়। এরই সঙ্গে তৃতীয় অথবা পঞ্চম সেমেস্টারে সাম্মানিকের সঙ্গে SEC-A র একটি কোর্স পড়ানো হয়। চতুর্থ সেমেস্টারে BNGG-CC/GE-4-4 (বাংলা কথাসাহিত্য ও প্রবন্ধ) এবং BNGG-LCC4(2) (বাংলা ভাষাবিজ্ঞান সাহিত্যের রূপভেদ ও কাব্য) কোর্স পড়তে হয়। এর সঙ্গে SEC-B কোর্সের যেকোনো একটা কোর্স এই সেমেস্টার অথবা ষষ্ঠ সেমেস্টারে পড়তে হয় শিক্ষার্থীকে। পঞ্চম সেমেস্টারে DSE-A কোর্সের যেকোনো একটি এবং ষষ্ঠ সেমেস্টারে শিক্ষার্থীকে BNGG-LCC 6(2) (সাময়িক পত্র ও কথাসাহিত্য) ও DSE-B কোর্সের যেকোনো একটা পড়ানো হয়।

সাম্মানিকের ক্ষেত্রে প্রতিটি ক্রেডিটের পূর্ণমান ১০০। এরমধ্যে ১০ নাম্বার ক্লাস উপস্তিতির জন্য। এই পর্যায় ছাত্রছাত্রীদের নিয়মিত ক্লাসে মনোযোগী করবে। ১০ নাম্বার ইন্টারনাল ও ১৫ নাম্বার কোর্সভিত্তিক টিউটোরিয়ালের

জন্য বরাদ্দ। এই নাম্বার বিভাজন শিক্ষার্থীকে পড়াশোনার ধারাবাহিকতা ধরে রাখতে সাহায্য করবে। বাকি ৬৫ নাম্বার লিখিত পরীক্ষা হবে। আপাতত দৃষ্টিতে এই নাম্বার বিভাজনের পরীক্ষায় শিক্ষার্থীরা অভ্যস্ত হয়ে উঠলে প্রচুর নাম্বার পাবার সুযোগ থাকছেযা তাদের উৎসাহিত করবে। SEC র ক্ষেত্রে লিখিত পরীক্ষা হয় ৮০ নাম্বারের। বাকি ক্লাস উপস্থিতির হার ও ধারাবাহিক মূল্যায়নের উপর বিভক্ত।

বর্তমান পাঠক্রম বাংলাসাহিত্যে আগ্রহী ছাত্রছাত্রীদের আরও অনেক বেশী সাহিত্যের প্রতি উৎসাহিত ও চৌকস করে তুলবে আশা করি। সুনির্দিষ্টভাবে এই পাঠক্রম বিভাজন সাহিত্যের ব্যাবহারিক ও প্রায়োগিক দুটো বিষয়কেই ছুঁত পেরেছে। বর্তমান সিলেবাস ও পরীক্ষা পদ্ধতি তাই অনেক বেশি যুক্তিসঙ্গত ও বিজ্ঞানভিত্তিক হয়েছে বলে আমাদের ধারণা।

Department of Education

Course Outcome and Program Outcomes

Course-CC – 1/ GE-2 (Semester 1)

Introduction to Education

Objectives:

- To understand the meaning, nature, scope and aims of education.
- To explain the factors of education and their interrelationship.
- To become aware of different agencies of education that influence education.
- To be acquainted with the concept of child-centrism and playway in education.

Course-cc-2/GE-2 (semester 2)

Psychological Foundation of Education

Objectives:

- To understand the meaning of psychology and be acquainted with its different aspect.
- To know the pattern of different aspects of human development and relate this knowledge with education.
- To be acquainted with the cognitive approach of development and thus to understand the process and factors of cognition.

Course-3/GE-3(semester-3)

Sociological Foundation of Education

Objectives:

- To understand the relation between sociology and education-nature and scope of sociology of education.

- To explain the concept of social groups and socialization process.
- To enable the students to understand the concept of socialchange and socialinteraction in education.
- To become aware of social communication I in education.

CC-4/GE-4(semester-4)

Inclusive Education

Objectives:

- Understand the meaning of Inclusion and exclusion.
- Know the types of exclusion and their causes.
- Know how to bring about inclusion in different spheres.
- Semester-3/5-Sec-A-Communication skill/skill for Democratic citizenship.
- To understand thebasic elements of communication.
- To acquire listening skills.
- To acquire speaking skills.
- To acquire reading writing skills.

