Course Outcomes of all Courses

Course Code	Title	Description
M 101 (Theory)	Plant Kingdom, Algae and Fungi	Algae and Fungi are one of the basics of Botany. There sitll lot of scope for utilization of these organisims for the benefit of human. The objectives of this course is to understands, Classification of plant kingdom and criteria, diversity, form, life span, nutrition and ecological status General characteristics, classification, morphology, reproduction, phylogeny and economic importance of Algae,Life history of Chlorophyceae (Volvox, Coleochaete, Chara), Xanthophyceae (Vaucheria), Cyanophyceae (Anabaena, Nostoc) Bacillariophyceae (General account), Phaeophyceae (Ectocarpus, Fucus), Rhodophyceae (Polysiphonia) General characters, cell structure, nutrition, reproduction and sexuality; Economic importance of Fungi Classification, phylogeny and life history of main classes of fungi with special reference to the types as mentioned; Phycomycetes (Phytophthora, Mucor); Ascomycetes (Saccharomyces, Penicillium); Basidiomycetes (Puccinia, Agaricus); Deuteromycetes (Cercospora, Colletotrichum)
M 102 (Theory)	Bryophytes and Pteridophytes	Bryophytes and Pteridophyte are abundent in North East India. There are are many plants unexplored for economic benefit.Classification and general account of structure, morphology, anatomy and Phylogenetic relationship among Hepaticopsida with reference to Riccia and Marchantia. Classification and general account of structure, morphology, anatomy and Phylogenetic relationship among Anthocerotopsida with reference to Anthoceros. Classification and general account of structure, morphology, anatomy and Phylogenetic relationship among Bryopsida with reference to Sphagnum and Polytrichum. Economic importance of Bryophytes Classification, comparative study of morphology, anatomy, reproduction, stellar diversity, heterospory and seed habit with reference to Psilopsida (Psilotum). Classification, comparative study of morphology, anatomy, reproduction, stellar diversity, heterospory and seed habit with reference to Lycopsida (Lycopodium, Selaginella). Classification, comparative account of morphology, anatomy, reproduction, stellar diversity, heterospory and seed habit with reference to Sphenopsida (Equisetum) and Pteropsida (Adiantum and Marsilea)
M 103 (Practical)	Algae, Fungi, Bryophytes, Pteridophytes, Field records etc.	Practical calsses are most importants to understand the theoritical knowledge of students of Botany like Algae: Volvox, Chara, Ectocarpus, Fucus, Polysiphonia, Anabaena , Fungi: Phytophthora, Mucor, Penicillium, Puccinia, Agaricus, Colletotrichum Bryophytes: Riccia, Marchantia, Anthoceros, Polytrichum, Sphagnum, Pteridophytes: Lycopodium, Selaginella, Equisetum, Adiantum, Marsilea etc.
M 201 (Theory)	Gymnosperms, Paleobotany and Plant Anatomy	Gymnosperm is the link between criptogams and angiosperms. Studing gymnosperms and its biodiversity will help the students to uderstand the internal structures of Plants. The objectives of this paper is to understand Classification, evolutionary significance and salient features and significance of gymnosperms. Comparative study of morphology, anatomy and reproduction of Cycadales (Cycas), Coniferales (Pinus, Cryptomeria, Thuja), Ginkgoales (Ginkgo) and Gnetales (Gnetum) Paleobotany UNIT III: General account, anatomy and reproduction of Psilophyta (Rhynia), Lepidodendrales (Lepidodendron) and Sphenophyllaes (Sphenophyllum) ,Process of fossilization. General account, anatomy and reproduction of Cycadofilicales (Lyginopteris), Bennettitales(Williamsonia) and Cordaitales (Cordaites),Plant anatomy , Cell wall and cell membrane: Origin, ultra structure, chemical constituents and function of Cell wall and cell membrane, Models of cell membrane and organization , Tissues and their classification: Theories of structural development and differentiation of roots and shoots, different tissue systems and their functions, Anatomy of primary monocot and dicot roots, secondary growth of stems and roots.

M 202 (Theory)	Cell Biology	Cell Biology will aquent the students to understand the molecular basis as well as internal physiological aspects of plants including, Introduction to cell biology: Introduction to cell, membrane structure and function, membrane pump, membrane carrier, membrane channels, membrane physiology, Chromatin, chromosome and cell nucleus, Chemical and physical structure of chromosome, Nuclear structure and dynamism, special types of chromosome and their significance, Cellular organelles and membrane trafficking, post translational targeting of protein, mitochondria, peroxisomes, endoplasmic reticulum, secretary membrane system and golgi apparatus, endocytosis and endosomal membrane system ,Signaling mechanism, signal transduction and signal protein , Cell cycle: G phase and regulation of cell proliferation, S-phase, G2-phase mitosis and cytokinesis, meiosis including practical , Structure and function of DNA and RNA
M 203 (Practical)	Gymnosperm-6, Paleobotany-6, Plant Anatomy-8, Cell Biology-6, Field records etc.	Practical calsses are most importants to understand the theoritical knowledge. Field study is essential to unerstand the theoritical aspects like. Gymnosperm: Cycas, Pinus, Cryptomeria, Gnetum, Thuja . Paleobotany, Plant Anatomy: Study of gross anatomical details of cells, tissues and various other organs of plants , Study of anomalous structure: Primary and secondary growth in stems covered under theory syllabus , study of various stages of mitosis and meiosis using appropriate stain and plant materials
M 301 (Theory)	Ecology, Plant Geography, Evolution	Ecology, Plant Geography, Evolution will helps the students to unerstand plant relation with environment. such as Ecosystem structure (abiotic and biotic components), Plant adaptations in response to water, temperature and light, Population ecology: Population characteristics; Ecotypes; Ecads. Community ecology: Community characteristics; Frequency; Density; Cover; IVI; Life forms, Biological spectrum and its significance, Ecosystem ecology: food chain, food web, ecological pyramids; Ecosystem function (Energy flow, Biochemical cycles), Ecosystem services, Ecosystem resilience; Ecological succession: Types and pattern, Environmental pollution: Water pollution: Sources and kinds, impact of pollution on aquatic ecosystem, eutrophication of water bodies; Air pollution: sources and kinds, impact on plants, acid rain; Soil pollution: Sources and kinds, impact on plants and ecosystems. Phytogeographical regions of India Factors regulating distribution of plants, endemism, isolation and speciation; Vegetation of India with special reference to North Eastern Regions; Major biomes of the world, Evidences, theories and mechanism of evolution; Origin of new species. Gene pool; Genetic drift; Changes in gene frequencies in population
M 302 (Theory)	Instrumentation and Laboratory Techniques	Instrumentation and Laboratory Techniques is essential to study chemical as well as physical aspects of Plants,like Microscopy: Working principles of Electron, Phase contrast and fluorescence microscopy; Image documentation: Camera lucida- principle, types; microphotography, digital imaging-advantages of digital camera and digitization , Types and techniques of micro technique, Principles and applications of hot air oven, incubators, autoclave, laminar air flow chamber, centrifuge, lux meter, pH meter UNIT III: Chromatography: Introduction, definition, concept of partition coefficient, Paper chromatography- principle, method, advantages; TLC and column chromatography: principle, method, advantages and disadvantages; Spectroscopy: principle, Beer and Lambert's law, mechanics of measurement; Spectrophotometer- working principle and application,fixatives and stains: principles, types, procedures and applications; Methods of sterilization and culture media; Mounting media Field and herbarium techniques, preservation of museum and herbarium specimens, preservation techniques for special types of plants (submerged aquatic plants, succulent and xerophytes, palm, canes and bamboos) , Preparation of normal, molal, molar, ppm and percent solutions; Somogyi's reagent, Biuret reagent, Nessler's reagent, different indicators.

M 303 (Practical)	Ecology, Laboratory Instrumentation and Laboratory techniques	Ecology, Laboratory Instrumentation and Laboratory techniques will helps to understand the significance of biodiversity and environmetal issues. Which includes 1. Determination of abundance and frequency of species by quadrate method. 2. To measure the dissolved oxygen content in polluted and unpolluted water samples. 3. Study of anatomical peculiarities with reference to ecological adaptations (xerophytes and hydrophytes; at least 3 plant samples for each type)4. Soil testing for the presence of Phosphorus, Potassium, Nitrate. 1. Image documentation of suitable botanical microscopic preparation by using camera lucida. 2. Microtomy- Preparation and processing of suitable material up to block preparation, Sectioning, staining and mounting and permanent slides preparation. 3. Demonstrations- TLC chromatogram. 4. Demonstration of different types of instruments as per theory syllabus mentioning their principles, functions and uses. 5. Preparation of different stains, solutions and reagents as per theory paper. 6. Submission of field report, permanent slides and practical records.
M 401 (Theory)	Morphology, Palynology, Embryology of Angiosperms	Study of the pollen morphology has proved of great value in the field of taxonomy. The discovery of Electron scanning and transmission microscopy, besides light microscopy, help in revealing ultra-structure of the pollen grains and spores. Embryology will aquent the students the changes taking place in an ovule before and after the fertilisation. Outcome will be knowledge on , Origin and evolution of Angiosperms; Inflorescence and flowers. Morphology of stamens and carpel , Telome theory, Phyllode theory, Carpel polymorphism, Inferior ovary. Role of morphology in plant classification, Aspects and prospects of Palynology, historical perspective, pollen morphology, methods of studying pollen, pollen production and sterility , Basics of embryology, microsporogenesis and megasporogenesis, development of male and female gametophytes, Types of embryosacs and evolutionary significance , Fertilization, embryo development, polyembryony, apomixes, endosperm development, types, hautorial structure, experimental embryology: role in crop improvement
M 402 (Theory)	Plant Taxonomy	Taxonomy uesful to uderstand the theory and practice of describing, naming and classifying living things. Such work is essential for the fundamental understanding of biodiversity and its conservation, including Objectives, Principles and Evolutionary Trends in Taxonomy, History of plant classification; Concept of species, genus and family, Concept of classificatory systems like Artificial, natural, Phylogenetic, phenetic, cladistic, and APG; Detail study of Bentham and Hooker, and Takhtajan system of classifications. Principles and rules of binomial nomenclature; ICBN-Historical developments, rules and commendations; rules of priority and its limitations, type concepts and its applications; concept of biocode Modern Trend in Plant Taxonomy and classification; Role of anatomy,embryology, palynology in plant classification, Numerical Taxonomy, Chemotaxonomy, Cytotaxonomy, and Serotaxonomy Affinities, phylogeny, economic importance and comparative studies of the following families: Magnoliaceae, Ranunculaceae, Fabaceae, Mimosaceae, Caesalpinaceae, Malvaceae, Apiaceae, Euphorbiaceae, Solanaceae, Verbenaceae, Lamiaceae, Acanthaceae, Rubiaceae, Cucurbitaceae, Asteraceae. Affinities, phylogeny, economic importance and comparative studies of the following families: Arecaceae, Poaceae, Musaceae, Zingiberaceae, Liliaceae, Orchidaceae
M 403 (Practical)	Morphology, Palynology, Embryology, Plant Taxonomy	Practical study of the pollen morphology has proved of great value in the field of taxonomy. The discovery of Electron scanning and transmission microscopy, besides light microscopy, help in revealing ultra-structure of the pollen grains and spores. Embryology will aquent the students the changes taking place in an ovule before and after the fertilisation like Study of special types of inflorescences – Cyathium, Hypanthodium, Verticillaster, Hypanthium, . Study of special types of Fruits – Spurious fruits (Dillenia); Aggregate fruits (Custard apple, Michelia, Periwinkles, Polyalthia); Multiple fruits (Pine apple, Jack fruit) ,Palynology: Study the morphological nature of pollen grains by permanent preparation of pollen slides from the plant materials available in the locality. Embryology: Study from permanent preparation of slides like Anther, Male gametophyte ,different types of Ovules. Plant Taxonomy: Description of specimen from members of locally available Dicotyledonous and Monocotyledonous families included in the theory. Description of specimens with preparation of keys up to generic level of locally available plants.

M 501 (Theory)	Microbiology and Immunology	Immunology is a branch of biology that covers the study of immune systems in all organisms.Hence, research in the field of immunology is of prime importance for the advancements in the fields of the modern medicine, biomedical research .Microbiology helps to understands microorganisms such as bacteria, protozoa, fungi and similar organisms that can't be seen with the naked eye. Outcome will be knowledg on , General Microbiology: History and development, scope of Microbiology, introduction to microbial world, microbial taxonomy and its modern trends, Microbial nutrition, growth and metabolism, microbiology of soil, air and water, role of microorganisms in biogeochemical cycles (N, C, S cycles) in nature, biological nitrogen fixation , Distinguishing features of Actinomycetes, Archaebacteria and Mycoplasma ,General account; Classification of Bacteria, Modern concept of Bacterial cell, Reproduction and Growth of Bacteria- genetic recombination; General account of Rickettsiae, Chlamydeae and diseases caused by them General characteristics; Classification of viruses, Nature of Viruses, Viroids, Virusoides, Prions, Replication of viruses – Lytic Cycle and Lysogenic Cycle (Bacteriophage), Transmission of viruses Concept of immunology, types of immunity, cell mediated and humoral immunity, primary and secondary immune responses, antigen and antibody-structure and classes
M 502(Theory)	Plant Pathology and Lichen	Plant pathology is the important branch of interdisciplinary science which deals with various subjects like virology,Mycology,bacteriology. It deals with the management of disease there causal organism and the life cycle. These includes , General account and historical development; Common symptoms of plant disease; Types of plant diseases according to major causal agents; Disease resistance; Physiology of parasitism; Host-parasite interaction. Concept of disease cycle, mechanism of disease development, dissemination and transmission of plant pathogens, Epidemiology and Disease forecasting Defense mechanism: concept and definition; structural, chemical and biochemical mechanisms, Study of following diseases with reference to causal organisms, symptoms, disease cycle and control measures: Late blight of potato, Rust of wheat, Grey blight of tea, White rust of crucifers, Powdery mildew of pea, Leaf spot disease of cabbage, Citrus canker, Yellow mosaic of bhindi, , papaya and Tobacco mosaic virus (TMV) disease, Plant disease management- chemical control, biological control and development of transgenic for controlling plant diseases, Lichens: General account, classification, structure and reproduction
M 503 (Theory)	Cytogenetics, Plant Breeding and Biometrics	Cytogenetics, Plant Breeding and Biometrics will help to understand crop improvement. Objectives of this paper is to understand , Principles of inheritance- Mendel's Laws, deviations to Mendel's law-Incomplete dominance,co -dominance, Quantitative and polymeric gene interaction, sex linked inheritance, Non-mendelian inheritance, extra chromosomal inheritance, Structural and numerical changes of chromosome: Structural changes-Chromosomal aberrations and ,evolutionary significance; Numerical changes-Euploidy (Polyploidy) and evolutionary significance, Linkage and crossing over, recombination and cytological basis of crossing over, linkage map, Principles of plant breeding-Introduction, selection, hybridization and back cross method , Heterosis and inbreeding depression-genetic basis; male sterility Biometrics, Mean, mode, median, standard deviation, t-test, chi-square test, measurement of gene frequency, Hardy-Weinberg equilibrium
M 504 (Theory)	Applied Botany	Study of applied botany essential how plants products and plant parts used for human welfare. Objectives is know Algae as food, feed, medicine and commercial products, role of algae in soil fertility UNIT II: Fungi- Role of fungi in agriculture, fungi as food, medicine and commercial products (Antibiotics, alcohols), mycotoxins and mycotoxicosis, Lichens as indicator plants, mycorrhiza and its role in plant development, Allergy and allergens, Bacteria- useful and harmful effects, role of bacteria in agriculture, medicine, bioremediation, serology, Breeding for disease resistance, induced mutation and crop improvement, induction of polyploidy and crop evolution,Deforestation and its effect on environment, impact of climate change, Application of plant growth regulators in agriculture, methods of plant propagation-grafting, layering ,and budding; bonsai, indoor gardening

M 505 (Practical)	Microbiology, Plant Pathology and Lichen	To understand microorganism, plant diseases practical classes is essential like , 1. Gram staining of Bacteria,. Preparation, Sterilization of culture media: Basic liquid media (Broth) for cultivation of bacteria; Basic solid media for routine cultivation of fungi. Isolation of soil microorganisms by the serial dilution and agar plating method. Isolation of microorganisms from air. Isolation of fungal pathogens from diseased plant parts. Pure culture technique: Streak-plate methods; Pour-plate method. Counting of bacterial cells using haemocytometer, Isolation and culture of plant pathogen and establishment of Koch's postulates and their pathogenicity. Study of plant diseases like Late blight of potato; Black rust of Justicia and wheat; Leaf spot disease of cabbage; Grey blight disease of tea; Citrus canker; Yellow mosaic disease of papaya and bhindi; Tobacco mosaic virus ,representing Fungal, Bacterial and Viral diseases studying their symptoms and by making permanent slides where ever possible.
M 506 (Practical)	Cytogenetics, Plant Breeding, Biometrics and Applied Botany	Cytogenetics, Plant Breeding, Biometrics and Applied Botany practical classes is essential on 1. Karyotype study in onion, garlic and Aloe vera 2. Study of chromosomal aberration in Tradescantia / Rhoeo 3. Study of gene interaction 4. Study of emasculation process in any plant 5. To work out mean, mode, standard deviation and standard error 6. Isolation of Rhizobium from root nodules 7. Counting of pollen grains in honey samples 8. Submission of permanent slides (at least 5 numbers) 9. Submission of practical notebooks and collected specimens showing applied aspects
M 601 (Theory)	Molecular Biology and Plant Biochemistry	Biochemistry help to understand the plants and higher fungi produce through their metabolism a vast variety of chemical substances. These are important for the plant itself, but also for the environment and for the recovery and use by human. Plant molecular biology is important because it's the field that's needed for the second green revolution. Increasing the crop yield is a must for humanity and for that to happen, we should first understand the plants. Molecular Biology: UNIT I: Structure and organization of gene, expression and regulation of gene (Lac operon concept), Genetic code; properties and evidences UNIT II: DNA replication, different forms of RNA and their roles, concept of exons and introns, Transcription and Translation in Prokayotes UNIT III: Mutation: Point mutation-transition, transversion, frameshift mutation, molecular mechanism (tautomerization, alkylation, deamination, base analogues, dimerization) Plant Biochemistry: 30 Marks UNIT IV: Nitrogen metabolism, Amino acid metabolism and protein synthesis UNIT V: Enzymes- Classification and nomenclature of enzymes, Enzyme as biocatalyst, properties and function UNIT VI: Carbohydrate metabolism - Structure of monosaccharides, disaccharides and polysaccharides
M 602 (Theory)	Bioinformatics, Computer Application and Biotechnology	Explains the writing the cutting-edge biological concepts and technologies in biotechnology. Use the main databases, tools, and methods for the storage, searching, and analysis of biological molecules. Solve computational problems common to bioinformatics and apply classical computer science solutions to biotechnology. Like Introduction to Bioinformatics, branches of Bioinformatics, Aim, Scope and Research areas of Bioinformatics, biological databases, classification format of databases, biological database retrieval system, Application of Bioinformatics: Basics of Molecular phylogeny, drug discovery and drug design, DNA data bank, genomics, proteomics and their application in crop improvement Computer Applications, Basics of computer, use of operating system (MS Office), Data representation, Internet browsing and searching of biological data using search engines, History, scope and significance of biotechnology, Plant Tissue culture-different techniques, micropropagation, meristem culture, embryo culture, somatic embryogenesis, pollen culture and development of haploid plants, somaclonal variation, transgenic plants, Plant genetic engineering, techniques and applications: (restriction enzymes, construction of DNA libraries, DNA fingerprinting, DNA sequencing), application in agriculture and medicines