Objectives:

- Skill for-Democratic citizenship.
- Have an idea about their duties and rights as citizens.
- Have an idea about child violence and domestic rights.

Semester- 4/6-sec-B

Teaching skill/Life skill Education

Objectives-Teaching Skills:

- To understand the meaning of lifeskills
- To be acquainted with the different types of life skills

- To find the ways in which an individual's personality can be built through the development of these life skills.

DSE-A (1A)-Anyone from the following two (For semester-5)

Peace and value education

Objectives:

- To know the concept of Peace Education.
- To understand peace and non-violence.
- To develop the concept of value education, to understand peace, value and conflict resolution.

Educational Thoughts of Great Educators

Objectives:

- To develop on understanding of educational ideas of Indian and western education.
- To understand pedagogical concepts given by Indian western educational thinkers.

DSE-B (1B –Any one the following two for Semester-6)

1. Human Rights Education

2. Women Education

Objectives:

- To know the basic concept of human rights and role of United Nations and human rights.
- To understand enforcement mechanism in Indian and to know the role of advocacy groups.

Programme Outcomes

1. Development of logical minds to fight professional need.
2. Development of positive attitude to fights problem of social professional life,
3. Development of a mind that can be trained and can teach others to be a human being in society.
4. They can compete for public sector job including State civil service and state administration.
5. After obtaining higher studies they can compete for teaching profession by virtue of graduation degree they can compete the office support function job in as well as public sector.
6. Securing further higher studies any one can participate as an education policy maker.
7. After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, Staff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.

Department of English
Course outcomes and Programme outcomes

HONOURS
Course Outcomes

CC 1: History of English Literature and Philology
&
CC 2: Classical European Literature

These two papers provide a strong foundation for the study of English Honours Course.

- History of literature provides a chronological understanding of the historical development of literature.
- Philology helps the students to understand regional dialects and helps them to identify the origin of word formation. It develops and improves their communication skills, critical thinking and analytical skills.
- The second paper grooms the students about the culture and society of the classical European world and thus provides them a proper human perspective.

CC 3 : Indian writing in English

Poems, a Novel and Play taught in this paper inspire the students to appreciate the creative efforts of the Indian writers who can express their thoughts very proficiently in English.

CC 4, CC 7, CC 8, CC 9, CC10 AND CC 12: British Literature of different periods

These papers which mainly focus on the different genres of British Literature enable the students to develop their literary and creative skills.

CC 5 : American Literature

This paper helps the students to understand the culture and history of the United States.

CC 6 : Popular Literature

This paper includes literature which narrates the story of our lives through entertainment.

- This helps the students to use their imagination and helps them to enhance their empathy for others.
- This eventually helps them to develop their own creative skills.

CC 11: Women's Writings

This paper focuses on the literary works by women during different periods of time.

- It serves as an inspiration to the students who learn to realise that when women raise their voices, powerful things can happen.

CC 13: Modern European Drama

This paper gives an insight into new perspectives through the Problem Plays, Tragicomedies and Absurdist fiction.

CC 14: Post Colonial Literature

This paper which includes the literature of the post colonial period addresses the problems and consequences of the decolonization of a country. This provides the students a greater scope to delve deeply into the realms of literature.

DSE – A 1: Modern Indian Writing in English Translation

- This paper helps the students to form a fair idea of our regional cultures, literature and society.
- It helps them to understand people from different cultural backgrounds of our country.
- It also helps them to appreciate the text in its proper context.

DSE - B 1: Literary Types, Rhetoric and Prosody

- Literary Types helps the students to understand the nuances of the different genres of literature.
- This helps them to conceptualize the various techniques of literature and helps them a lot in critical analysis.
- Rhetoric is a very important tool in analyzing and appreciating a work of art.

- Prosody is a very important element of language that contributes towards rhythmic and acoustic effects in a piece of writing.

DSE – A 4: Media and Communication Studies

This paper deals with Mass Communication and Globalisation, Writing Pamphlets, Posters, Advertisements and Creating Advertisements. These are practically helpful for the students who want to join the Media Industry or engage themselves in social works through the Non-Govt. Organizations.

DSE – B 3: Autobiography

Students will benefit a lot from the study of autobiographies of great personalities. Their struggles, challenges and experience will help the students in future.

AECC 1: Communicative English

This paper helps the students to speak and write correct English. Correction of errors, functional grammar and identification of true and false statements, makes their foundation strong and helps them to reach the root of a problem.

SEC A2: Business Communication

This paper teaches the students to develop their communication skills in handling business. It teaches them to be efficient in managerial communication, as well as in technical communication with vendors.