M 603 (Theory)	Plant Physiology	One of the most importan implication of plant physiology is the elucidation of the subtle processes that regulate energy metabolism in green plants. Photosynthesis and respiration were found to be two related aspects of the same function—the metabolism of nutrients and energy like , Plant-soil-water relationship: component and classification of soil, Soil to plant-water potential, osmotic potential, Movement of water within the plant body: absorption, transpiration and its significance, factors, mechanisms of transpiration, ascent of sap, Mineral nutrition and mineral salt absorption, criteria of essentiality of elements, micro and macro nutrients-specific functions and deficiency symptoms, mineral salt absorption , Photosynthesis: photolysis of water, cyclic and non-cyclic photophosphorylation, electron transport system, C3 cycle, photorespiration and glycolytic metabolism (C2 cycle), CAM pathway, C4 cycle, chemosynthesis, espiration: Aerobic respiration, Glycolysis (EMP, PPP) and TCA cycles and its regulation, anaerobic respiration mechanism and factors, Translocation of organic solutes: mechanism of translocation, diffusion, Munch hypothesis, source and sink relationships, phloem loading and unloadin Growth and development: Phages of growth, growth regulation-physiological role and mechanism of action (Auxins, cytokinins, GA, ABA, ethylene); Physiology of flowering - photoperiodism and vernalization; seed dormancy-types and causes, methods of overcoming dormancy; senescence and aging; stress physiology-concept of biotic, abiotic and xenobiotic stresses.
M 604 (Theory)	Plant Resource Utilization	This is important to understsning by student for growing worldwide realization that biodiversity is fundamental to agricultural production and food security, as well as a valuable constituent of environmental conservation have been clearly observed. The importance of biodiversity and its conservation can not be overemphasized. The study of Plant Resource Utilization will helps in these aspect , Origin of Cultivated Plants: Concept of centers of origin; Plant introduction; Crop domestication; Classification of plant resources on the basis of their uses; Cereals: Rice, wheat and their role in green revolution; Leguminous plant resources: soybean, arhar dal, pea - their products and uses. Beverages: Tea, Coffee and cocoa - their sources, products and uses; Spices and condiments: Sources and uses of black pepper, cinnamon, clove, bay leaf, turmeric, zinger; Oil: Mustard, groundnut, castor and citronella ,fibers - Botany and uses of cotton, jute and ramie; Fruits - orange, pineapple, banana; Products and byproducts of sugar industry - Sugarcane, sugar beat, Timber and non-timber plant resources: sal, gamari, teetasopa; Botany and uses of cane and bamboo, Para-rubber, herbal dye (henna, manjistha, bixa); Botany and uses of medicinal plants (Holarhhena, Rauvolfia, Catharanthus, Taxus, Plumbago, Azadirachta, Andrographis). Practcal classes will give the uderstanding in harmacognosy: Pharmacognosy and its importance in medicinal plant uses, Ethnobotany-Definition, concept and scope; discipline and sub-disciplines of ethnobotany, importance of traditional knowledge in relation to plant uses and IPR (Intellectual Property Rights)
M 605 (Practical)	Molecular Biology, Biotechnology, Bioinformatics and Computer Application	Practical classes give understaning in Molecular Biology, Biotechnology, Bioinformatics and Computer Application like,Prepare the standard curve of protein and determine protein content in plant materials by Biuret method. Separate and identify amino acids present in plant extract by (i) Paper Chromatography, (ii) Thin Layer chromatography. Quantitative estimation of reducing sugar and total sugar by Somogyi's method. Separate and identify chlorophyll pigments by Paper Chromatography. 5. Determine Titratable Acid Number (TAN) in Bryophyllum leaves. Estimation of Total Nitrogen by Micro Kjeldahl method. Preparation and sterilization of the medium, Slant preparation and Inoculation - MS medium. Micro propagation of some important plants. Study of Genetic engineering Techniques (photographs): FISH, DNA Fingerprinting, DNA Sequencing, Gene gun, Ti plasmid. Study of steps of genetic engineering techniques from photographs (Bt cotton, Golden rice, Flavr Savr tomato), Construction of Restriction Map from the data provided. Aseptic seed germination - legume seed Study of different bio fertilizers. Homology Modeling through the BLAST (For Genes), Nucleic acid and protein databases. Sequence retrieval from databases. Sequence alignment, Sequence homology and Gene annotation. Construction of phylogenetic tree and Computer Application

M 606 (Practical)	Plant Physiology and Plant Resource utilization	Objectives of Practical classes on Plant Physiology and Plant Resource utilization is understands Determine the osmotic potential of cell sap by plasmolytic method. Determine the water potential of plant tissue. Determine the stomatal index, stomatal frequency and estimate the transpiration rate of different types of leaves. Study the effect of temperature on the rate of imbibitions and determine the Q10. Determine RQ of different plant materials (Seeds, Leaf buds, Flower buds). Extract and separate chloroplast pigments by solvent method and Paper chromatography, Determine effect of CO_2 concentration on the rate of photosynthesis. Chemical tests for tannins (Tea); Alkaloids (Vinca rosea) Pharmacognosical studies of both crude and powdered drugs - Zinger, Holarrhena, Rauwolfia Histochemical test for Curcuma longa, starch in non-lignified vessels (Zingiber); Alkaloid (Andrographis, Neem and Plumbago)
E 101(Theory)	Diversity of Microbes and Cryptogams	This chapter is basic requriement in studing Botany like Introductory Botany: Classification of plant kingdom, Importance of plant for human life and support system , Algae - General characters, classification, Life history and Economic importance of Cyanophyceae (Anabaena), Chlorophyceae (Volvox, Oedogonium), Phaeophyceae (Ectocarpus), Rhodophyceae (Polysiphonia) , Viruses, Bacteria, and Lichen - General account of viruses, acteriophages, Transmission of viruses; Classification of bacteria, Ultra structure of bacterial cell, reproduction and economic importance of bacteria; Lichen - General Account and economic importance ,Fungi and Plant Pathology- General Characters, cellular organizations, nutrition, reproduction, classification, and Economic importance; Life history of Phycomycetes (Phytophthora, Mucor); Ascomycetes (Saccharomyces. Penicillium, Peziza); Basidiomycetes (Puccinia); Deuteromycetes (Helminthosporium); Plant disease symptoms, disease cycle and control measure Bryophytes - Morphology, structural organization, habit, reproduction, classification and life histories of the following: Hepaticopsida (Marchantia); Anthocerotopsida (Anthoceros) and Bryopsida (Funaria Pteridophytes - Origin and evolutionary trends, classification, morphological and anatomical characteristics and life cycles of the following: Lycopsida (Lycopodium, Selaginella); Sphenopsida (Equisetum); Pteropsida (Pteris)
E 201(Theory)	Cell Biology and Genetics	Cell Biology and Genetics essential part of Botany because Plant cells are eukaryotic cells that differ in several key aspects from the cells of other eukaryotic organisms. Cell walls perform many essential functions: they provide shape to form the tissue and organs of the plant, and play an important role in intercellular communication and plant-microbe interactions. Like Structure of prokaryotic and eukaryotic cell, ultra structure of nucleus, mitochondria, and chloroplast , Chromosome organization - morphology of chromosome, types of chromosome; structure and function of DNA and RNA and their replications Cell division - Mitosis and meiosis and their significance, Gene expressions - Structure of genes, protein synthesis, regulation of gene expression in prokaryotic and eukaryotic cell , Mendelian genetics - Laws of segregation and independent assortment, allelic and non-allelic interactions, incomplete dominance Linkage and crossing over and their significance; Changes in chromosome structure and number and their role in evolution, mutations- spontaneous and induced.
E 301 (Theory)	Diversity of Seed Plants and their Systematic	Study of this chapter acquaint the students with increasing civilization, especially as knowledge grew concerning the uses of plants as food and medicine, the necessity of plant names became even greater. This paper includes, Gymnosperms: Introduction, general characters, classification, Origin & Evolution of seed habit. Morphology of vegetative and reproductive structures, anatomy of stem & leaf, and life cycle of the following types: Cycas, Pinus, Gnetum, Fossilization processes, General characteristics of Cycadofilicales, Bennettitales. Taxonomy of angiosperms: Introduction, Scope and objectives, Binomial Nomenclature, Taxanomic Ranks, General accounts of systems of classification – artificial, natural, phylogenetic. Salient features of classification systems with merits and demerits of Bentham and Hooker; Engler and Prantl. Diversity of flowering Plants: Systematic position (Bentham & Hooker system) distribution, general characters, floral formula, floral diagram, distinguishing characters and economically important plants of the following families. like 1. Magnoliaceae, 2. Malvaceae, 3. Papilionaceae, 4. Caesalpinaceae, 5. Mimosaceae, 6. Apiaceae, 7. Euphorbiaceae, 8. Lamiaceae, 9. Solanaceae, 10. Verbenaceae, 11. Asteraceae, 12. Poaceae, 13. Orchidaceae.

E 302 (Practical)	Diversity of Microbes and Cryptogams, Cell Biology and Genetics, Diversity of Seed Plants and their Systematics	Practical classes are essential to understand Diversity of Microbes and Cryptogams, Cell Biology and Genetics, Diversity of Seed Plants and their Systematics like in , Study of vegetative, reproductive bodies of genera included under Algae, Fungi (inclusive of plant diseases) of theory syllabus. Study of morphology, anatomy and detailed reproductive structures of Bryophyta and Pterydophyta genera included under theory syllabus. Gram staining of Bacteria. Examination of stages of Mitotic and Meiotic cell divisions. Gymnosperms: Study morphology and anatomy of leaf/stem, detailed reproductive structures of Cycas, Pinus, Gnetum. Study of fossil specimens and slides. Angiosperms: Description of specimen from representative of locally available plants belongs to the families included in theory syllabus.
E 401 (Theory)	Plant Physiology and Biochemistry	One of the most importan implication of plant physiology is the elucidation of the subtle processes that regulate energy metabolism in green plants. Photosynthesis and respiration were found to be two related aspects of the same function—the metabolism of nutrients and energy which includes ,lant water relations: Plant-water relations: Different bio-physio-Chemical phenomenon: definition, phenomenon and Importance of permeability, diffusion, osmosis, Plasmolysis, imbibition, Absorption of water- Introduction, mechanism of water absorption (Active and passive theories), Ascent of sap: Definition, mechanism- (root pressure theory, capillarity, Imbibitional and transpiration pull theories), Transpiration: Definition, types, structure of stomata. Mechanism of opening and closing of stomata (Starch- sugar, K+ (Potassium ion) pump theory),Mineral nutrition: Essential macro and micro elements and their role in plants (deficiency, symptoms, disease and functions), Translocation of organic solutes, Mechanism: Mass flow or munch hypothesis, protoplasmic streaming theory,Plant metabolism, Photosynthesis, Ultra structure of chloroplast, photosynthetic pigments, concepts of two Photo systems, Light phase: cyclic and non cyclic photophoshorylation, Dark phase: calvin cycle (C3) Hatch and Slack cycle (C4) and crassulacean acid metabolism, significance of photosynthesis, Types of respiration - Aerobic: Glycolysis, TCA cycle ETS (Oxidative phosphorylation) respiration. The course deals with- Growth and growth hormones: Phases of growth, factors affecting growth, Plant growth substances, hormones and their Practical applications; Seed dormancy: Introduction, methods of breaking Seed Dormancy, factors affecting seed dormancy; Physiology of flowering: Photoperiodism (LD/SD/DN plants) Vernalization and Devernalization; Plants movements: Classification of movements, Movements of curvature. Movements of variation (paratonic – nastic). The course also acquaint the students with - Biochemistry: Elementary biochemistry: Introduction, different organic constituents of the cell, Functions of carbohydrates (mono /oligo / polysaccharides) starch, Cellulose, Hemicellulose, proteins and nucleic acids, lipid, alkaloids, gums, mucilage and organic acids; Nitrogen metabolism: Introduction, physical and biological nitrogen fixation, nitrogen in soil, ammonification and nitrification, denitrification; Enzymes: Introduction, nomenclature and classification, mechanism and mode of action. Concept of holoenzymes, apoenzymes, coenzymes and cofactors.
402 (Practical)	Plant Physiology and Biochemistry	Practical classes are helps to understands physiological function and chemical constituents of Plants .Objectives are to understan 1. Determine the osmotic potential of cell sap by plasmolytic method. 2. Determine the Diffusion Pressure Deficit (DPD) of plant cells. 3. Determine the effect of time period on the rate of imbibition in different types of seeds. 4. Determine the relation between absorption and transpiration. 5. Measure the effect of different environmental conditions on the rate of transpiration of a twig by Ganong's Potometer. 6. Determine the effect of CO_2 concentration on the rate of photosynthesis. 7. Determine RQ of different plant materials (Germinating seeds, Leaf buds, Flower buds). 8. Qualitative analysis of plant materials to prove the presence of Sucrose, Glucose, Proteins, Fats and Cellulose. 9. Qualitative analysis of Plant ash to prove the presence of Iron, Potassium, Calcium, Magnesium, Phosphorus.

E 501 (Theory)	Structure, Development and Reproduction in Flowering Plants	Students wiil acquaint with the Basics of Botany including , Basic body plan of flowering plant, modular type of growth, diversity in plant forms – annuals, biennials and perennials, Histological organization of root and shoot apices, various theories of cellular organization. Types of tissue: Meristematic tissue – meristem, structure and types based on origin and position, Permanent tissue: Simple, Complex and Secretary, Epidermal tissue: Trichomes and Stomata. Anatomy: Primary structure of root, stem and leaf of Monocot and Dicot, Secondary growth in root and stem, Wood anatomy: Growth rings, heart wood and sap wood, Periderm: Origin, structure and functions, Floral biology, Embryology: Microsporogenesis and development of male gametophyte, megasporogenesis and development of female gametophyte, Double fertilization and its significance. Development of dicot embryo, Structure, development and types of endosperms, Fruit: Development and maturation of fruit, types and parts of fruits, fruit dispersal strategies, Vegetative propagation: Grafting, layering and budding. Seed: Types of seed, germination of seeds-types and nature and dispersal of seeds, factors affecting germination.
E 502 (Practical)	Structure, Development and Reproduction in Flowering Plants	Practical classes is mast to understanding Structure, Development and Reproduction in Flowering Plants. The objetives is to -- 1. Study of non-living cell inclusion (ergastic maters): Starch grains, Aleurone grains, Raphides, Cystolith. 2. Study of types of stomata. 3. Study of epidermal hairs. 4. Study of secondary growth in thickness by permanent preparation of differentially stained slide: Amaranthus, Boerhavia, Mirabilis, Bougainvillea, Dracaena, Tinospora. 5. Study from permanent slide: T.S. through young and mature anther; Male gametophyte; L.S. of ovule showing different nuclear stages of embryo sac; L.S. of ovule showing types of Endosperm; L.S. of Embryo – Dicotyledonous, Monocotyledonous. 6. Study of spurious fruits, aggregate fruits, composite fruits (at least 2 types each). 7. Study the adaptation in fruits and seeds for dispersal through air (at least 4 types). 8. Demonstrate the process of: Budding; Air layering; Scion grafting. 9. Practical Records, Permanent slides to be submitted in the examination.
E 601 (Theory)	Ecology and Utilization of Plants	The outcome of this course will be understanding about the mutual co relationship and understand the of interactions of organisms (both biotic and abiotic) with one another within the physical and chemical environment. Which incldes ,Introduction, concept, definition, Autecology and Synecology, Ecosystem Ecology: Introduction, ecological organization – species population, community ecosystem and biosphere, Kinds of ecosystem, structure and function of ecosystem, abiotic components, biotic components and their role. Ecological succession-Types and pattern, food chain, food web, ecological pyramid, Bio-geo-chemical cycles-concept, details of Nitrogen and carbon cycle, Composition and functioning of ecosystem: i) Simple – pond ecosystem,ii) Complex – forest ecosystem, iii) Artificial – crop land ecosystem. UNIT IV: Ecological grouping of plants with reference to their significance of adaptive external and internal features: Hydrophytes and Xerophytes. Environmental pollution with special reference to Air and Water pollutions - causes, effects and control measures; Green house effect. Utilization of Plants: Classification of plants on the basis of Botanical sources and uses of Rice, Wheat, Maize, UNIT VI: Sugar cane, Gram, Pea, Coffee and Tea, Black pepper, Turmeric, Clove, and mustard - Their uses and botanical sources , Non timber plant products - Cotton, Jute, Rubber, Bamboo, and Jatropha. Their uses and botanical sources Timber and medicinal plant resources: Teak, Sal, Rauvolfia, Neem, Cinchona-their uses and botanical sources