SEC B 2: Academic writing and Composition

This paper is of immense help to the students, as it helps them to develop and enhance their writing skills. This paper will help them to perform well in various competitive examinations, as it teaches them to be analytical, critical, focused and precise.

PROGRAMME OUTCOMES

The students on completing the B.A (English Honours) Course successfully will be able to:

- Read a variety of texts proficiently and analyse and interpret them critically.
- Write a literary or expository text using the conventions of Standard English as stylistically appropriate, while showing a nuanced use of language.
- Comprehend major texts and traditions of language and literature written in English and appreciate their social, cultural and historical contexts.
- Design and create text for a variety of purposes and audience.
- Read with interpretive and analytical proficiency one or more creative literary form (poetry, fiction, non-fiction).
- Equip them to serve as teachers, content writers, editors or administrators.

B.A. General Programme in English

Course Outcome

CC 1 / GE 1

Poetry & Short Story

- Important poems from William Shakespeare, William Wordsworth, P.B.Shelley and John Keats create an interesting ambience for the students to inculcate in them a sense of beauty and appreciation. It helps them to appreciate Nature.
- Very stimulating, touching and educative short stories nurture in students, their love for the subtler aspects of life.

CC 2 / GE 2

Essay, Drama and Novel

- This paper through its engaging personal essays, provoking comedies, and a tragic novel helps the students to be proficient in analysing and appreciating the different aspects of life.
- This paper will also help them to develop a better perspective of life.

CC 3 / GE 3

Women's Writing and Women's Empowerment

- This paper focuses on the literacy works by women during different periods of time.
- It serves as an inspiration to the students who learn to release that, when women share their voices, powerful things can happen.

CC 4 / GE 4

Academic Writing

- The basic purpose of this paper is to enhance the skill of the students in communicating. This paper will help the students to write precisely.
- It will help them to analyse critically and focus on the technique and style.

LCC (L 1)

- This paper helps the students to develop their communication and language skills. They are taught to differentiate between formal and informal, correct and incorrect language.
- Difference between British English and American English makes them aware of the correct spellings.

LCC (L1 - 2)

- This paper enhances their creative ability by teaching them to write stories, travelogues and advertisement matters.
- The different poems taught in this paper will help the students analyse the texts critically. Rhetorics taught here will help the student in analysing and appreciating a work of art.

LCC (L 2) – 1 Alternative English

- This paper will help the students to understand the concept of Nationalism.

- This paper is a specimen of 'Unity in Diversity' which is the essence of our mother land.

LCC (L 2) – 2 Alternative English

- This paper on Indian writing in English helps the students to understand the local colour and the local culture of India.
- This paper will make the students aware of their traditions, culture and heritage.

DSE - A 2

Modern Indian writing in English Translation

- This paper helps the students to form a fair idea of regional cultures, literature and society.
- It helps them to communicate and understand people from different cultural backgrounds.
- It also helps them to appreciate the text in its proper context.

DSE - B 1

Partition Literature

- Any literary work is the mirror of the era in which it is written. Partition Literature reflects the tragedy of the people affected by the partition.
- This helps the students to delve into the inner turmoil and social complexities that paralysed the subcontinent.

- This paper provides a vast canvas to the students to penetrate into the nuances of cultural and literary issues then prevalent.

AECC 1

Communicative English

- This paper helps the students to speak and write correct English.
- Correction of errors, functional grammar and identification of true and false statements, makes their foundation strong and helps them to reach to the root of a problem.

SEC A2

Business Communication

- This paper teaches the students to develop their communication skills in handling business.
- This teaches them to be efficient in managerial communication and as well as technical communication with vendors.

SEC B 2

Creative Writing

- This paper is of immense help to the students as it helps them to develop and enhance their writing skills.
- This paper will help them to perform well in competitive examinations as it teaches them to be focused and precise.

PROGRAMME OUTCOMES

The students on completing the B.A. Gen. Course in English will be able to:

- Read a variety of texts proficiently and analyse and interpret them critically.
- Comprehend major texts written in English and appreciate their social, cultural and historical contexts.
- Design and create texts for a variety of purposes and audience.
- Communicate effectively with others.
- Equip them to serve as teaches, contents writers, editors or administrators and various Government Jobs.

Department Of History

COURSE OUTCOME

Honours Course

PAPER 1 SEM-1

History of India Earliest times to C 300 BCE

- This paper will help students to know about making of Indian history from the earliest time.
- This study will also help them to build up their knowledge about pre historic civilizations like Harappa and Mohenjo-Daro.

PAPER 2 SEM – 1

Social Formations and Cultural patterns of the Ancient world other than India

- The knowledge of history in contemporary world (other than India) will help students to know how the civilization evolved during Paleolithic and Mesolithic period.
- Students will also attain knowledge of ancient Egypt specially the fantastic growth of its novel architectural science.

PAPER 3 SEM – 2

History of India C300 BCE to circa CE 300

- Student will study that the growth and expansion of agriculture ultimately shaped the urban centers of north, central and southern parts – is a major discourse.
- They will also study the formation of Class, Varna and Jati in a changing social scenario can also be traced. From small urban zones the process of empire building by Maurya dynasty is another important piece of knowledge for students.

PAPER 4 SEM 2

- To teach the social formations and cultural patterns of the medieval world other than India.
- The department opted teaching ‘Group B ‘of this paper.
- Students will get a fair concept of European Renaissance history in a chronological manner. Feudalism is another area that will make them knowledgeable about its economy and the plight of medieval serfs.

PAPER 5 SEM—3

History of India CE 750-1206

- Students will explore history of indigenous power like Palas, Rashtrakutas, and Pratiharas and more interestingly the noted maritime power, the Cholas.
- They will develop the idea of local self-government of the Cholas will enrich their concept of self –government.
- They will learn about the advent of Arabs and Turks and invasion of Mamud and Ghurin India will show how the fragility of unity among Indian chiefs had been ruinous.

PAPER 6 SEM –3

Rise of the Modern West -1

- The debate on transition from feudalism to capitalism and different nuances of Renaissance, its spread on the continent will help students to understand the rise of the modern west.

PAPER 7 SEM – 3

History of India: 1206-1526

- The history of the sultanate helps students to understand political expansion over the land.
- Their political and economic organizations will also be known.

- The cultural synthesis of the Hindus and the Muslims is another interesting knowledge for students.

PAPER 8 SEM 4

Rise of the Modern west II

- This paper will help students their understanding for printing revolution and major changes in war technique in Europe. The political, social and economic directions shall be traced also.
- The growth of scientific institutions and scientific discoveries will be studied.
- The structure of constitutional monarchy in Europe is another area that will interest them.

PAPER 9 SEM 4

History of India 1526-1605

- The entry of the Mughals and their gradual consolidation of power in India is interesting area of study.
- The evolution of administrative tools like mansab, jagir under them is another important point to note.
- A special emphasis on Akbar will make their understanding how tolerant attitude of a central ruler is beneficial for a pluralist nation like India.

PAPER 10 SEM 4

History of India 1605 -1750

- This paper concerns history of other Great Mughals including Aurangzeb. The crisis in Mughal Jaigir system is an important area of discussion that changes the earlier notion of Mughal decline and replaced by another point that the crisis remained within Mughal socio-economic system.

- The interesting debate initiated by historian Satish Chandra that whether 18th Century was an age of decline shall also be discussed.

PAPER 11 SEM 5

History of Modern Europe 1780-1939

- The epoch making event of the French Revolution is a major part of discussion. Similarly the Great Russian revolution of 1717 is another interesting turning point in history.
- The steady march of imperialism that made the world involved in two World Wars will also be traced.

PAPER 12 SEM 5

History of India 1750-1857

- The expansion of British power in Bengal and eventually the whole of India are to be studied along with the administrative and economic institutions that they framed during the process of expansion.
- The ideology of Raj as envisaged therein will be taught. The local peasant uprisings in Bengal – their reasons and nature will be probed into.

PAPER 13 SEM 6

History of India 1857-1964

- The modern institutional growth specially the birth of political organizations, emergence of nationalism, political activities of the moderates and extremists and launching of Gandhian mass movement are important topics of study.
- The history of communalism is a point of departure from early Congress call of national unity. How this departure happened is a serious investigation of this period.
- The large mass of partition literature will also help the students to understand the partition of 1947.

PAPER 14 SEM 6

History of world politics 1945-1994

- The period starts from Cold War, an inevitable phenomenon in the post WW II period.
- Student will learn how the entire world was divided between two ideologically opposite camps is an important area of historical study.
- How the Stalinist hegemony was thwarted by the USA will be a point of interest among students.

Discipline Specific Elective

DSE TH & TU Paper 1 DSE-A1 SEM -5

History of Bengal 1757-1905

- This area of study will explore transitional period of Bengal history in the 18^{th} century, the shifting of power from nawabs to the English East India Company.
- The study on the effects of colonial economy will help them to understand how once fertile Bengal became poorer and drained economically day by day by deliberate policy of the English East India Company.
- Student will come to understand the growth of Bengali nationalism and its trial on the wake of anti-partition movement by Bengali bhadrolok will show the undaunted nationalist spirit of her people.