E 601 (Practical)	Ecology and Utilization of Plants	The objective of practical classes are to understand about mutual co relationship students need to study and understand the of interactions of organisms (both biotic and abiotic) with one another within the physical and chemical environment practical classes are needed. Which inclding 1. Determine the frequency and density of herbaceous species by quadrate method 2. Study the anatomical features of some common Hydrophytes: Root of Eichhornia, Petiole of Eichhornia, stem of Hydrilla, Petiole of Nymphaea. Xerophytes: Leaf of Nerium, Leaf of Thevetia, Leaf of Grass. 3. Test for the presence of inorganic salts in the soil: Chloride, Sulphate, Phosphate. Utilization of Plants: 1. Study the morphology, parts used, chemical nature and uses of the following plants a) Cereals – Rice, b) Pulses and legumes – Pea, c) Beverages – Tea, d) Fibres – Cotton, Jute e) Fats and oils –Mustard, f) Spices – Black pepper, Turmeric, g) Medicinal – Rauvolfia, Neem, h) Fuel – Jatropha, i) Sugar-Sugar cane
M 104	MICROECONOMICS I	This paper acquaint the students with the Economic Problem- Scarcity and Choice; Concepts of Equilibrium and the Basic Market Model; Interfering with the market versus working through the Market. This paper also requires the students to keep abreast with the Cardinal versus Ordinal utility, Indifference Curve Consumer's Equilibrium; Price Effect-Income Effect, Substitution Effect; Engel's Curve; Derivation of the Demand Curve; Giffen Paradox; Consumer's Surplus and Applications and Limitations of the Concept. The paper also deals with Organisation of Production; Production Function; Total, Average and Marginal Products and the Law of Variable Proportions; Production with two variable inputs-Isoquants; Factor Elasticity of Substitution; Returns to Scale; Least cost input combination; Expansion Path; Contract Curve and the derivation of Production Possibility Curve; Cost of Production andTypes of Costs The paper intends to acquaint the students with the TR, AR, MR; Relation between AR, MR, Elasticity of Demand; Comparing Costs and Revenues to maximize Profit.
M 105	MACROECONOMICS 1	The paper intends to acquaint the students with the Basic Economic Activities-Production, Consumption, Capital Accumulation; Circular Flow of Income in a two sector economy; Concept of National Income and related aggregates, Approaches to measuring National Income, Components of National Income; National Income and Economic Welfare The paper also deals with Classical Theory, Keynes' objections to classical theory, Theory of Effective Demand; Simple Keynesian model of Income Determination, Keynesian Consumption Function, Technical attributes of Consumption Function, limitations of Keynesian Consumption Function, Factors affecting consumption function. The course also keeps the student abreast with the Meaning of Investment, Marginal Efficiency of Capital, Marginal Efficiency of Investment, Relation between MEC and MEI Determination of volume of investment Accelerator Theory; Theory of Multiplier and Concept of super Multiplier.

M 204	MICROECONOMICS II	This paper acquaint the students with the Market structure :Perfect Competition: Features; Equilibrium of a Firm and Industry; Price Determination; Derivation of the Supply Curves of Firm and Industry; Monopoly: Features; Price-Output Determination; Price Discrimination-Meaning and conditions; Price and Output under Market Segmentation; MR, Output, Profit and Consumer's Surplus under different Degrees of Price Discrimination; Comparison between Monopoly Equilibrium and Equilibrium of a Competitive Firm. Monopolistic Competition: Features; Product Differentiation; Perceived and Proportionate Demand Curves; Price- Output Determination; Excess Capacity. This paper also deals with the Theory of distribution:Personal versus Functional Distribution; Marginal Productivity Theory of Distribution; Wage Determination under Perfect Competition and Imperfect Competition: Monopoly, Monopsony and Bilateral Monopoly; Collective Bargaining; Rent: Differential Surplus Approach; Modern Theory of Rent; Quasi Rent; Profit: Economic Profit; Gross and Net Profits; Innovation Theory: Risk and Uncertainty Bearing Theory. This paper tries to make aware its student with theWelfare Economics- Basic issues of Welfare Economics; Old Welfare Economics (Pigouvian), Pareto Optimality; Compensation Principle (ideas only). The paper is also deals with Financial Microeconomics- Pay Back Period, Average Rate of Return, Net Present Value and Internal Rate of Return,
M 205	MACROECONOMICS-I1	Unit 1: GOODS AND MONEY MARKET EQUILIBRIUM: Liquidity Preference and the rate of interest: Interaction between the rate of interest and income: the IS-LM framework, Policy implications in IS-LM framework. Unit 2: BUSINESS CYCLE: Meaning, Phases, Characteristics; Theories of Business Cycle –Hawtrey's Monetary Theory , Hicks's Multiplier – Accelerator Interaction Theory; Unit 3: QUANTITY THEORY OF MONEY: Transaction Approach, Cash Balance Approach, Keynes reformulation of the Quantity Theory of Money. Unit 4: INFLATION: Meaning and Impact, Theories of Inflation- Demand pull (Keynesian and Monetarist), Cost Push; Structural Theories of Inflation-Inflation in developing countries.
M 304	ELEMENTARY MATHEMATICS FOR ECONOMICS	The objective of the course is to acquaint students with the Variables, Sets, Functions; Limit and Continuity of a Function; Equations, Identities, Systems of equations and Homogeneous function. This course seeks to acquaint students with Various types of matrices, Matrix operations-addition, subtraction and multiplication; Rank of a matrix, Determinants; Matrix inversion; Solution of Simultaneous equation system; Crammer's rule; Application to partial equilibrium market model, simple national income model; Structure of input-output table, Static Leontief system This course also deals with Differentiation of a Function; Basic rules of differentiation- Partial and Total ifferentiation, Integration of a function - basic rules; derivation of total function; definite integral
M 305	THE MONETARY SYSTEM	This paper acquaints students with Concept of Money, Money and Near Money. Supply of Money: definition and measures. The paper is also intends to acquaint the students with Commercial Banking- Meaning, functions, assets and liabilities-Balancing liquidity with profitability, process of credit creation by commercial banks. The course also keeps the student abreast with the concept of Central Bank-Meaning, Functions, Methods of credit control, Monetary Policy- Objectives. Promotional role of a Central Bank in a developing economy (with reference to RBI). The course is also deals with the Financial System- Meaning, constituents, functions and importance of financial system. Money market and Capital Market (concepts only), Stock Market-its role in economic development;, Stock market indices

M 404	MATHEMATICAL APPLICATIONS IN ECONOMICS	The ojective of the paper is to acquaint the students with application of mathematics in Economics. After completion of the course students will have the knowledge of application calculus in Economics, particularly application to consumer's and producer's surplus, problems relating to investment, capital formation and derivation of simple growth process (Domar) Application to elasticity of demand and supply, derivation of marginal functions, Inter-relationships among total, marginal and average functions, tax yield in competitive market; -application to simple market model, national income model, Production Function and Euler's Theorem. This course gives concept on Unconstrained maxima and minima with single explanatory variable-application to cost minimization, revenue maximization, tax revenue maximization, profit maximization and equilibrium of firm-unconstrained maxima and minima with more than one explanatory variables-application to discriminating monopoly, multi-product quilibrium, multi-planned equilibrium, equilibrium of firm with advertisement cost and subsidy This paper acquaint the students with inequality Constraint and formulation of a Linear Programming Problem – Graphical Solution and Two Person zero sum game –Pure strategies with saddle point, games without saddle point-the rules of dominance- solution of games without saddle point – mixed strategies, basic ideas and examples of non zero sum games – Nash equilibrium, Prisoner's Dilemma and Repeated games.
M 405	INTRODUCTIONS TO DEVELOPMENT ECONOMICS	After successful completion of this course the student will be able to gather knowledge about meaning and measurement of development – GDP and PCI as indicators of development, HDI - Structural Changes in the Development Process (Kuznet) and Obstacles to development. This paper acquaint the students with Meaning and Sources of Economic Growth: Population Growth, Capital Accumulation and Technical Progress; the Notion of Capital-Output ratio; Theories of Economic Growth-Classical Approach: Smith and Ricardo, Harrod-Domar's Theory of Instability of Growth Process. The aim of this paper is to acquaint the students with Development Theories: Theories of Persistence of Underdevelopment: Vicious Circle of Poverty, Cumulative Causation (Myrdal), Strategies for Development; Balanced and Unbalanced Growth Strategy, Development with Unlimited Supply of Labour (Lewis).
M 405	INTRODUCTIONS TO DEVELOPMENT ECONOMICS	The objective of the course is to acquaint the students with Meaning and Measurement of Development – GDP and PCI as indicators of development, HDI - Structural Changes in the Development Process (Kuznet). - Obstacles to Development This paper is to acquaint the students with the Meaning and Sources of Economic Growth: Population Growth, Capital Accumulation and Technical Progress; the Notion of Capital-Output ratio; Theories of Economic Growth-Classical Approach: Smith and Ricardo and Harrod-Domar's Theory of Instability of Growth Process. The course is also deals with the Development Theories: Theories of Persistence of Underdevelopment: Vicious Circle of Poverty, Cumulative Causation (Myrdal), Strategies for Development; Balanced and Unbalanced Growth Strategy and Development with Unlimited Supply of Labour (Lewis).
M 501	ELEMENTS OF PUBLIC FINANCE	The aim of this paper is to acquaint the students with Nature and scope of Public Finance; Public Goods and Private Goods; Role of Public Finance; Principles of Public Finance—Principle of Maximum Social Advantage The paper also deals with Concepts of Revenue Receipt and Non-revenue Receipt; Sources and Classification Public Revenue; Tax and Non-tax Revenues and Public Expenditure; Causes for growth of Public Expenditure(Wagnar's Law); Classification of Public Expenditure; Canons of Public Expenditure; Effects of Public Expenditure on ---Production, Distribution and Economic Stability; Importance of Public Expenditure in Developing Countries This paper also acquaint the students with Sources of Public Debt--Internal and External Debt; Burden of Public Debt; Redemption of Public Debt; Debt Trap; Role of Public Debt with special reference to developing Countries.
M 502	BASIC STATISTICS FOR ECONOMICS (For Arts Stream only)	The objective of this course is to acquaint the students with the Centra Tendency, Dispersion and Correlation and Regression. After completion of the course the students will also understand about the coneptProbability, its Rules, Conditional Probability, concept of discrete and continuous Random variables and mathematical expectation and Binomial, Poisson and Normal Standard distribution.

M 503	INTRODUCTION TO ENVIRONMENTAL ECONOMICS	The aim of this paper is to acquaint the students with Nature and scope of environmental economics, Economy-environment interaction, Market failure, externality, public good-Environment as a public good and Tragedy of Commons. After successful completion of this course the student will be able to gather knowledge about Environmental Kuznets's Curve, Pollution Control Policies: Command and control approach, Incentive based approach: Taxes, Liability Law and tradeable permits and Climate Change – its Implications and Mitigation
M 504	INTERNATIONAL TRADE: THEORY AND POLICY	This paper acquaint the students with theTheories of International Trade- Ricardian Theory of Comparative Cost Advantage; Factor Endowments and Heckscher- Ohlin Theory; Empirical Test of H-O Model- Leontief Paradox; Factor Intensity Reversal The objective of this course is also aquaint the students with the Terms of Trade and Gains from Trade,Concepts of Terms of Trade; Factors affecting Terms of Trade; Gains from Trade; Offer Curves, Distribution of gains from trade in terms of Offer Curves,Trade as an Engine of Growth. The course also deals with International Trade policy,Free Trade and Protection- Arguments for and against Free Trade and Protection; Tariffs- Classifications of Tariffs, Effects of Tariffs- Partial Equilibrium analysis, Concept of Optimum Tariff and Retaliation; Quotas- Types, Effects; Tariffs versus Quotas.
M 505	HISTORY OF ECONOMIC THOUGHT I	The aim of this course is to acquaint the student with- Mercantilism: Tenets, Rise & Fall. Physiocracy: Tableau Economique of Quesnay, concept of Natural Order, Produit Net, Taxation, Trade. The course is also deals with-Adam Smith: Views on division of labour, theory of value, capital accumulation, istribution, trade, and economic development; David Ricardo: Main Contributions in brief;Thomas Robert Malthus: Theory of Population, Theory of Glut; J. B. Say: Laws f Market; J. S. Mill: Restatement of the Classical Theory. After comletion of the course students will also able have knowledge about SOCIALIST THOUGHTS: Contributions of Karl Marx: Theory of Value, Theory of Surplus and Theory of Economic Development.
M 506	Policy and the Indian Economy	The objective of the course is to acquaint the students with the Basic Features of Indian economy: Trend and Composition of National Income and Per Capita Income, Occupational Distribution, Basic Demographic features, Increasing Importance of the Tertiary Sector: Trend and Composition within the Tertiary Sector. The course is also help the learners to gather knowledge about Poverty, Inequality and Unemployment: Conceptual and Measurement Issues – the Indian Situation. The course is also deals with the Role of Agriculture in Economic Development: Barriers to Agricultural Growth; Land Reforms in India – Rationale, Measures and Impact; Green Revolution and Indian Agricultural Growth; Food Security and Public Distribution System. After successful completion of the course the students will be able to learn about Role of Industries in the Development Process: Large vs. Medium, Small and Micro Enterprises (MSME); An overview of the India's Industrial Progress – Overview of the Industrial Development Strategy before Reforms, Industrial Policy of 1991 and Liberalization.
M 601	Public Economics	The objective of the course is to acquaint the student with- 1. TAXATION: Canons of Taxation; Principles of Taxation; Benefit Principle and Ability to Pay Theory, Direct Tax and Indirect tax: Meaning and concepts; Rate schedule of taxation Proportionate Tax, Progressive Tax, Regressive tax, Impact, Incidence and Shifting of Tax; Sharing of Tax between Buyers and Sellers; Taxable Capacity; Relative and Absolute Taxable Capacity; Factors determining Taxable Capacity; Effects of Taxation on Production and Distribution; Characteristics of a Good Tax System; Role of Taxation in Developing Countries. 2. GOVERNMENT BUDGET: Concept of Government budget ;Classification of Public Budget—Balanced and Unbalanced Budget, Capital and Revenue Budget; Brief Ideas on Performance Budgeting, Zero Base Budgeting. 3. FISCAL POLICY: Meaning and Objectives; Components of Fiscal Policy; Role of Fiscal policy in a developing economy. Unit 4: FEDERAL FINANCE Meaning; Principles of Federal Finance; Current Finance Commission of India- a brief overview.

M 602	Applied Statistics (For BA)	The aim of the course also acquaint the students with- 1. INDEX NUMBERS:Concept, uses of Index numbers, Problems in the construction of Index numbers, Methods of constructing Index numbers-Laspeyres', Paasche's and Fisher's, Chain base Index number, Wholesale price and cost of living index numbers. 2. TIME SERIES ANALYSIS: Time Series Analysis-Concept and Components-Measurement of Trend, Graphical Method, Moving average and Least square method, Fitting of linear and exponential trend curves. 3: VITAL STATISTICS: Concepts and Measurement of fertility-crude birth rate, general fertility rate, age specific fertility rate, total fertility rate, Net reproduction rate, gross reproduction rate, Measurement of Mortality14 crude death rate, specific death rate, standardized death rate, Life Table (Basic features). 4. SAMPLE SURVEY: Population, sample, parameter; sample versus complete enumeration; Types of samples-simple random, stratified random and systematic sampling.
M 603	Economics of Natural Resources and Sustainable Development	The aim of the course is to acquaint the students with Natural Resources: Types and Characteristics and Economics of Non-renewable Resources: Conditions for optimal depletion, Market forms and rate of depletion, Role of a backstop The course is also deals with Economics of Renewable Resources: The Idea of sustainable yield, Economically optimal rate of harvest and Development-environment Trade-off, Sustainable development- Indicators and policy issues – Integrated economic and environmental accounting
M 604	International Economics	The objective of the course is to acquaint the student with International Economics as a distinct branch of Economics, Its Nature and Scope and the Structure of BOP; Accounting Principle; Disequilibrium in BOP- Types of Disequilibrium; Causes of Disequilibrium; Adjustment Mechanism-Correction under Fixed and Flexible Exchange Rate regimes The course is also deals with Functions of Foreign Exchange Market; Determination of Equilibrium Exchange Rate; Concepts of Spot and Forward Rates. The aim of the course also acquaint the students with Forms of Economic Integration; Customs Union- Partial Equilibrium Analysis of Customs Union - Trade Creation and Trade Diversion (concepts only) and Objectives and functions of IMF, IBRD, WTO
M 605	History of Economics Thought II	After successful completion of the course students wiil be able to learn about SOME FAMOUS SCHOOLS OF THOUGHT: Marginalist school--W.Jevons, J.B. Clark.; Austrian school: C.Menger, Bohm-Bowark, F.Wiser,V. Pareto;Mathmatical school--L.Walras, W.Leontief, Hicks; Neo-classical economics: Alfred Marshall, Irving Fisher, Wickshell; Welfare economics of A.C. Pigou. The course will acquaint the student with KEYNESIAN ECONOMICS: Departure from the Classical School, Aggregate Approach to Economics, Policy Prescriptions. The course is also deals with INDIAN ECONOMIC THOUGHT: Main themes of Kautilya's Arthasashtra; Modern Economic Ideas: Dada Bhai Naoroji, Ranade, Gokhle; M.K. Gandhi's ideas on —Village, Swadeshi, Khadi, Cottage Industries and place of Machine, Welfare of Labour, Non-violent Economy, Decentralisation, Trusteeship and Sarvodaya.
M 606	Planning for Development: India and the Northeast	The objective of this course is to acquain the student with Planning: Concept and Justification, Types of Planning; Overview of Planning Process in India: 1951-90: Strategies, Goals, Achievements and Failures, Planning in the Post-liberalization Period; Planning for Inclusive Growth; Role of the Community and Voluntary Organizations. The aim of this course is also acquaint the learners with the India in the Global Economy: Basic Features and Consequences of Economic Globalization; Trend, Composition and Direction of Foreign Trade in India before and after Liberalization; Capital Flows - Foreign Direct Investment (FDI) and Foreign Institutional/Portfolio Investment (FPI). The course is also deals with the Economic Problems of North-East India: Comparative Development Experience of North Eastern States vis-à-vis all India Average – Growth Rates, Per Capita Income, Human Development Attainments (Literacy and Health); Specific Problem of Industrialization in the Region and Industrial policies for North-East and Problem of Agricultural Transition in the Hill Areas (Shifting Cultivation to Commercial Crops).

E-101	Elementary Micro Economics	The aim of this course is to acquain the student with- 1. Concept of Equilibrium: Stable and unstable, static, comparative static, dynamic. 2. CONSUMER BEHAVIOUR: CARDINAL APPROACH INDIFFERENCE CURVES-ASSUMPTIONS AND PROPERTIES, LAW OF DIMINISHING MRS, CONSUMER'S EQUILIBRIUM, INCOME EFFECT, SUBSTITUTION EFFECT, PRICE EFFECT, DERIVATION OF DEMAND CURVE, GIFFEN PARADOX. 3. Production and Cost: Law of Variable proportions and Returns to Scale, Isoquants, Iso-cost, Least Cost Combination, Expansion path; Cost of TC, AC, MC and their interrelation; Long run AC Curves, Economics and diseconomies of scale. 4. Product Pricing: Pricing under Perfect competition, Equilibrium of Firm and Industry, Derivation of Supply curve, Price –Output determination under monopoly, Price Discrimination, (concept only) Price and output under Product Differentiation. Basic idea of Oligopoly. 5. Factor Pricing: Wage determination under perfect competition, monopsony and bilateral monopoly, Differential, economic and quasi rent; Risk and Uncertainty bearing theories of profit.
E-201	Introductory Macro Economics	The objective of this course is to acquain the student with- 1. National Income: Concepts of National Income and related Aggregates, Measurement of National Income, National Income and Economic welare. 2. Theories of Output and Employment: An overview of the Classical theory, Keynesian Theory of Effective Demand, Consumption Function and Investment Function, Multiplier, Classical and Keynesian Theories of interest. 3. Inflation: Demand – pull and cost push Theories, Effects of Inflation on Production and Distribution.-- Anti Inflationary Policy.
E-303	Money, Banking and Finance	The objective of this course is to acquain the student with- 1. Quantity Theory of Money: Cash Transactions and cash Balance approaches. 2. Commercial Banking: The Process of Credit Creation, Assets and Liabilities. 3. Central Banking: Function of the Central Bank. 4. Business Cycle: Meaning and Characteristics; Hawtrey's Theory of Trade Cycle. 5. Monetary Policy: Objectives of Monetary Policy with special reference to UDCs. 6. Financial System: Meaning, Functions and constituents. Concepts of Money Market, Capital Market and Stock Market.
E-403	Indian Economy with Issues of North-East	The aim of the course is to acquain the student with- 1. Trend and composition of National Income and Per-Capita Income of India and State Domestic product of North-Eastern States, Increasing importance of the Tertiary sector. 2. Role of Agriculture in the Economic development of India and Assam, Problems of Agriculture in India with special reference to North-Eastern States, Impact of Land reform and Green Revolution. 3. Industrial progress and Industrial development strategy of India before and after reforms. 4. Natural resources of Assam, Demographic features of Assam- Trend of population growth rate, Density of population, Occupational distribution, Literacy. 5. Role, Problems and Development of Transport, Power and Communication of Assam.
E-503	Public Finance	The objective of this course is to acquain the student with- 1. INTRODUCTION: DISTINCTION BETWEEN PUBLIC FINANCE AND PRIVATE FINANCE, PUBLIC GOODS VS. PRIVATE GOODS. 2. Public Revenue: Tax and non-tax revenue, Direct tax vs. indirect tax Ability- to-pay principal of taxation, Shifting and incidence of taxation, Taxable Capacity, Effects of Taxation on Production and Distribution, Rate structure in taxation. 3. Public Expenditure: Effects of Public Expenditure on Production, Distribution and economic stability. Role of public Expenditure in Developing Economy. 4. Public Debt: Types of public debt, Redemption of public Debt, Burden of public Debt. 5. Fiscal Policy: Main objectives. 6. Government Budget: Capital and Revenue Budgets—Ideas of fiscal and revenue deficits

E-504	Introduction to Growth and Development Economics	The objective of this course is to acquain the student with- 1. Growth: Meaning, Sources of Economic Growth. 2. Development and Underdevelopment: Meaning Difference between Economic Growth and Economic Development, measurement of Economic Development-GDP and PCI as indicators of Development, HDI; causes of Underdevelopment. 3. Development Theories: Cumulative Causation, balanced Growth and Unbalanced Growth, Lewis Theory of Development with Unlimited Supply of Labour. 4. Sectoral Development: Role of Agriculture and Industry in Economic Development, Large versus Small Scale Industries. Choice of Technique: LABOUR INTENSIVE VERSUS CAPITAL INTENSIVE TECHNIQUE.
E-603	International Economics	The aime of this course is to acquain the student with- 1. Introduction: Nature and Scope of International Economics, International Economics as a distinct Branch of Economics, Basis of International Trade-Recardo's Theory of International Trade. 2. Terms of Trade: Different Concepts of Trade. 3. Balance of Payment: Structure of BoP, Accounting principle, Meaning of Disequilibrium in BoP, Types and Causes of Disequilibrium, Measures sot Correct Disequilibrium. 4. Foreign Exchange Rates: Determination of Equilibrium Exchange Rates. 5. International Institutions: Objectives of IMF and IBRD.
E-604	Planning and Development in India	The aime of this course is to acquain the student with- 1. Basic Features of Indian Economy as a Developing Economy. Concept of Planning, Rationale for Planning, Types of Planning (only concepts), Broad strategies, Goals, Achievements and Failures of Indian Planning, Role of Planning in Post-liberalization period. 2. Features and Consequences of Economic globalization, Trend, Composition and Direction of Foreign trade in India, FDI and FPI in India. 3. DECENTRALIZED PLANNING IN ASSAM, ROLE OF NEC, LOOK – EAST POLICY. 4. POVERTY ALLEVIATION PROGRAMMES IN INDIA.
1.01	Foundation of Educational Theories and Principles	1) To be acquainted with scientific and sound principles and theories of education. 2) To understand the concept, nature and scope of education. 3) To gain knowledge about different aims of education. 4) To be familiarized with different dimensions of Education such as the learner, the teacher and the curriculum. 5) To acquire knowledge about the concept of discipline and freedom. 6) To expose the students to modern trends of education – particularly value education.
2.01	Educational Psychology	1) To enable the students to understand the relation between education and psychology and different methods of educational psychology. 2) To enable the students to understand learning process, memory, attention, instinct and emotion. 3) To acquaint the students with the concept of personality, type and trait theories. 4) To understand the concept of intelligence - nature and different theories.
3.01	Development of Education in India	1) To acquaint the students with the ancient and medieval system of education in India. 2) To help the students to understand the development of education in India during the British Period. 3) To acquaint the students with the development of education in India during post independence period. 4) To acquaint the students with the development of education in Assam.
4.01	Sociological Foundations of Education	1) To acquaint the students with education as a social process. 2) To inculcate the knowledge of Education from the social perspective. 3) To understand education as a determinant of social change and development. 4) To develop social habits and attitudes in the students and to make them socially adjustable.

5.01	Emerging Issues and Education	1) To acquaint the learner with the emerging issues in education. 2) To develop awareness and understanding about different literacy programmes, women empowerment, Human rights, globalization, vocationalization of secondary education. 3) To develop in students basic understanding regarding students indiscipline –its causes and remedies. 4) To acquaint the students about the need and importance of national integration and International understanding and the role of education in promoting them.
5.02	Educational Measurement and Educational Statistics	1) To help the students to acquire knowledge of the concept of measurement and evaluation in education. 2) To develop an understanding of different types of educational tests and their uses. 3) To acquaint the students with the characteristics of a good measuring instrument and the procedure of constructing educational and psychological tests. 4) To help the students to be acquainted with the concept and application of statistics in Education.
6.01	Educational Technology	1) To enable the students to understand the concept and scope and objectives of Educational Technology. 2) To acquaint the students about teaching technology, behavioural technology and instructional technology. 3) To make the students understand about communication process, teaching aids, system approach and use of computer and internet in educational technology.
6.02	Environmental and Population Education	1) To enable the students to understand the concept scope and importance of environmental education. 2) To enable the students to understand the programmes of environmental education at different levels of education. 3) To make the students aware of environmental stressors and disaster management education.
101	Introduction to History	Aim of the course is to acquaint the students with the meaning and scope of History; Categorization of History;History and other Disciplines; and Traditions of Historical writing.
102	History of India (up to A. D. 300)	Aim of the course is to acquaint the students with the Introduction to Geographical background of India and Survey of sources . The paper also deals with Proto-History, State formation in the 6th century B.C.; and Post-Mauryan invasions and their impact.
203	History of India (300-1200 A. D.)	The ojective of the paper is to acquaint the students with the Age of the Guptas, Post-Gupta period, Rise of Regional powers and Foreign Invasions.
204	History of Ancient Civilizations of the World	The aim of the course is to acquaint the students with Ancient Egypt,Ancient Mesopotamia, Chinese Civilization, Ancient Greece and Ancient Rome.
305	India under the Turko-Afghans	The aim of the course is to acquaint the students with the Survey of sources of early medieval India, Foundation and Consolidation of the Sultanate, Fragmentation of the Sultanate and Rise of Provincial Kingdoms . The course also deals with State, Society and Economy of the Sultanate period.
306	History of Assam (5th Century A. D. to 1228)	The objective of the course is to acquaint the students with the sources of ancient Assam history, a brief history of Society, Economy, Religion, Ruling Dynasties and Political institutions. The paper also deals with invasions from the West and Emergence of petty Chieftains in Western Assam and Eastern Assam.
407	India Under the Mughals	The objective of the course is to acquaint the students with the Advent of the Mughals and thier struggle for existence, Consolidation and territorial expansion of Akbar, Jahangir, Shahjahan, Aurangzeb; Mughal Administration and Institutions- Administrative structure, Land-Revenue system, Mansabdary system, Zamindari and Jaigirdari systems.The paper also deals with Religious policy of Akbar and Aurangzeb; Society and Economy, Trade and commerce under the Mughals; Rise of the Maratha Power under Shivaji and his Administrative structure, Revenue system; Disintegration of the Maratha power ; Decline of the Mughal Empire and the advent of the Europeans.

408	History of Europe (1453-1789)	The objective of the course is to acquaint the students with the Transition of Europe from Medieval to Modern Age,Thirty Years War: Causes and effects, Rise of Prussia and Austria; Genesis and growth of Capitalism, Imperialism, Mercantilism; World Conflict and Evolution of World Politics; the Maritime ascendancy of Holland and its collapse, The Anglo- French struggle and triumph of British imperialism.
509	India under the East India Company	The objective of the course is to acquaint the students with the Background of Political, Social and Economic changes in mid eighteenth century in India, Tools of British expansion,Consolidation of British rule in India, Administrative system-Central, Provincial, District and Judicial administrative system, Land Revenue settlements, Impact of Colonial Rule on Rural Economy; Popular resistance to Company's rule and Revolt of 1857: causes, nature, and results
510	History of Assam (1228-1826)	The objective of the course is to acquaint the students with the Sources of Assam history, Political Condition of the Brahmaputra Valley at the beginning of the 13th Century,Foundation and consolidation of Ahom Rule , The kingdom of Kamrup-Kamata, Rise and decline of the Kock kingdom, Mughal invasion and Ahom resistance, Zenith of the Ahom Rule and Internal Dissension, Political institutions, Society, Economy and Religion;Ahom and Koch administrative systems;Ahom Tribal Relations; and a Brief outline of Society, Economy and Religion.
511	History of Europe (1789-1870)	The objective of the course is to acquaint the students with The French Revolution, Rise and Fall of Napoleon, The Congress of Vienna,The European State System after Napoleon, Concert of Europe, Revolutions of 1830 and 1848 and their repercussions, Eastern Question, Napoleon III , and The Unification of Italy and Germany.
512	History of Science and Technology in Pre-Colonial India	The objective of the course is to acquaint the students with the Stone Age technology, Iron Age culture: Use of iron and its impact, Painted gray ware (PGW) and Northern Black polished ware (NBPW) cultures, Early developments in science and technology: Aryabhatta, Varahmihira, Brahmagupta, Bhaskara I, Charaka and Technological developments in Medieval period- Persian wheel, Agro.industries, metal technology, gun-powder, textiles, bridge-building etc. of India.
513	History of Great Britain (1485-1820)	The objective of the course is to acquaint the students with England under the Tudors: Transformation from feudalism to absolute monarchy, The Renaissance and Reformation in England, Colonial and Commercial development; England under the Stuarts: Conflict between the Crown and Parliament, The Establishment of the Commonwealth and Protectorate under Cromwell, The Restoration of monarchy; Constitutional Developments: Bill of Rights, Act of Settlement, Evolution of Cabinet system of government under the Hanoverians; and Industrialization and its Social impact.
514	History of China (1839-1949)	The objective of the course is to acquaint the students with China in the 19th Century: Condition of China before the advent of the imperialist powers, Canton commercial system; Opening of China: Opium Wars, treaties with the imperialist powers; struggle for concession in China , Increasing Western economic interest; Popular and Reform Movements:Taiping; self-strengthening and reforms in the Chinese states,Boxer Rebellion and its consequence; Emergence of Nationalism in China: Revolution of 1911, Sun Yet Sen, Emergence of the Republic; and Growth of Communism in China: Political crisis in the 1920's, Communist movement of 1928-1949, Mao Tse Tung.
615	India under the Crown	The objective of the course is to acquaint the students with British administrative changes after the Revolt of 1857: Act for the Better Government of India (1858), Queen's Proclamation, Provincial administration,Local Bodies, Changes in the Army; Cultural Awakening in the 19th century: Spread of Western Education-Emergence of Intelligentsia, Growth of Press,Social Reform Movements: Arya Samaj, Brahma Samaj, Prarthana Samaj, Theosophical Society, Aligarh Movement, Ramakrishna Mission; Indian Nationalism: Emergence of the Indian National Congress, Moderates and Extremists, Partition of Bengal and Swadeshi Movement, National Movement under Gandhi : Non-Co-Operation Movement, Growth of Revolutionary activities, Communal consciousness, Civil Disobedience Movement, Quit India Movement; Partition of India and Women's participation in the Freedom Struggle in India.

616	History of Assam (1826-1947)	Aim of the course is to acquaint the students with the Advent of the British into Assam, Administrative Reorganization under David Scott, Annexation of Lower Assam, Anti-British uprisings (1826-1830), Annexation of Upper Assam, Repercussions of the Revolt of 1857; Territorial Expansion: Cachar, Manipur, Jayantia Hills, Khasi Hills, Garo Hills, Naga Hills, Lushai Hill; Changes in the Economic structure:Agrarian System, Growth of modem industries- Tea, Coal and Oil, Development of Transport and Communication; and Political Awakening: Education, Press, Public Associations, National Movement in Assam-Swadeshi Movement, Non-Cooperation movement, Civil-Disobedience movement, Quit India movement and Role of women in the Freedom struggle in India.
617	History of Europe (1871-1945)	Aim of the course is to acquaint the students with the Internal developments in France: The Republican Constitution of 1875, Relations between the State and the Church, Internal Developments in Germany and Italy: Kulturkamph, Economic Developments in Germany, Socialism and the German Reich, Internal Developments in Italy; Internal problems of Russia up to 1917: Revolution of 1905, Revolution of 1917; World War I and aftermath: Factors responsible for the World War I, Peace settlement,The League of Nations: Achievements and Failures; and World War II: Origin, Entry of U S A, Defeat of the Axis Power.
618	World since 1945	Aim of the course is to acquaint the students with the UNO- Structure, Difference with the League of Nations, Peace-keeping and other activities of UNO, Cold War; Conflict in the Middle-East: Arab- Israel Conflict, Suez Crisis of 1956, Iran-Iraq war,The gulf war (1970-91); China- Korean War, Vietnam; and Africa after Decolonization- Problems of the African states: Ghana, South Africa.
619	History of Japan (1853-1941)	Aim of the course is to acquaint the students with the Tokuguwa Shogunate: End of Isolation, Commodore Perry and the Treaty of Kanagawa (1854),The Harris Treaty; Meiji Restoration: Processes of modernization in Social, Military, Economic and Political field, End of Feudalism,Meiji constitution; Emergence of Japan as a world power: Sino-Japanese Relations, Anglo-Japanese Alliance, Russo-Japanese war; and Japan between the two world wars:, Washington Conference, Rise of Militarism,Manchurian crisis and aftermath.
620	Project	Aim of the course is to acquaint the students with field study, collection of data, compilation of data and coming to a conclusion about the impact on society of the particular subject. It developes the idea of research among the students.
1.1	Early India up to 1200 A.D.	The objective of the course is to acquaint the students with Ancient Civilizations of India; Condition of India in the 6th century B.C; Emergence of Territorial States & Foreign invasions; Rise of Regional Powers in the Post Gupta period and Post Harshavardhana Polity.
2.2	Early Assam up to 1228 A. D.	The objective of the course is to acquaint the students with brief survey of the sources of ancient Assam; Ancient Assam Society, Economy,Religion, Political dynasties and Political Institutions.
3.3	History of India (1206-1526)	The objective of the course is to acquaint the students with Survey of Sources of medieval India; Foundation and consolidation of the Sultanate; Expansion of the Delhi Sultanate; The Rise of Provincial kingdoms; and State, Society and Economy of medieval India.
3.4	History of Assam (1228-1826)	The objective of the course is to acquaint the students with Rise of Territorial States:Foundation and consolidation of the Ahom kingdom, The kingdom of Kamrup-Kamata, Emergence of the Koch power; Ahom-Mughal Conflicts; Zenith of the Ahom rule;Decline and downfall of the Ahoms; and Political Institutions, Society and Economy of medieval Assam.
4.5	History of India (1526-1757)	The objective of the course is to acquaint the students with the Advent of the Mughals and territorial expansion; Rise of the Afghans under Sher Shah Sur and his administration; Mughal administration; Rise and disintegration of the Maratha power and the Advent of the Europeans.
4.6	History of Europe (1453-1815)	The objective of the course is to acquaint the students with the Transition of Europe from medieval to Modern Age; Renaissance and its impact on Europe;Reformation and its impact-Martin Luther, Zwingli and Calvin;Counter Reformation; Thirty Years' War; The French Revolution; Napoleon; and the Congress of Vienna.
5.7	History of India (1757-1857)	The objective of the course is to acquaint the students with the Background of the advent of the Europeans in India; Establishment and consolidation of the British as a political power; Administrative Policies and Reforms; British expansionist policies; and the Revolt of 1857.