DSE –Paper 2 A-3 SEM -6

History of Bengal 1905-1947

- The paper under review is a testimony of province's attainment of political maturity.
- The cross currents of Bengal's political movements, emergence of communism as well as interplay of communal politics are to be taught.

DSE –Paper 6 B-3 SEM -6

History of Modern East Asia II 1868-1945

- Different aspects of modern Japan are discussed in this course.
- Transition from feudalism to capitalism, Meiji restoration, military reforms and Japanese imperialism are other important topics.
- Students will know rise of fascism in Japan.

Skill Enhancement Course:-

Section A 1 – Archives and museums

- The visit to archives and museums will help students to learn how to use the archives and museums.
- The system of maintaining archival data as well as the process of preserving artifacts will be taught.
- A visit to museum will expand their imagination about different historical periods.

Section B 2 – Art Appreciation: An introduction to Indian art

- The gradual evolution of Indian art and architecture from the Classical period down to modern and contemporary Indian art and architecture will be taught.

Programme Outcome

1. After completion of entire core courses, students would be able to sit for the state and central sponsored competitive examinations.
2. The course will not only help their admission to post graduate classes of any Indian University.
3. The major topics taught in the core course, the same will also be taught in their post graduate classes. Therefore they would be pre informed.
4. After attaining the M.A. degree there is scope to select teaching jobs either in school and college.
5. There is wide possibility of research work too.
6. Both state and union civil service examination has history in preliminary steps, specially the history of Indian freedom movement. So the study of core course will definitely be helpful for their pursuit of jobs.

History General

CC-1/ GE -1 History of India from Earliest times up to 300 CE

CC-2/ GE -2 History of India from C 300 to 1206

CC- 3/ GE -3 History of India from 1206 to 1707

CC -4/ GE-4 History of India from 1707-1950

DSE A-2- Some aspects of European History

DSE B-1

Patterns of capitalism 16th century to early 20th century

Skill Enhancement Elective Course B-1

Museums& Archives in India

Course outcome:-

- Th**e** core courses of the general papers mainly cover Indian history from earliest times to the time of enactment of Indian constitution in 1950. Thus, students of general group will have a fair knowledge of Indian history from the beginning.
- The cross-currents of Indian history through the ages will make their awareness strong about her past and future.
- A detail study of mother land will make their understanding clear about plurality of the nation and how the country remained tolerant about diverse religion, language and ethnic groups.
- The study on the major aspects of European history along with the transitional phase of agricultural economy to Industrial economy will generate students' curiosity about this period of Europe.

- The Skill Enhancement Elective Course on Museums & Archives in India will also generate their interest about historical data, artifacts exhibited in local and national museum.

Programme Outcome

1. The general group students cannot have admission to regular post graduate classes but they may pursue advance courses in different open universities for their post graduate studies.
2. They will have further scope to sit for state and central sponsored examinations.
3. As history constitutes a major part in state civil service examinations, students have a good chance to compete for such examinations.
4. Moreover, this course will also help them for school teaching from primary level to secondary stage.
5. After completing graduation degree a student can appear in different competitive examinations such as Bank, Railway, Public Service Commission, School Service Commission, Staff Selection Commission, Union Public Service Commission, West Bengal Civil Service etc.

Department of Philosophy
(General Course)
Course Outcomes and Programme outcome

COURSE CODE & SUBJECT	OUTCOME OF THE COURSE
SEMESTER I	
PHIG CC1 Indian epistemology and Metaphysics Carvaka, Nyaya, Vaisesika and Advaita Vedanta.	The course is designed to provide complete knowledge of Indian concept of knowledge- a discussion on its origin, multidimensional usage or application definitely enriches students of philosophy. While going through the different Systems of ancient Indian philosophy they can get in touch with atleast some of the invaluable treasures of ancient India.
SEMESTER II	
PHIG CC2 Western Epistemology and Metaphysics. Outcome of the course	Students will get acquainted with the Western concept of the origin of knowledge depicted in the views of eminent Western philosophers like Locke, Berkeley, Hume, Descartes, Spinoza and Leibnitz. CC1 and CC2 clubbed together is an attempt to provide the students of philosophy with a comprehensive view of knowledge. The inclusion of these courses is a humble attempt to satisfy the inquisitive human mind's insatiable thirst for knowledge to a great extent.
SEMESTER III	
PHIG CC3 Western Logic	It starts with the basic distinction between a sentence and a proposition and with a view to build up a strong sense of reasoning; it gradually makes the students familiar with topics like categorical syllogism, Venn diagram method of testing validity, construction of truth-tables for testing the validity of arguments and statement forms. This course helps the students improve their logical skill which

	in turn will help them a lot while appearing in different competitive exams like UPSC, WBCS, etc.
SEMESTER IV	
PHIG CC4 Philosophy of Mind	Though Psychology itself has been treated as an independent subject yet the inclusion of Psychology or Philosophy of Mind in the course gives the students of philosophy a basic knowledge of human mind. Human mind is the locus of sensation, perception, consciousness, memory, etc. Knowledge of the human mind given in a nutshell will definitely create inquisitiveness among the students to explore more about it. So they can pursue further studies on Psychology and become professional psychologists or counselors in the near future.
SEMESTER V	
PHIG - DSE A Ethics - Indian and Western	From ancient Carvaka and Buddhist ethics, Hedonistic theories of Bentham and Mill, Kant's Moral Theory to Modern theories of Punishment - the domain of ethics has been unfolded to the students keeping in view, making them aware of what to do (good or right) or what not to do (bad or wrong) . In other words, this course intends to develop strong sense of moral values among the students.
SEMESTER V	
PHIG - DSE Applied ethics and philosophy of Religion DSE - A – Course - DSE - B – Course -	This course is mainly designed to impart the knowledge concerned with Ethical Theories. The students will learn and understand to deals with the practical application of these theories. Arguments for the existence of God have also been taken into consideration in this course. Not only belief in God but the other side of the coin i.e. disbelief in God, too, has been discussed in the Sociological theory of Durkheim, Freudian theory and Carvaka theory. Students can put forward their own ideas about the topic and have much scope to express them in this area.

	So this course is really thought provoking and contributes a lot to improve the ability of critical thinking of the students in the long run.
PHIG - SEC - A Course Skill Enhancement Elective	Students will be able to understand the Logical reasoning and application- logical reasoning and its application, both from Indian and Western perspective which has been effectively covered in this course. This course will undoubtedly enhance the skill of rational thinking.
PHIG - SEC – B Course Man and Environment	We are aware that our environment is getting polluted everyday. The food we eat, the air we breathe everything is full of pollutants which damages the sanctity of mother earth. Here the damaging factor is none other than human beings who are not concerned about the fact that if we go on destroying greenery, pollute the water of rivers, etc. then ecological balance would be in danger and the Earth would not be worth living for generations to come. But if we through the Upanisadic world view or Tagore's understand of nature, it becomes clear to us that from time immemorial Nature or Environment has been looked upon with awe. Different theses regarding the importance of Man in relation to Nature as well as the importance of Nature in itself or in other words, the intrinsic value of Nature- all this have been explained elaborately with a view to make the students attribute some value to Nature not only for their own interest but for the sake of Nature as well.

Programme Outcome

1. The general group students cannot have admission to regular post graduate classes but they may pursue advance courses in different open universities for their post graduate studies.
2. They will have further scope to sit for state and central sponsored examinations.
3. Students can appear in state level civil service examinations, students have a good chance to compete for such examinations.
4. Moreover, this course will also help them for school teaching from primary level to secondary stage.
5. They can go for journalism, can be an author to a book or work in a publishing house, write articles in newspapers and magazines.
6. They can be part of various organizations where the skill of communication, group discussions and various ideas related to the topics covered in this course may be discussed.
7. They can become motivational speakers and counselors.

Department of Political Science
Course Outcomes and Programme outcome

(Honours course)

CC-1: Understanding Political Theory: Concept

CC-2: Understanding Political Theory: Approaches and Debates

- In these two papers students are enriched about the base of politics.
- Here they are analyzed about the major concepts, approaches, and debates regarding political theory.
- Basically the key concepts of political theory is the main focus and various approaches and debates are discussed here like state, sovereignty, power ,authority, law, liberty, equality etc. and normative, empirical, Marxian approach etc. are also discussed.

CC-3: Constitutional Government in India

CC-4: Politics in India: Structure and Processes

- In these two papers it is mainly discussed about the constitution of India and the political system in India.
- Here it is critically analyzed about the constitutional forms and structure and their efficiency which started from the Constituent Assembly.
- In the one hand it is discussed the Executive, Legislature, Judiciary system in India on the other hand party system, electoral process, various social movement in India etc.
- This knowledge helps the students to get the administrative job under the Govt. of West Bengal as well as under the Govt. of India after qualifying the the competitive examination like IAS, IFS,Staff Selection, WBCS, Miscellaneous etc.