5.8	History of Europe (1815-1945)	The objective of the course is to acquaint the students with Concert of Europe, Revolution of 1830,Revolution of 1848; Unificatiion of Germany and Unificatioin of Italy; Formation of Triple Alliance and Triple Entente, Russian Revolution of 1917; Causes of the First World War, League of Nations-Achievements and failure; Rise of Fascism and Nazism; and Circumstances leading to the Second World War.
6.9	History of India (1857-1947)	The objective of the course is to acquaint the students with the British administrative changes after the Revolt of 1857; Administrative reforms; Socio-Religious Reforms; National Awakening; and National Movement under Gandhi and Partition of India.
6.1	History of Assam (1826-1947 AD)	The objective of the course is to acquaint the students with the Advent of the East India Company in Assam and administrative changes made by them; Resistance to British Rule; British territorial expans; New awakening-Educatioin, , Press, Political Associations; and Highlights of the National Movement in Assam.
M 101	Descriptive Statistics –I	Upon completion of this chapter, students will be able to know the different types of data: Concepts of a statistical population and sample from a population; qualitative and quantitative data; nominal and ordinal data; cross sectional and time series data; discrete and continuous data; frequency and non-frequency data etc. One will also able to know about the Collection and Scrutiny of Data: Primary data-designing a questionnaire and a schedule; checking their consistency; Secondary data-their major sources including some government publications, Complete enumeration, controlled experiments, observational studies and sample surveys, Scrutiny of data for internal consistency and detection of errors of recording .Students will have an idea of cross-validation,Presentation of Data, Construction of tables with one or more factors of classification, Diagrammatic and graphical representation of non-frequency data, Frequency distributions, cumulative frequency distributions and their graphical and diagrammatic representation-column diagram, histogram, frequency polygon and ogives, Stem and leaf chart, Box plot, scatter diagram for bivariate data.Students will have an idea of quantitative Data: Univariate data, Concepts of central tendency, dispersion and relative dispersion, skewness and kurtosis and their measures including those based on quantiles and moments, Absolute moments, factorial moments, cumulants, Sheppard's corrections for moments for grouped data. Upon completion of this chapter,student will be able to Prepare of bivariate frequency table. They will understand the product moment correlation coefficient and its properties, Spearman's rank correlation co-efficient. Students will have a concepts of regression, principle of least squares and orthogonal polynomial. Students will have a brief idea about fitting of linear regression and related results, Correlation index, Fitting of curves reducible to polynomials by log and inverse transformation, Correlation ratio, and Intra-class correlation, Partial and Multiple correlation and regression.
M 102	Probability – 1	Upon completion of this chapter students will know what are random experiment,trial,sample point,sample space,events,mutually exclusive events,exhaustive events etc. These chapters will also enable us to know the mathematical,statistical and axiomatic definitions of probability.Reading this unit one will know the additive,multiplicative,Baye's theorem etc.Studying probability theory one will enable to solve some practical problems on probability. This unit enables us to understand random variable, probability mass function,probability density function,cumulative distribution function,marginal,conditional distribution etc.Also one can understand mathematical expectation,additive and multiplicative theorem of mathematical expectation,moment generating function,cumulant generating function etc.
M 103	Practical	Practical from topics in Paper M101 & M102

M 201	Numerical and Computational Techniques –I	Upon completion of this chapter one should be able to understand the changes that take place in the value of the dependent variable due to changes in the independent variable. Also will be able to define and understand the uses of different operators like Δ & E operators, derivation of fundamental theorem.One will be able to understand the meaning and uses of Interpolation and extrapolation.This chapter helps us in deriving various formulae of interpolation for equal intervals like Newton's forward and backward difference formulae.Also for unequal interval this chapter helps us in deriving different formulae such as Newton's divided difference,Lagrange's formula etc. This paper gives us a brief idea about the central Difference-its Operator's,different methods for determinig the value of the dependent variable by using Gauss's forward, backward, Bessel, Everret and Stirling formulae.Chapter inverse interpolation helps to obtain the value of independent variable corresponding to dependent variable.Chapter numerical differentiation helps us to know the process of finding the derivatives of a function at some particular value of the independent variable when the values of the function corresponding to the given value of the independent variable are known. After completion of this paper one may be able to derive various formulae for Numerical Integration like Trapezoidal Rule, Simpson's 1/3 rd and 3/8 th rule, Weddle's rule, Euler-Maclaurin's formula etc. This unit helps us to know about general properties of linear difference equation, linear difference equation with constant coefficient, roots of polynomial equations, and solution of simple problems by Newton- Raphson method, Bisection method, and Graphical method, Regula Falsi Method, Method of Iteration.
M202	Mathematical Method –I	This chapter provides the basic concept of various theorems of real analysis which are Roll's theorm Lagrange's and Cauchy's Mean value theorems, Taylor's theorem. Further from this course student will able to know about the maxima and minima, Point wise and uniform convergence. Furthermore the idea of limit, continuity and differentiability for both single and several variable.The course also provides the basic idea of Partial derivatives, applications of Lagrange's multipliers, Riemann Internal,Infinite and Improper integrals; Gamma and Beta integrals Jacobian transformation.
M203	Practical	Practical from Paper M201
M301	Mathematical Methods – II	This paper gives us a basic concept of matrices,how to write a co-efficient matrix from a set of linear equations.Upon completion of this paper one will have a clear understanding of special types of matrices viz square,null,upper and lower traingular,symmetric,skew symmetric hermitian,skew hermitian,orthogonal,idempotent,unitary and their related properties.After successfully completing this paper students will be able to perform differents matrix operations. After successful completion of this chapter students will be able to understand what is meant by inverse of a matrix,when a matrix is said to be invertible and related theorems;find out the inverse of a square matrix and also find out the value of the variables of set of linear equations by using inverse.This paper gives us basic concept about the rank of matrices and related theroms.Upon completion of this paper students will lear about elementary operations,elementary matrices, normal form of matrices;how E-operations are used to reduce matrices to normal form and then find the rank.Under invariance of rank students will have a clear understanding of row(column) rank under E-row(column) transformation,rank of product,equivalence of matrices and related theorems.On completing this paper students will be able to know what is meant by a system of linear equations,homogenous and nonhomogenous system of equations,consistency and its solution sets;know how to write down co-efficient and augmented matrix of a linear system.This paper also helps us in uderstanding the quadratic forms of matrices.One will have a clear understanding of positive definite, negative definite forms.Students will also be able to convert a given linear equation to quadratic forms
M302	Distribution – 1	On successful completion of the course student will be able to expalin and illustrate the concept of a discrete and continuous probability distribution and can able to enumerate the basic assumptions of several important discrete and continuous probability distribution and can write down their corresponding probability functions. Further they can learn how to derive moments, cumulants, m.g.f and various constants of both discrete and continuous probability distribution. Even upon completion of this chapter student will be able to apply probability distribution to a variety of problems in various diversified field.

M303	Practical	Practical from topics in Paper M301 & M302
M401	Mathematical Methods – 3 & OR – I	This paper gives us an idea of vectors and its properties.After completing this paper students will be able to perform addition of two vectors,multiplication of a vector by a scalar.They will have a brief idea of linear dependence and independence and linear combination of vectors,basis,dimention,hyperplan,convex setand their properties etc.They will be able to determine whether sets of vectors are linearly dependent or independent. This paper helps us to understand what is meant by Eigen values and Eigen vectors and also discuss their related theorems, Cayley-Hamilton theorem.After successful completion of this paper one should be able to find out the eigen values and eigen vectors of square matrix. At the end of this paper students will be able to formulate a given simplified description of a suitable real world problem as a linear programming model in general,standard and cannonical forms;Sketch a graphical representation of two dimentional linear programming model; Conceptualize the feasible region;Solve a two dimentional linear programming problem graphically and by using simplex method.This chapter helps us to learn the limitations and advantages of LPP. Upon the completion of this paper one may be able to become familiar with transpotation problem,different types of problems that can be solved by using different transportation model methods eg. north-west corner method,Vogel's Approximation Method etc;be able to develop linear progrmming models of transportation problem;one willbe able to know how to handle the case of unequal supply and demand.
M402	Descriptive Statistics 2 & Probability – 2	After completion of this chapter one is able to understand what are sampling theory,population,sample,parameter,statistic,sampling distribution,hypothesis,null and alternative hypothesis.One also will know the steps of test of significance and large sample tests- normal test etc.One will able to obtain standard error of means, proportion, moments (raw and central moments), standard error of simple function of moments etc. This unit enables us to know what are Characteristic function and its properties,Central Limit Theorem: De – Moivre's and Levy Lindeberg , Chebyshev's lemma, WLLN with proof and applications, Bernoulli's law of large Numbers. Liaponenef's This unit enables one to know about stochastic processes -Its applications in various fields – other than mathematical applications, classification of general stochastic process into discrete / continuous time, discrete / continuous state space, elementary problems,Markov chain, transition probability matrix- its construction and applications, Chappman Kolmogorov equation, classification of states etc.
M 403	Practical	Practical from paper M401 and M402
M501	Sampling Distribution and Statistical Inference – I	This unit helps us to derive the distributionof χ 2 , x, s2 ,t, r,and, F – Their properties, interrelationship and applications. Order statistics chapter gives us an idea of order statistics and their uses,derivation of the distribution of rth ordered statistic, joint distribution of the rth & sth order statistics, distribution of sample range and sample median etc. Point estimation helps us to know the properties of good estimators-unbiasedness, consistency, efficiency, sufficiency. Also gives the idea of Mean square error, Minimum Variance Unbiased Estimator, Crammer Rao lower bound and related results. Upon completion of this chapter students will be able to estimate the value of the parameter by using Methods of maximum likelihood, Method of Moments, Method of Minimum chi-square etc.

M502	Sample Survey	Upon completion of this chapter students will have an idea about statistical population, sample,population and sample size,parameter and statistic. Students will have the basic concept on Sampling, Census and survey work,sampling frame and sampling unit. These chapter will enable us to know about various sampling techniques-Simple Random Sampling, Stratified Random Sampling, Cluster Sampling, Systematic Sampling, Double sampling, sampling with probability proportional to size. This unit enables us to understand the Estimates of population total and mean, bias in estimates, standard error of estimates, Ratio and regression method of estimation .This unit helps us to know about the Cost and variance functions.They will be able to find out the optimum size and structure of sampling units.Also one can understand the proportional and optimum allocation in stratified random sampling,Non sampling errors and their control.
M503	Applied Statistics–I	Having successfully completed this paper student will be familiar with different types of index numbers e.g. index numbers of wholesale prices, cost of living index numbers (CLIN) and index of production (agricultural and industrial) numbers.Further they will be able to draw Comparison of CLIN over time.Students will be able to learn different methods which are used in constructing an index number.They will be able to construct simple price,quantity and value indexes etc. This course provides basic idea of econometrics and their scope and limitations.Further they will learn about Income distributions. Pareto's curve, Measures of inequality-Gini's coefficient and Lorenz curve, and concentration curve. Student can able to determine the relation between variables, Linear model.They can also learn Least square assumptions ,how to estimate regression parameters their test of significance and confidence interval.Furthermore student will get the idea of multicollinearity,autocorrelation & Heteroscedasticity. From this chapter student will learn about demand analysis,elasticity of demand,analysis of demand by time series and family budget data and Engel curve. This paper aims to provide students with a working knowledge of time series.They would know how to use them in examining financial processes.After completion of this course student will be able to characterize the basic properties of a time series and decompose it into a trend,seasonal,cyclical,irregular etc.The students would get acquainted with different methods of determination of trend and seasonal variation.Further they will have a basic idea of correlogram and periodogram.they will have concepts of forecasting and its applications.

M504	Operations Research – II	After successful studying this chapter student should be able tounderstand the fact that replacement of depreciable assests is necessary.They will be able to formulate different replacement theory. Also one can understand the replacement policy for goods whose cost of maintenance increases with time and the value of money also changes at a constant rate at that time. Students will be able to understand the mechanism behaind sudden failure of systems also have a brief idea of group replacement policy. This chapter helps us to understand what is inventory management problem,why do we need inventory control,the nature and importance of Inventories,different types of Inventories.Also one may have a brief idea about the different functions and costs associated with Inventory control-stock holding cost,storage space cost, depreciation costs,pilferage cost , record keeping cost, handling cost etc.Uponcompletion of this chapter student will know the major reasons for holding inventories.After completing this chapter students will be able to determine the economic order quantity through various models such as- Deterministic model policy when inventory levels are reviewed continuously and demand occurs uniformly with and without shortage cost, Economic order quantity for production planning when inventory models are reviewed periodically with and without shortage etc.Students will be able to conduct an ABC analysis of Inventory items. This chapter gives us an Idea of Arrows, Network node, activities, dummy activity. After succussful reading this chapter one should be able to construct network diagrams basically by using Activity on node diagram or Activity on arrow diagram. This chapter gives a brief idea about Network scheduling using CPM and PERT.Students will be able to learn how to define a project in terms of activities such that a network can be used to describe the project. One may be able to understand How compute the critical path and the project completion time also able to calculate different types of floats and slacks. This chapter also gives a brief idea of usefulness of PERT and CPM, optimistic time, pessimistic time and most likely time etc.
M505	Practical from paper M501 & M502	Practical from paper M501 & M502
M506	Practical from paper M503 & M504	Practical from paper M503 & M504
M601	Statistical Inference 2	After successful completion of this paper students will have working knowledge of confidence interval and confidence co-efficient, confidence intervals for parameters of univariate normal & two independent normal; Students will be able to find out the confidence interval and confidence limits of parameters Upon completion of this paper one should be able to understand various concepts related toTesting of Hypothesis such as Statistical Hypothesis—its different types, Statistical tests, critical region, errors of Type I and Type II , Size & Power of a test,Most Powerful, and Uniformly Most Powerful tests etc. Students will be able to explain various steps involved in testing of hypothesis ; Understand the concept of optimum test under different situations.This paper discuss Neyman Pearson Lemma and its application in testing hypothesis regarding univariate normal distribution, Power curves of UMP tests with simple illustrations. This paper elaborate the concept of Likelihood ratio test and its use in developing various tests and significance. On completion of this paper students should be able to understand the concepts related to the testing of hypothesis using Non-Parametric Tests-its application.This paper gives us an idea of contingency and association,theoretical and practical knowledge on the analysis of non parametric test.This paper helps students in identifying the appropriate non parametric hypothesis testing procedure based on type of outcome variable and number of samples.After completing this paper students will be able to perform chi-square test, Kolmogrov-Smirnov test (one and two samples), Run test (one and two samples), Sign test for location of univariate and bivariate population, median test, Spearman rank correlation, Kendall's Tau, Wilcoxon-Mann-Whitney test, Wilcoxon signed rank test etc.

M602	Design of Experiments	In this paper students will learn What is meant by Analysis of variance; linear models associated with AOV. Students will learn how to use one-way AOV to test for differences among the means of several groups;how to use two way AOV and interpret the interaction effect; how to perform multiple comparisons in a one way AOV and a two way AOV.Students will learn different applications of AOV in detail, violation of assumptions in AOV, transformation ,study of relationship between two variables.Students will also have some basic Idea of one way and two way classified data, Application of AOCOV. This chapter provides concepts and methods of design of experiment .After completion of this paper students will understand the different terminologies and principles of experimental designs. They will be able to define techniques of error control, choice of size, shape and structure of experimental units, grouping of experimental units etc.This paper also provides a clear understanding of completely randomized design, randomized block, Latin square designs, and their affiances, Factorial experiments. Upon completion of this paper one may be able to understand confounding in Factorial experiments, Total and Partial; balanced confounding, confounding of main effects: Split plot arrangements,techniques for analysis of experiments with one missing yields (RBD & LSD).
M603	Applied Statistics – 2	This chapter gives us a basic concept on population Census in India and in the state of Assam. Functions of NSSO and CSO, National Statistical Commission (NSC) Simple Registration system. After successful completion of this paper students will have an idea of demographic data-its sources, vital rates, crude birth rates, general fertility rates, age specific fertility rates, total fertility rate, gross and net reproduction rates, crude death rate, age specific mortality rates, infant mortality rate, complete life table- concepts, different columns & their relationships, Standardised rates, idea of abridged life table without construction, Population Projection by Logistic curve and its fitting, Basic idea of Stable and Stationary population.This paper introduce the basic Ides of Biostatistics & Epideniology. Upon completion of this chapter students will have a theoretical as well as practical knowledge of statistical quality control.Students will be able to understand tolerance limit,use of statistical process control.Students will be able to describe uses of control charts x, Rcharts, p and c charts, and group control charts etc;explain the process of Acceptance sampling and describe the use of O.C . and A.S.N. functions.This paper gives a brief idea of Sampling by attributes and variables.After completing this paper one will be able to learn Uses of Dodge- Romig and other tables.
M604	Computer Programming and Multivariate Analysis	upon completion of this paper student will be able to derive Bivariate Normal Distribution, Marginal and Conditional distributions, independence; Multivariate Normal distribution, marginal and conditional distribution, independence, characteristic function etc.Further they have an idea of Hotelling T2 and its application.Students will be able to illustrate mean, Variance, Covariance of Multinomial distribution. The aim of this paper is to introduce the concepts and idea involved in problem solving with Fortran 77 using an interactive timesharing computer system.At the beginning this paper gives us basic idea of different parts of a computer, brief idea of software, hardware; high level languages,Flowchart symbols and their uses, construction of Algorithms,etc. Further students will learn what is meant by Fortran constants, Fortran variables (real and integer).Students will be well acquainted with different types of declaration statements, arithmetic operations, hierarchy of operations, real, integer and mixed mode arithmetic, use of simple built-in library functions, simple input-output statements without format statement, use of DO loops, Nested Do loops and While-Do statement etc. They will be able to write small programs for determination of commonly used statistical measures and for carrying out simple statistical analysis.
M605	Practical	Practicals based on Design of Experiments, Testing of Hypothesis, Non Parametric, & Demography.