CC-5: Indian Political Thought-I CC-8: Indian Political Thought-II

- In these two papers the political thought of India is discussed in detailed from ancient period to pre-independence period. Here it is mainly focused on kautilya (ancient period), Barani, Abul Fazal (medieval period) and Rammohan Roy, Bankim Chandra Chattapadhya, Vivekananda (modern period).
- Besides M.N. Roy, Narendra Dev, Rammonohar Lohia, Jayprakash Narayan, Sayed Ahamed

Khan, Iqbql, Neheru, Savarkar, Jinnah, Jyotiba Phule, Ambedkar, Pandit Ramabi etc. are also discussed here which will enrich the students 'thinking about the Indian political thought.

CC-6: Comparative Government and politics

- In this paper it is comparatively analyzed among U.K, U.S.A, P.R.C, Franch, Russia and Bangladesh regarding government and political scenario. Besides rights of the citizen of U.K, U.S.A, and
- P.R.C are also analyzed which helps the students to know the internal political situation of these states.

CC-7: Perspective of the International Relations.CC-9: Global Politics since 1945.

- In these two papers International politics is discussed.
- Here the major theories of International Relations as Realism, Dependency, and World System Theory are discussed and emergent issuesare also discussed. Indian foreign policy and relation with PRC and USA are analyzed. Besides Cold war,Regionalism, some Regional organization as ASEAN, OPEC, SAFTA, SAARC, BRICS, are discussed, India and her neighbors and UNO in detailed are explained here also.
- With this knowledge students can work under the External Affairs Department of India as an International Relations Expert, and as a Reporter of news paper.

CC-10; Western Political Thought and Theory-I CC-11: Western Political Thought and Theory-II

- In these two papers western political thought is taught, basically focused on Greek political thought, Roman political thought, Thought of Machiavelly, Bodin, Hobbes, Locke, Rousseau arediscussed. Besides Bentham, Hegel, T.H. Green is also explained by which the students are very much enriched about western political thought.

CC-12: Political Sociology

- In this paper students are well known about the social base of politics, various types of political culture, the way of socialization and various media of socialization. They are analyzed about therole of Caste, Tribe, Class, Gender in politics and the importance of politics

are also analyzed.

- With this expertise, students can work under various NGOs, who work for social development and sometimes they can work as psychological counselor for the under privileged community.

CC-13: Public Administration: Concepts and Perspectives. CC-14: Administration and public Policy in India

- In these two papers students are taught about the administrative system, administrative theories and its importance in politics.
- Various major concepts are discussed here. Besides Indian administrative system, policy making system, district administration is also discussed.
- This subject knowledge helps the students to qualify much competitive examination especially for the administrative job under State Government as well as Central Government.

DSEC-A (1): Gender and Politics

- In this paper students are taught about the issue of gender in politics, patriarcy, feminism, etc. and various women's movements in India, violence against women etc.
- This knowledge helps the students to be practical and it will break the dogmatic concept about the women in society.
- With this subject knowledge students can involve themselves to many NGOs, who work for women's empowerment and struggle against domestic violence.

DSE-B (1): Indian Foreign Policy in Globalizing world

- In this paper it is discussed about the foreign policy making and its importance, especially in the period of globalization.
- In this global scenario it is very important to maintain the relation with others country mainly big powers and neighbor countries.

DSE-A (4): Understanding Global Politics

- In this paper the world politics is analyzed in different way where the ideas of world is discussed in detailed and the state system with sovereign power are focused.
- Besides the world economy, world culture and identity are also described here.
- The most important concept 'civil society' and its relevance are mentioned.

DSE-B (4): Human Rights in Comparative perspective

- In this paper it is compared between India-USA and India –South Africa in the context of Human Rights. Understanding and Institulization of Human Rights are being mostly focused in this paper.
- Besides comparative analysis between India and Pakistan on the question of gender and violence, comparative analysis between Australia and India regarding Adivasis/Aboriginals and land question are discussed clearly.
- Students can work under Human Rights commission of Central as well as States, and they can also do the social awareness programme under any NGOs.

SEC-A (1): Democratic Awareness through Legal Literacy

- In this paper some basic legal questions are analyzed by which the students are well informed about the legal procedure.
- They are taught what is FIR, Arrest, Bail, Search, Seizure, etc. and what have to be done when they will lose something. Consumer Rights, RTI, Cyber-crimes, etc. are also analyzed.
- Students can take a role of a legal expert and do many awareness programme under any Govt. project or NGOs.