M606	Project	Students will be required to go for data collection on some topics. Selection of the topic , sampling plan and data collection will have to be done under guidance of teachers of the department. On the basis of this data collection exercise, each student will be required to submit a project report. Among other things, this project report should contain details of the topic, the hypotheses to be tested, the sampling plan, and details of data collection. It should also contain analysis and results of the study. While data collection may be done in a group, the analysis, conclusion and report writing would have to be done individually by each student under guidance of a teacher of the department. The external examiner will examine the report and also carry out a viva voce examination. Based on the report and the viva voce of the report, marks will be assigned as per project scheme of GU for TDC.
E 101/E 102/E 103	Descriptive Statistics and Finite Difference	Upon completion of this chapter, students will be able to know the different types of data: Concepts of a statistical population and sample from a population; qualitative and quantitative data; nominal and ordinal data; cross sectional and time series data; discrete and continuous data; frequency and non-frequency data etc. One will also able to know about the Collection and Scrutiny of Data: Primary data-designing a questionnaire and a schedule; checking their consistency; Secondary data-their major sources including some government publications, Complete enumeration, controlled experiments, observational studies and sample surveys, Scrutiny of data for internal consistency and detection of errors of recording .Students will have an idea of cross-validation,Presentation of Data, Construction of tables with one or more factors of classification, Diagrammatic and graphical representation of non-frequency data, Frequency distributions, cumulative frequency distributions and their graphical and diagrammatic representation-column diagram, histogram, frequency polygon and ogives, Stem and leaf chart, Box plot, scatter diagram for bivariate data.Students will have an idea of quantitative Data: Univariate data, Concepts of central tendency, dispersion and relative dispersion, skewness and kurtosis and their measures including those based on quantiles and moments, Absolute moments, factorial moments, cumulants, Sheppard's corrections for moments for grouped data. Upon completion of this chapter one should be able to understand the changes that take place in the value of the dependent variable due to changes in the independent variable. Also will be able to define and understand the uses of different operators like Δ & E operators, derivation of fundamental theorem.One will be able to understand the meaning and uses of Interpolation and extrapolation.This chapter helps us in deriving various formulae of interpolation for equal intervals like Newton's forward and backward difference formulae.Also for unequal interval this chapter helps us in deriving different formulae such as Newton's divided difference,Lagrange's formula etc. After completion of this paper one may be able to derive various formulae for Numerical Integration like Trapezoidal Rule, Simpson's 1/3 rd and 3/8 th rule,Newton-Raphson Method etc. Having successfully completed this paper student will be familiar with different types of index numbers e.g. index numbers of wholesale prices, cost of living index numbers (CLIN) and index of production (agricultural and industrial) numbers.Further they will be able to draw Comparison of CLIN over time.Students will be able to learn different methods which are used in constructing an index number.They will be able to construct simple price,quantity and value indexes etc.
E 201/E 202/E 203	Probability and Distribution	Upon completion of this chapter students will know what are random experiment,trial,sample point,sample space,events,mutually exclusive events,exhaustive events etc. These chapters will also enable us to know the mathematical,statistical and axiomatic definitions of probability.Reading this unit one will know the additive,multiplicative,Baye's theorem etc.Studying probability theory one will enable to solve some practical problems on probability. This unit enables us to understand random variable, probability mass function,probability density function,cumulative distribution function,marginal,conditional distribution etc.Also one can understand mathematical expectation,additive and multiplicative theorem of mathematical expectation,moment generating function,cumulant generating function etc.Upon completionof this paper students will have an idea of different measures of location,dispersion of random variable,chebyshev's inequality,central limit theorem,weak law of large number.This chapter gives basic concept about distributions viz Bernoulli,Binomial,Poisson,Normal etc.

E 301/E 303/E 306	Applied Statistics I & Correlation Regression	After successful completion of this paper students will have an idea of demographic data-its sources, vital rates, crude birth rates, general fertility rates, age specific fertility rates, total fertility rate, gross and net reproduction rates, crude death rate, age specific mortality rates, infant mortality rate, complete life table- concepts, different columns & their relationships, Standardised rates, idea of abridged life table without construction. This chapter gives us idea of population,sample,estimate,parameter,statistics,sampling distribution,standard error etc. Upon completion of this paper one should be able to understand various concepts related toTesting of Hypothesis such as Statistical Hypothesis—its different types, Statistical tests, critical region, errors of Type I and Type II.This unit helps us to derive the distributionof χ^2 ,t and F – Their properties, interrelationship and applications. After successful completion of this paper students will have working knowledge of confidence interval of sample mean and proportion,measures of association & contingency.Upon completion of this chapter,student will be able to understand the product moment correlation coefficient and its properties.Students will have a concepts of regression, principle of least squares Students will have a brief idea about fitting of linear regression and related results,Partial and Multiple correlation and regression,ordinary least estimation.
E 302/E 304/E 307	Practical paper	Practical from theory paper E 401/E 403/E 406
E 401/E 403/E 406	Sample Survey and Design of Experiments	Upon completion of this chapter students will have an idea about statistical population, sample,population and sample size,parameter and statistic. Students will have the basic concept on Sampling, Census and survey work,sampling frame and sampling unit. These chapter will enable us to know about various sampling techniques-Simple Random Sampling, Stratified Random Sampling, Cluster Sampling, Systematic Sampling, Double sampling, sampling with probability proportional to size. In this paper students will learn What is meant by Analysis of variance; linear models associated with AOV. Students will learn how to use one-way AOV to test for differences among the means of several groups;how to use two way AOV and interpret the interaction effect; how to perform multiple comparisons in a one way AOV and a two way AOV.Students will learn different applications of AOV in detail, violation of assumptions in AOV, transformation ,study of relationship between two variables. This chapter provides concepts and methods of design of experiment .After completion of this paper students will understand the different terminologies and principles of experimental designs. They will be able to define techniques of error control, choice of size, shape and structure of experimental units, grouping of experimental units etc.This paper also provides a clear understanding of completely randomized design, randomized block, Latin square designs, and their affiances, Factorial experiments.
E 402/E 404/E 407	Practical paper	
E 5.1	Distribution Theory and Applied Statistics	Upon completion of this chapter students will have an idea of statistical distribution viz Beta, Gamma,exponential,uniform,hypergeometric,geometric,negative binomial etc.This paper aims to provide students with a working knowledge of time series.They would know how to use them in examining financial processes.After completion of this course student will be able to characterize the basic properties of a time series and decompose it into a trend,seasonal,cyclical,irregular etc.The students would get acquainted with different methods of determination of trend and seasonal variation.From this chapter student will learn about demand analysis,elasticity of demand,analysis of demand by time series and family budget data and Engel curve.Further they will learn about Income distributions. Pareto's curve, Measures of inequality-Gini's coefficient and Lorenz curve.At the end of this paper students will be able to formulate a given simplified description of a suitable real world problem as a linear programming model in general,standard and cannonical forms;Sketch a graphical representation of two dimentional linear programming model; Conceptualize the feasible region;Solve a two dimentional linear programming problem graphically.This chapter helps us to learn the limitations and advantages of LPP.
E 502/E 503	Practical paper	Practicals from theory paper 5.1

E 601/E 604	Estimation	Point estimation helps us to know the properties of good estimators- unbiasedness, consistency, efficiency, sufficiency. Upon completion of this chapter students will have a theoretical as well as practical knowledge of statistical quality control.Students will be able to understand tolerance limit,use of statistical process control.Students will be able to describe uses of control charts x, Rcharts, p and c charts, and group control charts etc;explain the process of Acceptance sampling and describe the use of O.C . and A.S.N. functions. This course provides basic idea of econometrics and their scope and limitations.Further they will learn about Income distributions. Pareto's curve, Measures of inequality-Gini's coefficient and Lorenz curve, and concentration curve. Student can able to determine the relation between variables, Linear model.They can also learn Least square assumptions ,how to estimate regression parameters.The aim of this paper is to introduce the concepts and idea involved in problem solving with Fortran 77 using an interactive timesharing computer system.At the beginning this paper gives us basic idea of different parts of a computer, brief idea of software, hardware; high level languages,Flowchart symbols and their uses, construction of Algorithms,etc. Further students will learn what is meant by Fortran constants, Fortran variables (real and integer).Students will be well acquainted with different types of declaration statements, arithmetic operations, real, integer and mixed mode arithmetic, simple input-output statements without format statement, use of DO loops, Nested Do loops and While-Do statement etc. They will be able to write small programs for determination of commonly used statistical measures and for carrying out simple statistical analysis.
E 602/E 605	Practical paper	Practicals from theory paper E 601/E 604
M 104	Rksamhita, Atharva- samhita Vidma Sarasya and Tarkasamgraha	a. Rksamhita (1.1 and 1.2), b. Atharva- samhita Vidma Sarasya- These two are Vedic Texts. The students are expected to get acquainted with the Vedic Literature, specially the Rigveda, the first book of India. (1.2), c. Tarkasamgraha (Pratyaksa Khanda)-It is aimed to give an introduction to Indian Philosophy by this Text.
M 105	Raghuvamsa, Canto 1, Svapnavasavadattam and Laghusiddhantakaumudi (Samjna)	a. Raghuvamsa, Canto 1- This is a famous work of Kalidasa. It reflects the poetic embellishment as well as the nice story of the Ramayana from ancient Indian Classical literature. b. Svapnavasavadattam- It is a drama ascribed to Bhasa which aims at giving an introduction to Indian Theatre in ancient era. c. Laghusiddhantakaumudi (Samjna) – This text is an introductory part of the grammar in Sanskrit Language. Knowledge of Grammar is mandatory towards the communication of any language.
M 204	History of Classical Sanskrit Literature, Laghusiddhantakaumudi and General Grammar	a.History of Classical Sanskrit Literature (Ornate poetry, Lyrics, Historical kavyas)- The origin and development of Sanskrit language and literature is briefly discussed in this content. b. Laghusiddhantakaumudi (Sandhi and karaka- vibhakti)- This text aims at highlighting the word construction as well as making of Sanskrit sentence. c. General Grammar – The students will be acquainted with the formation of Sanskrit language in this portion of syllabus.
M 205	Hitopadesa, Chandomanjari, Translation and Composition in Sanskrit	a. Hitopadesa, ed. by M.R. Kale (Mitralabha)- The tales, fables etc. are of high value towards character building of human being. This book gives lessons for moral education for human life with some short story methods. b. Chandomanjari (Samavrttas only – Anustup, Drutavilambita, Bhujangaprayata, Indravajra, Upendravajra, Vamsasthavila, Sikharini, Vasantatilaka, Sardulavikridita) – The very nature of poetry is rhythmic. This book opens with the various formations of Sanskrit metre as a part of prosody. c. Translation (from English to Sanskrit, unseen)- The students will be practisedto translate someunseen Sanskrit sentence to English language. d. Composition in Sanskrit –General skills of sentence construction is dealt in this portion of syllabus.
M 304	Ramayana, Mahabharata and Comprehension	a. Ramayana (Balakanda ch – I)-This treatise is considered as the adikavya (the first book) of Classical Sanskrit literature. Literary knowledge and poetic skill are discussed in this content. b. Mahabharata (Santiparvan, chapter 191 – Asramadharma)- The dharmasastra of India is elaborately taught with special reference to the Santiparvan. c. Comprehension (Arthavabodha) : This item of the syllabus is generally meant to develop the skill of framing question and answer thereof a passage of Sanskrit write-up.

M 305	Sahityadarpana Chapter I and VI and Laghusiddhantakaumudi	a. Sahityadarpana Chapter I and VI- This treatise is on Indian poetics. The nature of poetry and dramaturgy is dealt here. b. Laghusiddhantakaumudi Pratyayas: (Krt = Ktvac, Tumun, Nyat, Yat, Kta, Ktavatu,Lyap, Satr, Sanac, Tavya, Aniya, Taddhita = Matup, In, Thak,Ta, Tal Stri = Tap, Nip)– In this selected portion of grammar, the syntax and semantics are exercised.
M 404	History of Sanskrit Literature, Brief Sketches of Indian Philosophical Systems and Tarka-samgraha	a. History of Sanskrit Literature, (Dramas – Bhasa, Kalidasa and Bhavabhuti, Prose, Romance, Tales and Fables) – The origin and development of Indian drama and prose literature is discussed. The students will be taught the beginning of Sanskrit drama. b. Brief Sketches of Indian Philosophical System – An introduction of Indian philosophy with orthodox and heterodox schools is approached to the students. c. Tarka-samgraha (Anumana-khanda) – This book is on Indian philosophy. A critical idea on inference is given here and students are expected to get introduced with different types of valid knowledge.
M 405	A Handbook of Sanskrit Philology by S.R. Banerjee Chapter I,II,III, Sentence Interpretation in Mimamsa and Introduction to Indian Arts by A.K. Coomarswamy	a. A Handbook of Sanskrit Philology by S.R. Banerjee, Chapter I,II,III (Sections 14 and 15) – This book is on Sanskrit linguistics. The comparative philology of Sanskrit language as a family of Indo European Languages is taught. b. Sentence Interpretation in Mimamsa by Prof. R.N. Sarma- Formation of words and meaning of the sentence are discussed critically. c. Introduction to Indian Arts by A.K. Coomarswamy, (Chapter – Rajput Painting, Gupta, Dravidian and Aryan, Great Enlightenment) – The Indian Art and sculpture is of late origin. The history of creative mind for expressing inner thought in paintings is of great value. The paintings of different periods are discussed here so that students can have an idea of ancient Indian Art.
M 501	Rksamhita – Indra – sukta (II.12), Devisukta (X.125), Samjnanasukta (X.191) and Satapathabrahmana – Manu-matsya-katha	a. Rksamhita – Indra – sukta (II.12), Devisukta (X.125), Samjnanasukta (X.191) b. Atharvasamhita – Bhumisukta (XII.1.1.10) c. Satapathabrahmana – Manu-matsya-katha (Vedic Selection part II)- These three are vedic Texts. The rich vedic literature is discussed here with the skill of vedic chanting.
M 502	Kavyaprakasa – Ullasa I, Sahityadarpana: Ch. X and Kavyamimamsa : Ch. I	a. Kavyaprakasa – Ullasa I, b. Sahityadarpana: Ch. X (Arthalankaras only) c. Kavyamimamsa : Ch. I – These are all treatises on Indian poetics. The nature and scope of poetry with different characteristics are discussed for the knowledge of Indian Aesthetics.
M 503	Kadambari and Abhijnanasakuntalam	a. Kadambari (Kathamukham: asitasesa-narapati ……yadikautuhalam)- This is a famous work on prose literature of Sanskrit language. The basic of Sanskrit prose is introduced as well as literary estimation there. b. Abhijnanasakuntalam– This drama of Kalidasa is opus magnum in literature. The students trained in reading and acting in Sanskrit drama apart from gathering literary knowledge with strict adherence to Sanskrit dramaturgy.
M 504	Kiratarjuniyam – canto I, Kumarasambhavam – canto III and Nitisatakam (1-30 verses)	a. Kiratarjuniyam – canto I b. Kumarasambhavam – canto III- These two books are included in Pancamahakavya (a group of five pieces of poetry). c. Nitisatakam (1-30 verses)- The value education and spiritual learning of human life are taught here.
M 505	Kathopanisad (Adhyaya – I), Niruktam (Daivata-kanda) and Essential Vedic Grammar	a. Kathopanisad (Adhyaya – I)- The wisdom of metaphysics and other philosophical aspects are discussed here. b. Niruktam (Daivata-kanda) This is meant for interpretation of vedic words towards its formation and etymological meaning. c. Essential Vedic Grammar- This is essentially a study of structure of vedic word with relevant aphorisms where students can get a knowledge of grammatical rules.
M 506	Sarvadarsanasamgraha of Madhavacarya and Samkhyakarika with Gaudapada-bhasya	a. Sarvadarsanasamgraha of Madhavacarya (Carvakadarsana and Paninidarsana)- This book is on Carvaka philosophy and paninian philosophy where heterodox school of Indian thought and main tenets of sentence interpretation in Sanskrit are discussed. b. Samkhyakarika with Gauda.pada-bhasya (upto verse no. 14)- The cosmology of the creation is dealt with herein where origin of the universe is discussed.

M 601	Srimad-bhagavadgita and History of Indian Philosophy	a. Srimad-bhagavadgita (chapter VIII Aksarabrahmayoga)–This content throw a light on ethics of human life. b. History of Indian Philosophy (Advaita Vedanta and Bauddha Philosophy) – God is one and unique – this is the doctrine of Advaita Vedanta where the students have a scope to learn about deep philosophical knowledge. The Bauddha Philosophy deals four noble truths where human beings are advised to find the true value of life.
M 602	Vastuvidya: Brhatsamhita, Vrksayurveda: Brhatsamhita and Lilavati ch. I (upto ghanavidhi)	a. Vastuvidya: Brhatsamhita (chapter 53, 1-41), b. Vrksayurveda: Brhatsamhita (ch.55)- This portion of syllabus aims at highlighting the aspects of Indian Architecture as well as health of trees and plants. c. Lilavatich. I (uptoghanavidhi)- The ancient Indian Mathematics are dealt in this books. The students are expected to know the various formula of vedic mathematics.
M 603	Caraka-samhita (Sutrasthana, Dirghajivitaya) and Information Technology	a. Caraka-samhita (Sutrasthana, Dirghajivitaya) – In this portion, the utility of the medicinal plants are discussed. b. Information Technology Major components of a computer: i) Main memory, ii) Secondary Memory, iii) Key-board, iv) Monitor, v) Mouse, vi)Printer, vii)Secondary storage devices (floppy. Hard-disk and optical-disk), viii) Hardware and software ix) What is operating system?, x) Bootstrapping of computer, xi) Concept and Machine Language and high level languages, xii) What are compilers, interpreters, assembler, linkers and loader?, xiii) Different types of operating system.- These items are the basics of computer through which it is expected to provide introductory knowledge of computer.
M 604	Sahityadarpana and Elements of the Science of Language by Taraporewalla	a. Sahityadarpana – ch. II – There are different varieties of poetry which are elaborately stated here. b. Elements of the Science of Language by Taraporewalla Selected Topics: Main characteristics of IE Language, Growth of Languages, Analogy, Classification of vowels, phonetic laws, Grassmann's Law, Grimm's Law, Verner's Law; Ablout, Vowel Gradation in Sanskrit – These are of Sanskrit linguistics which keep the learners abreast of the phonology and morphology of Sanskrit language.
M 605	Paribhasa-prakarana from Bhattoji Diksita's Siddhantakaumudi, Sahityadarpana, ch. IX and Survey of Astronomy, Mathematics, Medicine and Architecture	a. Paribhasa-prakarana from BhattojiDiksita'sSiddhantakaumudi – This unit throws a light on technical terms of Sanskrit grammar. b. Sahityadarpana, ch. IX– The different writing styles as called diction of any poet are exhibited in this text. c. Survey of Astronomy, Mathematics, Medicine and Architecture – The aim of this unit is to disseminate knowledge of ancient Indian Astronomy, Mathematics, Medicine and Architecture in present context.
M 606	Kautilya's Arthasastra-Adhikarana I and Naradasmrti	a. Kautilya'sArthasastra-Adhikarana I (Vidyasamuddesa, Brddhasamyoga, Amatyaniyoga, Mantradhikara) – The ancient Indian economic system, social condition etc. are critically analysed in this unit. b. Naradasmrti (Adhyaya I and Adhyaya iv on Dayabhaga) – The aim of this portion is to highlight the rule of dividing inherent property to claiments.
E 101	Political History of Ancient India – I	a. Rksamhita(1.1 and 1.2) – In this unit, the students are expected to get acquainted with the Vedic Literature, specially the Rigveda, the first book of India. b. Tarksamgraha (PratyaksaKhanda) - It is aimed to give an introduction of Indian Philosophy by this Text.
E 201	Political History of Ancient India – II	a. Raghuvamsa,Canto -1 - This is a fomous work of Kalidasa. It reflexes the poetic embellishment as well as the nice story of the Ramayana from ancient Indian Classical literature. b.Svapnavasavadattam - It is a drama ascribed to Bhasa which aims at giving an introduction to Indian Thetre in ancient era. c.Laghusiddhantakaumudi (Samjna only) - This text is an introductory part of the grammar in Sanskrit Language. Knowledge of Grammar is mandatory towards the communication of any language.

E 301	Epigraphic Studies - I	a. History of classical Sanskrit literature (Ornate Poetry, Lyrics, Historical Kavya) - The origin and development of Sanskrit language and literature is briefly covered in this content. b. Laghusiddhantakaumudi (Sandhi and Karaka-vibhakti)- This text aims at highlighting the word construction as well as making of Sanskrit sentence. c. General Grammar - The students will be acquainted with the formation of Sanskrit language in this portion of syllabus.
E 302	Epigraphic studies – II	a. Hitopadesa, ed by M.R,Kale (Mitratabha) - The tales, fables etc. are of high value towards character building of human being. This book gives lessons for moral education for human life with some short story methods. b. Chandomanjari (Samavrttas only - Anustup, Drutavilambita, Bhujangaprayata, Indravajra, pendravajra,Vamsasthavila,Sikharini, Vasantatilaka, Sardulavikridita) c. Translation (from English to Sanskrit, unseen) - The students will be practiced to translate some simple unseen Sanskrit sentence to English language. d. Composition in Sanskrit – General skills of sentence construction is dealt in this portion of syllabus.
E 401	An Introduction to the History of Ancient Indian Art And Architecture part – I	a.Ramayana (BalakandaCh.I) – This treatise is considered as the adikavya (the first book) of Classical Sanskrit literature. Literary knowledge and poetic skill are discussed in this content. b.Mahabharata (Santiparvan, Ch -191 Asramadharma) - The dharmasastra of India is elaborately taught with special reference to the Santiparvan. c. Comprehension (Arthavabodha) - This item of the syllabus is generally meant to develop the skill of framing question and answer thereof a passage of Sanskrit write-up.
E 402	An Introduction to the History of Ancient Indian Art and Architecture Part-II	a.Sahityadarpana Chapters - I & VI - This treatise is on Indian poetics. The nature of poetry and dramaturgy is dealt here. b. Laghusiddhantakaumudi Pratyayas: (Krt = Ktvac, Tumun, Nyat, Yat, Kta, Ktavatu,Lyap, Satr, Sanac, Tavya, Aniya, Taddhita = Matup, In, Thak,Ta, Tal Stri = Tap, Nip) – In this selected portion of grammar where syntax and semantics are exercised.
E 503	Abhijnana Sakuntalam upto Act 4, Kiratarjuniyam – Canto I	a. Abhijnanasakuntalam (upto Act – IV) - This drama of Kalidasa is opus magnum in literature. The students trained in reading and acting in Sanskrit drama apart from gathering literary knowledge with strict adherence to Sanskrit dramaturgy. b. Kiratarjuniyam (canto I)–This unit aims at highlighting the literary concept of Bharavi with story of mahabharta.
E 504	Jaymati Kavya, History f Sanskrit Literature, Nitisatakam (1-30 Verse)	a. JayamatiKavya of BhavadevaBhagavati – This is a famous work on historical episode of Assam. The learners are required to possess knowledge of Assam history side by side while studying this poetry. b. History of Sanskrit Literature (Dramas of Bhasa, Kalidasa and Bhavabhuti, Prose-romance, Tales and Fables) – The origin and development of Indian drama and prose literature is discussed. The students will be taught the beginning of Sanskrit drama. c. Nitisatakam (1-30 verses) - The value education and spiritual learning of human life are taught here.
E 604	Dasakumaracharita, Sahitya Darpan (Chapter 10), Functional Sanskrit	a. Dasakumaracarita (Rajavahana- carita) – This unit is for the knowledge of prose literature in Sanskrit describing various kings of ancient India. b. Sahityadarpana - ch. X, (Selected Alankaras: Upama,Ananvaya, Rupaka, Utpreksa, Drstanta, Nidarsana, Arthantaranyasa, Samasokti, Vibhavana, Tulyayogita)- The nature and scope of ornate poerty with apt illustration of figure of speech are found to be highlighted here. c. Functional Sanskrit–Concept of writing Application, report, news item etc. in Sanskrit language are discussed.
E 605	Kadambari , Basabadatta, Kumarasambhawam(Canto 3)	a. Kadambari (Sukanasopadesa), b. Vasavadatta (Kandarpaketu- Vasavadattasamvada) – These two works are of Sanskrit prose literature where the learners are expected to have an idea of advance prose. c. Kumarasambhavam – canto III – This unit exhibits fine poetry of Kalidasa with proper aesthetic beauty in which the learners are required to exercise some nice pieces of suggestive meanings.

M 104	Logic I	This paper will acquaint the students of philosophy as discussed in logical tradition.This paper will discuss topics on the logical form,argument, truth and validity logical constants,truth function,truth table method.This paper will discuss the concepts of union,modern classification of propositions.	
M105	Epistemology and Mataphysics I	This paper will discusss with nature and scope of Philosophy,knowledge by Acquaince & Knowledge by description.Realism,Naïve and scientific,Idealism-Subjective and objective.	
M 204	Logic II	This paper will discuss topics on shorter truth tables method,formal proof of validity,standard form of categorical syllogism,venn diagram,testing syllogisms.This paper will discuss the quantifcation,universal and existential propositions.	
M 205	Epistemology and Mataphysics II	This paper is related with the theories of truth,correspondence,coherence and pragmatic,substance casuality,space and time,freedom and determinism,Rejection of Metaphysics.	
M 304	Indian Philosophy I	This paper will acquaint the students of Philosophy as discussed Astica,Nastika,characteristics of Indian philosophy,upanisadic philosophy,Carvaka,Jainism and Buddhism.	
M 305	History of Modern Western Philosophy I	This paper will acquaint the students of philosophy as discussed Descartes method,cogifo ergo sum,Mind body relation,spinoza's sunstance,Attibutes and Modes,Leibnitz's theory of Monads,pre-established Harmony.	
M 404	Indian Philosophy II	This paper will acquiant the students of philosophy with Nyaya,Vaisesika,Sankhya,yoga and samkara Brahman,Maya,Ramanuja's criticism of Maya.	
M 405	History of Modern Western Philosophy II	The fous of this paper is to acquaint the sudents of western philosophy with Locke,Hume and Kant.	
M 501	Greek Philosophy I	The focus of this paper is to acquaint the students of philosophy with Thales,Pythagoras Heraditus,the eleatic school, and Democritus's atomism.	
M 502	Contemporary Insdian Philosophy I	Exposure the students to the philosophy with the basic issues and problems of philosophy as discussed in contemporary Indian Philosophy.Vivekananda Aurobindo,tagore,Radhakrishnan.	
M 503	Contemporary Western Philosophy I	This paper will acquaint the students of philosophy as discussed Descartes method,cogifo ergo sum,Mind body relation,spinoza's sunstance,Attibutes and Modes,Leibnitz's theory of Monads,pre-established Harmony.	
M 504	Ethics I	This paper will acquaint the students of philosophy as discussed Morality,fact and value,concepts of Normative Ethics,and Teleological Theories	
M 505	Philosophy of Religion I	This paper will acquaint the students of philosophy with Nature and Scope of philosophy of religion,Animism,totemism,Mana,Fetishism,magic,Freud's religion,Foundation of religious beliefs and Mysticism.	
M 506	Social Philosophy	The focus of this paper is to acquaint the students of social philosophy,society,individual,terrorism,feminism and Marxism.	
M 601	Greek Philosophy II	This paper will acquaint the students of philosophy with Socrates,plato,Aristotle.	
M 602	Contemporary Insdian Philosophy II	This paper will acquaint the students pf philosophy with the basic issues and problems of philosophy as discussed in contemporary Indian philosophy. God-Truth and Religion Non-Violence-Satyagrahaa,sarvodaya Swadeshi-Trusteeship,Industry	
M 603	Contemporary Western Philosophy II	This paper will acquaint the students of philosophy with common features of tentialism,Kierkegaard,Nietzsche,Husserl,Sartre.	
M 604	Ethics II	Exposure of students to the philosophy with the Dentological Ethics,Moore,A,J,Ayer Emotivism,theories of punishment, and the law of karma	
M 605	Philosophy of Religion II	The focus of this paper is to acquaint the students of philosophy with Otto's Idea of the Holy,Symbolic nature of religious language,Arguments for the existence of god, and Sankardev's Vaishnavism,god.	

M 606	Project/ Dissertation	The project paper will immensely benefit the students of philosophy.The project paper may be prepared either on a particular philosopher or on a particular topic relevant to the course.The same os to be carried out under the guidance of a teacher.this paper has enabled the students to know more about the structure of research paper. Given below are some topics as examples: (1)Women's liberation. (2)Philosphical Ideas of Sankardeva. (3).A Critical Account of Sambara's Philosophy. (4).Philosophy of Gandhi. (5)Existentialism-A Critical Study.
E PHI 101/102	Logic I	This paper will acquaint the students of logic with basic issues & problem of logic as discussed in logical Tradition. This paper will discuss topics on Nature of logic utility of logic,character,symbol,various constants.From this paper the students can know about the modern symbolic logic,the development of traditional logic.
E PHI 201/202	Logic II	The focus of this paper is to acquaint the students of logic with shorter truth tables method,formal proof of validity,Quantification its relation between universal & existential propositions. Induction: Nature & kinds,grounds of Induction.
E PHI 304/305	General philosophy	This paper will acquaint the students of philosophy with Nature and scope of philosophy.Theories of knowledge-Rationalism,Empiricism and critical theory.This paper will also acquaint the students of philosophy with Naïve Realism & Scientific,subjective(Berkeley) objective(Hegel).
E PHI 404/405	Indian Philosophy	This paper will acquaint the students of philosophy with the basic issues and problems of philosophy as discussed in Indian tradition.This paper will discuss topics on general characteristics of Indian philosophy.The Astika's Nastika dichotomu.The concepts of vedas and upinisads.This paper will also discuss the concepts of substance-Buddhism and Jainism.
E PHI 502/506	General Philosophy(II)	This paper will acquaint the students of philosophy with Epistemological & Metaphysical problem like theories of Truth-Correspondence,coherence,pragamatic substance,causation,space & time.Logical positivisism:General characteristics Existentialism: General characteristics
E PHI 504/507	Indian Philosophy(II)	Exposure of students to the philosophy with the basic issues & problem of philosophy as discussed in Indian tradition.Nayaya:perception & Inference Vaisesika: categories of Dravya & Abhajia Sankhya: Prakritis,Purusa,Evolution Yoga: Psychology. Samikara: Brahman,Maya.Ramanija's criticism of Maya
E PHI 603/606	Ethics I	The focus of this paper is to acquaint the students of philosophy with morality & moral philosophy. Facts & Value. Kanta's Categorical Imperative. Teleological Theories: Hedonism & Utilitarianism. Niskama karma of Gita
E PHI 604/607	Philosophy of religion	Exposure of students to the philosophy with the basic issues and problem of philosophy as discussed in religious T radition.Nature & cope of philosophy of Religion.Religion,philosophy and science. The origin of Religion: Anthropological & Philosophical Theories. Arguments for the existence of god
PAPER 1 Eng	The Social and Literary Context: Medieval and Renaissance	This paper acquaints students with the contexts of the English literary tradition. Students are expected to read and relate the circumstances that influenced, shaped and contributed to the process of literary production from the medieval period to the Renaissance.
PAPER 2	Medieval and Renaissance: Poetry and Plays	In this paper students will study poetry and drama that emerged against the literary and historical contexts studied in the previous paper.
PAPER 3	The Social and Literary Context: Restoration to the Romantic Age	The objective of this paper is to acquaint students with the contexts of the English literary tradition from the Restoration of Charles II and the reopening of the theatres in 1660 to the Age of Romanticism. Students are expected to understand the circumstances that influenced, shaped and contributed to the process of literary production and topics identified in this paper are necessary and useful markers.
PAPER 4	Restoration to Romanticism English Poetry, Drama and Fiction	In this paper students will have the opportunity to study the literary texts that reflect the socio-cultural and political interests of the period studied in Paper III and also examine the ways in which texts take part in and are produced by urgent issues of a time.
PAPER 5	The Social and Literary Context: The Victorian World	This paper seeks to acquaint students with the contexts of the English literary tradition as it develops in the Victorian age. Students are expected to study the social and literary history of the Victorian world as a necessary preparation for the texts that they will encounter in Paper VI.

PAPER 6	Victorian Poetry and Fiction	Students will here encounter the poetry that is characteristic of the Victorian period – forms like the dramatic monologue, the love poem, pre-Raphaelite experiments and the beginnings of modern poetic experience in Hopkins. They will also find examples of the great Victorian fiction that closely followed the social concerns of the period and experimented with narrative voice and perspective.	
PAPER 7	The Social and Literary Context: Modernism and After	This paper will acquaint students with the circumstances that shaped the processes of literary production from the twentieth century to the present.	
PAPER 8	English Poetry and Fiction: Modernism and After	This paper brings to the student a selection of the poetry and fiction of the modern and postmodern eras that is representative of important trends, critical shifts and formal experimentation. In keeping with the nternationalization associated with these cultural phases the selection is no longer strictly British but includes examples from other literary cultures like the American and the Latin American.	
PAPER 9	Drama: Theory and Practice – I	This paper will introduce students to 20th century English and European drama. It is to be noted that by the turn of the century, the European avant-garde had completely altered the theatre – which at this juncture, seems to become a pan-European phenomenon, with stylistic/technical innovations and thematic experimentation. In the early phase of this period, realism is the dominant technique, and is then followed by radical turns away from it. Students are expected to acquaint themselves with the European historical and cultural situation in this period to read the prescribed theoretical texts in Section I and the plays in Section II.	
PAPER 10	Drama: Theory and Practice – II	The epoch of modern drama marks the proliferation of avant-garde theory within the theatre making it self-conscious, and experimental. The impact of contemporary philosophy, ideas and art movements like existentialism, expressionism, impressionism, Marxism and the Absurd reverberates in modern drama. These innovations, both in form and content co-exist alongside the revival of earlier forms like the poetic drama. Students are expected to approach the texts in this paper in the light of the ideas, issues and texts in Paper 9.	
PAPER 11	The Essay in English: Addison to Dickens	This paper introduces students to the literary form of the essay through a selection of representative texts from the 18th and 19th centuries. Students will have to acquaint themselves with the development of the form from the time of Francis Bacon (1561-1626), and examine the emergence of the periodical essay in the 18th century in the hands of Addison and Steele particularly because of favourable conditions like the increase in literacy rates and the appearance of a large number of periodicals which provided a forum for the articulation of views on a variety of topics. The essays are to be studied in relation to the wider political, social, and cultural context while noting the variety of themes that have been treated in the genre as also the diversity of styles of writing from the personal, intimate note of Lamb which is in keeping with the subjective thrust of Romantic literature to the detached, argumentative strain of later times.	
PAPER 12	The Essay in English: The Twentieth Century	This paper will introduce students to developments in the genre of the essay in the 20th century. Students will note how the genre has adapted in order to address a variety of contemporary issues and become the vehicle for representing personal experiences, moved into literary, social, and cultural criticism and engaged in polemic and persuasion. The essays are to be read against their intellectual and socio-cultural background, noting the shift away from the elevated, literary, and classical style of earlier times to a general tendency towards factual and referential writing and a style more direct, immediate, and colloquial.	