SEC-B (1): Legislative Practices and Procedures

- In this paper it is discussed the Parliamentary Procedure, the Power and Privileges of MPs, MLAs etc.
- They are taught the structure of Local Self Government b (Urban and Rural both).
- Besides it is discussed how a bill becomes a law, how many committees are there in legislature and how they function etc.
- This knowledge helps the students to qualify many competitive examination and able to get a Govt. job.

(GENERAL COURSE)

CC-1: Introduction to Political Theory

- In this paper some basic concept in politics like Law,Right,Liberty,Equality,Nationalism, Internationalism are discussed, different approaches regarding Political Science and different theories of State like Normative, Behavioral, Post behavioral, Marxist, Feminist approaches etc.and Contract theory, Idealist theory, Liberal theory, Gandhian theory etc. are taught.
- Besides political parties, interestgroups and their functions, roles are also analyzed.

CC-2: Comparative Government and Politics

- In this paper it is compared to different political system like Liberal democratic, Authoritarian etc. and different forms of political system like Unitary, Federal, and Parliamentary, Presidential etc.
- It is also compared among UK, USA, PRC regarding government and politics. Besides the features of the constitutions of Bangladesh, France, Switzerland is mentioned here.\

CC-3: Government and Politics in India

- In this paper it is discussed in detailed the government and politics in India, the framing of the constitution, the Preamble, Fundamental Rights, Directive Principles etc.
- The Executive, The Legislature, The Judiciary are explained and Local Government, Election Commission, Party system, andvarieties social, political movement are also analyzed.
- The students can be successful in competitive examinations like WBCS, PSC Miscellaneous etc. and able to get a Govt. job.

CC-4: International Relations

- In this paper international politics are discussed. Here many theories in International Relations, Cold war, India's foreign policy etc. are also analyzed.
- The students can be expert on International Relations and do job under External Affairs Department of India or as a reporter of any social media.

DSE-1(A): Public Administration

- In this paper Public Administration and its major concepts are discussed as Hierarchy, Unity of Command, Span of control, Authority, Centralization, Decentralization, Line and Staff,etc.
- Some major approaches like New Public Administration, Comparative Public Administration, Development Administration, etc. are also discussed. Besides Bureaucracy, Public Policy and some major programme as MGNREGA, Sarva Siksha Abhiyan, and National Rural Health Mission are analyzed.
- This knowledge helps the students to qualify competitive examination like IAS, WBCS, and Staff Selection Examination etc.
- They can also do various project works under taken by Govt. of West Bengal as well as Govt. of India.

DSEC-2(B): Human Rights: Theory and Indian Context

- In these paper human rights, its history and evolution, UDHR etc. are discussed.
- Besides Human Right Commission in India (National level and State level), relation between Constitutional rights and Human rights in India are also analyzed clearly.
- This paper helps the students to be a social worker and involve themselves under many projects under taken by the State as well as Central Govt. and do many social awareness programme under NGOs.

SEC-A (1): Legal Literacy &

SEC-A (2): Understanding Legal System

- In these two papers Indian Penal Code and its history, some major legal issues, Personal laws, Human Rights Law etc.are taught.
- The students are taught about the basic legal system which they can apply in their daily life.
- The students can work as a legal expert under NGOs and can do LLB degree for professional practice in court

SEC-B (1): Elementary Dimensions of Research & SEC-B(2): Basic Research Method

- In these two papers research methodology are taught by which the students are able to involve themselves in research activities.
- Here the basic ideas like variables, proposition, hypothesis, research design, research report

writing etc. are discussed. Besides data collection, sampling, data analysis etc.are also taught.

- The students can do any research work for any special project under Govt. or NGOs.

Programme Outcomes

Political Science is one of the best subjects in Humanities. After completing the BA degree with PoliticalScience, the students have many opportunities in future. There are many career options as—

1. Civil Service is the most popular option throughout the India. The students of political science can prepare for Civil Service.
2. The students of political Science are able to analyze and understand various issues in oursociety; therefore, they can work in social media as reporters and Editors.
3. Political Science is taught in almost all schools and colleges, so the students of political science can go for teaching as their career options.
4. The students of political Science can work in NGOs and government outreach programmes. Theycan also complete master's degree in social Work after BA.
5. The students of Political Science can apply for internship at various organizations including UNOas a political Scientist.
6. The students of Political Science can work as a lawyer after completing the degree LLB. Here thissubject knowledge helps them to do so.