PAPER 13	Life Writing: Biographies, Memoirs and Letters	In traditional approaches to life writing the emphasis has fallen on the resonant drama of the lives of great people for the way these model lives yield valuable insights about universal human nature. Now we look for the element of 'story' in this exemplary 'histories' and the material conditions under which the loftiest works are written. With our new found scepticism about aspects such as transcendent achievements and truth-telling (aspects enshrined in traditional life-writing), we look at problematic issues such as self-construction and self-representation. This paper will enable the students to appreciate the element of narrativization in seemingly linear, transparent, straight forward accounts of lives of significant people set down in memoirs, biographies and letters. The student will hopefully appreciate the 'literary' or constructed nature of life-writing purportedly telling nothing but the truth, as also note the 'textual' nature of all lives- that these lives in a way are re-made for each succeeding generation of readers through the act of transmission/ telling. Life-writing presenting ideals of exemplariness, is a genre with distinctive features that has been traditionally studied for the negotiation between great people, the drama of whose lives are regarded as records of transcendent achievements made against a host of obstacles and against the flux of time. Now the individual histories of significant (rather than great) people are also studied for the element of story in it. This paper will try to have that sense of narrativization which inform all that text, which underscore the 'literary' quality of all texts (and the 'textual' nature of all texts) by looking at various forms of life-writing such as memoirs, letters and biographies. The texts also enable one to deal with issues of representations and constructions as in the case of Trollope's Autobiography who reminds us through his rationalisations regarding his desire for profit that any text has a material basis, and it is salutary to pay attention to the material context of production and consumption.
PAPER 14	Women's Writing	This paper on writing by women introduces students to a body of literature that has emerged with growing feminist awareness of women's lives and their representation. It invites students to examine how women's texts pay attention to the historical and political conditions of their times, to the status and condition of women and to the ways in which they embody a politics of resistance. It expects students to look at the way a woman writer participates in the questions of selfhood, at women's relations with men and with other women, and at the implications of women speaking, writing, and empowering themselves by finding their own voices and interrogating women's work and roles in society. Particular attention should be given to women's use of language, their preference for certain genres that are assumed to be liberating, and the ways in which they have transformed and made some genres their own. Students will address women's issues and interests, the condition of women in the place and time of the writer and uses and subversions effected in the genre of the novel by women in Section I. From Section II, the students will be expected to address the use of these autobiographical forms by women and the specifically gendered experiences and perspectives that they represent. Section III will introduce students to contemporary Indian women poets writing in English in order to show how these poets have extended both the subject matter and idiom of poetry.
PAPER 15	Literary Criticism	This paper acquaints students with some of the key ideas of Western literary criticism from Graeco-Roman antiquity to the modern period and expects them to examine the implications of ideas (e.g. mimesis or imagination), and orientations (classicism, romanticism and modernism) that have marked the history of literary criticism. The paper is designed to present students with the opportunity to study key concepts associated with the names of significant thinkers in this history. The paper comprises two parts, Section I dealing with concepts from Graeco-Roman antiquity and Section II with the early modern, neoclassical, Romantic and Victorian criticism.
PAPER 16	Twentieth Century Criticism and Theory	This paper introduces students to key ideas and texts that will familiarize students with the intellectual shifts in the reading of culture, language and literature in the 20th century and the emergence of Theory and acquaint them with common concepts and notions that, they are likely to encounter in the reading of theory. The paper has three sections, Section I dealing with ideas and concepts of 20th century criticism, Section II with ideas associated with movements like structuralism, poststructuralism, psychoanalytical criticism, feminism, new historicism and postcolonialism and Section III containing critical overviews.

PAPER 17	Nature	Ecological literary criticism, or ecocriticism, emerged as a powerful field of study in the early 1990s, and has now become, like race, class and gender, an important dimension of literary and cultural studies. It is "the study of the relationship between literature and the physical environment", examining literary texts through "an earth-centred approach". This paper seeks to explore the process through which language and literature – as manifestations of culture – are produced by the interconnections between both nature and culture; it addresses nature not just as a passive background in literary texts but as a central presence determining the dynamic interpretations of the text itself. It seeks to understand and interrogate the representations of nature in literary texts; to examine whether there is a difference between how men and women depict and respond to nature; to ponder over the possibility of characterising nature writing as a completely new genre; to look at ways through which our understanding of and relationship has changed over the centuries as the human race has achieved varying degrees of 'progress'; and to question the very idea of 'progress' itself and its manifestations in the face of a serious environmental crisis. It will also be an attempt to revisit texts generated at various ages in history with a view to re-appraise the relationship between the human and the natural world as reflected in literature.
PAPER 18	Western Mythology: Introducing Classical, Judaic & Christian Myth	This course is an introduction to the study of Classical and Judeo-Christian myth and their recurrence in later social, historical, cultural and literary contexts. It is expected to provide a gateway to the reception of mythical ideas and images in western art and literary cultures. In the first section the emphasis is on obtaining knowledge of a specific range of myths and mythical characters and their function, and in the second section, we study the presentation of myths in a variety of literary material – in poetry, drama and fiction.
PAPER 19 (Optional Papers)	Option D: English Language and Linguistics 1	This paper, divided into two sections, seeks to introduce students to Linguistics as the scientific study of language and to familiarize them with its different branches as well as its key concepts. It will also acquaint students with the different levels of language organization. While the emphasis will be on the formal organization of the English language, the section on sociolinguistics will focus on what happens when language is actually used in society by different sections of people.
PAPER 20 (Optional Papers)	Option D: English Language and Linguistics 1	This paper is a continuation of the paper 19 and takes the study of language further higher.
BA General English Semester I	General English	The aim of this course is to provide the student an opportunity to read and respond to representations of issues in contemporary life and culture in the English language. The selection of texts is aimed to present themes and topics that are stimulating, insightful and informative. Each paper will have a grammar section of 10 marks. Students having English as their Major subject will have to answer questions on a text indicated in the syllabus, instead of the grammar section.
BA General English Semester II	General English	The aim of this course is to provide the student an opportunity to read and respond to representations of issues in contemporary life and culture in the English language. The selection of texts is aimed to present themes and topics that are stimulating, insightful and informative. Each paper will have a grammar section of 10 marks. Students having English as their Major subject will have to answer questions on a text indicated in the syllabus, instead of the grammar section.
BA Alternative English Paper I	Poetry	The BA Alternative English Course, designed for students who will be from disciplines other than English Literature, offers students a representative selection of texts written in the English language or translated into English, from the major literary genres. It seeks to familiarize students, through these texts, with great ideas, issues of immediate social and cultural concern and also enable them to acquire a facility with the English language. The Course, comprising of four papers, is divided over four semesters in the 1st two years of the TDC programme.

BA Alternative English Paper II	Drama	This paper on Drama acquaints students with 3 plays from various periods and different literary cultures. It expects students to study these plays keeping in mind the distinctive features of the dramatic form. They will be required to answer 4 out of 6 questions seeking essay-type answers. The questions will be designed to test the students' understanding and appreciation of the prescribed plays and will focus on representation of character, significance of scenes and dramatic techniques employed. They will also be required to explain 4 extracts with reference to context from the star-marked text
BA Alternative English Paper III	Fiction	This paper on Fiction introduces the genres of the novel and the short story.
BA Alternative English Paper IV	Non-Fictional Prose	This paper on Non Fictional Prose introduces the genres of essays from 18th century to Modern age.
BA Elective English Paper I	English Literary History	The object of this paper is to provide students who opt for Elective English with a foundation in literary history that will be useful in their approach to subsequent papers, genres and authors. Here they will study texts/movements/ areas that will be taken up in greater detail in subsequent papers. The focus being on literary traditions seen through a broad socio-historical perspective, students will acquire an overview of the development of English Literature.
BA Elective English Paper II	Poetry	This paper familiarises the learners to the rich variety of English poetry throughout the ages and also introduces them to the technical side of the same.
BA Elective English Paper III	Drama	The object of this paper is to introduce the students to English drama text and their technique. It includes Elizabethan as well as Modern drama.
BA Elective English Paper IV	Fiction	Texts prescribed in this paper includes fictions and short stories from 18th to 20th Century that tells the students about the development of English novels.
BA Elective English Paper V	Non-fictional Prose	This paper on Non Fictional Prose introduces the genres of essays from Elizabethan period to Modern age.
BA Elective English Paper VI	Written English	In this paper students will have an opportunity to develop their writing skill through the practise of common forms like the essay, substance of a poem, précis of a prose passage, expansion of ideas, reports, letters and composition of dialogues
BA Elective English Paper VII	Nature	This paper seeks to explore the process through which language and literature – as manifestations of culture – are produced by the interconnections between both nature and culture; it addresses nature not just as a passive background in literary texts but as a central presence determining the dynamic interpretations of the text itself. It will be an attempt to revisit texts generated at various ages in history with a view to re-appraise the relationship between the human and the natural world as reflected in the literature of their respective ages.
BA Elective English Paper VIII	Other Literatures	The internationalization of disciplines which began with Modernism and increased with globalization and the internet has made it imperative for students of English literature to familiarize themselves with literatures produced in regions other than the Anglo-American. This paper is an attempt to bring to students texts from some of the European languages that are available in translation as well as well as those that have been produced in the wake of colonialism in various parts of the world. By its very intention this is a random selection with attention focusing not on chronology but on location. Texts belonging to several genres are drawn from a number of cultures and it is expected that students will study each text with due attention to the cultures in which they emerge.
FE 1	Functional English 1	The syllabus addresses the undergraduate students' need for a course in English that will enable them to use the language effectively in a wide range of situations. this will help undergraduate students of the Science stream develop the skills of language learning, namely- Listening, Speaking, Reading and Writing and aims to develop students' proficiency in English through meaningful , communicative activities.

FE 2	Functional English 2	This paper exposes students to a wide range of functions in English and enable them to use these effectively and expand students' active (commonly used) vocabulary and passiveve(not commonly used, but recognised) vocabulary.	
ENG 1016	14th – 17th Century Poetry	Knowledge of 14th to 17th century English poetry in the context of themes of politics, New Worlds, cartography, architectural changes, gender, Nature and religion which cut across the globe (global).	
ENG 1026	16th and 17th Century Drama	Knowledge of 16th and 17th century drama through themes of the body and sexuality, performance, self fashioning, monarchy and authority/ (national and global)	
ENG 1036	18th Century Poetry and Prose	Familiarity through 18th century poetry and prose with issues of the European Enlightenment, food and fashion, wit and taste, travel, gender etc (global, national and regional)	
ENG 1046	18th Century Fiction	Knowledge of the beginnings of the novel as a genre through 18th century fiction and of issues of gender, travel, colonialism, everyday life, education etc	
ENG 2016	19th Century Poetry	Understanding of 19th century poetry through ideas of the poet and poetry, nature, the individual, the imagination, the ordinary, supernaturalism and romance, and aestheticism.	
ENG 2026	19th Century Prose	Familiarity with the prose forms through essays, letters, life writing and criticism and themes of Empire, industrialization, social mores, and evolution, printing and copyright.	
ENG 2036	19th Century Fiction	Knowledge of feminism, education, rules of conduct, class and family relationships and Victorian values through 19th c fiction.	
ENG 2046	20th Century Poetry	Introduction to 20th century Poetry and the modernist movement in the arts.	
ENG 2054/2064	Language, Communication and Writing/ Forms of Literature	Competence in speaking and writing English. Increased confidence and self assurance	
ENG 3016	20th c Drama	Getting a sense of a changed world, historical events like the World Wars, the Holocaust, migration and resettlement of the Jews and other refugees through 20th c world drama	
ENG 3026	Fiction and Non-fictional Prose – 20th Century and After	Knowledge of modern and postmodern fiction and non fictional prose from around the world through themes of nationalism, colonialism and postcolonialism, displacements, cultural hybridity, feminism and war.	
ENG 3036	The Renaissance	Enhanced knowledge of the intellectual developments of the Renaissance providing a further take on an important cultural phase.	
ENG 3046	The Enlightenment	Enhanced knowledge of the intellectual developments of the Enlightenment and its global impact.	
ENG 3056	Modernism	Knowledge of the intellectual background and cultural developments of Modernism.	
ENG 3066	History of Ideas	Knowledge of the history of ideas	
ENG 3076	Modernist Art Movements & Literature	Knowledge of modernist art movements and their relationship to literature	
ENG 3086	Writings from North East India	Introduction to the literatures of North East India	
ENG 3094 / 3104	Language, Communication and Writing/ Using Theory		
ENG 4016	Indian English Literature I	Introductory knowledge of the beginnings of English writing in India and familiarity with key issues like nationalism, politics, history, caste and secularism, gender, identity and space	
ENG 4026	American Literature I: The 19th century	Knowledge of 19th c American Literature through themes of the founding and consolidation of the nation, race, place, religion, community, family and the individual, mobility and fantasy	
ENG 4036	Literary Criticism and Theory I	Knowledge of the developments in Western criticism and theory up to the early 20th c	
ENG 4046	Language and Linguistics I	Introduced to basic concepts of language, morphology, syntax and English Phonetics and Phonology	
ENG 4056	Women and Literature 1	Knowledge of the women's movement, key feminist ideas and feminist literary criticism	
ENG 4066	Indian English Literature II	Comprehensive knowledge of post-independence Indian English writing along with important historical and theoretical concerns	
ENG 4076	American Literature II - 20th and 21st centuries	Knowledge of modern and postmodern American literary developments against issues like globalization, nternational power relations, and key ethical and environmental concerns	

ENG 4086	Literary Criticism and Theory II	Familiarity with structuralist, poststructuralist, new historicist, feminist and ethical developments in Theory	
ENG 4096	Language and Linguistics II	Ability to use knowledge of the formal properties of language learnt in Paper 16-D to analyze literary and nonliterary discourses. Added knowledge of recent developments in linguistic studies	
ENG 4106	Women and Literature II	Knowledge of central concepts of gender theory and perspectives especially areas of women's writing or ecriture feminine, the body, gaze, subjectivity/selfhood, community and representation	
ENG 4116	South Asian Fiction [Elective 1]	Introductory knowledge of Contemporary South Asian Fiction through themes of diaspora, memory, displacement, gender and transculturalism.	
ENG 4126	African Fiction	Introductory knowledge of African fiction in English through themes of the story teller, the relations between oral literature and the novel, colonization of Africa and the contemporary everyday life and politics of the African states.	
ENG 4136	Modern European Literature in Translation	Knowledge of modern European literature against the backdrop of Europe's late 19th and 20th c history and politics.	
ENG 4146	Children's Literature	Introductory knowledge of Children's Literature and theoretical developments through themes of innocence, fantasy, family, gender, animals and the environment	
ENG 4156	Literature and Film	Introduction to the issues involved in the relationship between literature and cinema.	
ENG 4166	Migration and Literature	Knowledge of reading interdisciplinarity through the area of migration and literature and themes of assimilation, alienation, identity, exile, rootlessness, memory and trauma	
ENG 4174 / 4184	Language, Communication and Writing/ Scholarly Writing		
M 101	Physical Chemistry	From the study of this paper, students will be able to learn about different terms related to the thermodynamics, first law , second law, third law and zeroth law of thermodynamics. Different relation related to thermodynamics and some experiments on thermodynamics are also known from the paper. This paper gives an idea of partial molar quantity, chemical potential and Gibbs'Duhem equation. From the study of the chemical kinetics chapter, students will be able to learn about rate, rate law, order, molecularity of a reaction. Experimental determination of rate and order are given in the chapter. It also give the brief idea of catalysis and its uses.	
M 102	Organic Chemistry	From the course studennts will be able to name organic compounds according to IUPAC system of nomenclature. Electron delocalization effects in organic compounds, tautomerism and Hydrogen bonding will hepp in explaining the properties of organic molecules. Students will have an idea about steroisomerism - conformational and configurational isomers, enantiomers & diastereomers, π-distereomersSyn/anti, cis/trans & E/Z designation. Stereomutation of π-diastereomers. the course explains ver well about enantiomers - optical activity, asymmetry, dissymmetry or chirality, racemic modification, & methods of resolution of racemic modification & projection formulaFlying-wedge formula, Fischer, Newman & Sawhorse projection. Students will be able to learn mechanism of organic reactions namely i) Addition reactions : electrophilic, nucleophilic and free radical mechanism. ii) Substitution reactions : electrophilic, nucleophilic and free radical mechanism iii) Elimination reaction : β–elimination reaction - base catalysed and pyrolytic elimination reactions.	
M 103 Practical	Practical	From this paper students will be able to learn about the experimental method to determine the solubility, water of crystallisation, kinetics between H2O2 and iodide ion, S2O3 2- and HCl, adsorption process and conductometric titration. The paper gives an idea of chromatographic process.	

M 201	Physical Chemistry	This paper gives an idea of ideal behaviour, kinetic theory, distribution of molecular speeds, mean, root mean square, mean free path, transport properties, laws of diffusion and different properties of gases.The chapter liquid state gives idea of structure of water, properties of liquid and liquid crystal and properties of liquid crystal.Colligative properties chapter deals with the thermodynamic treatment of four colligative properties and calculation based on these properties .It also deals with the real solution. The electrochemistry chapter gives idea about conductance and molar conductance. Mobility of ions and transport no of ions are also stated in the chapter. Different equation and theory related to conductance are given in the chapter. It gives idea of electrochemical cell, electrode potential, reference electrodes, different electrolytes, fuel cell , battery etc. Students will be able to learn about the composition and uses of different cells.
M 202	Organic Chemistry	The course helps to acquire concept of topocity and prostereoisomerism, criteria of establishing topocity of groups, atoms and faces. It will help to understand mechanism of electrophilic aromatic substitution with examples along with directive influence of groups,activation and deactivation of aromatic rings, o/p ratio. The course benefits the sudents in explaining the mechanism of nucleophilic aromatic substitution, benzyne mechanism, cine substitution, methods of trapping benzyne intermediates. The course helps to understsnd general methods of preparation, physical properties, reactions and functional group transformation of Aliphatic Compounds and Aromatic Compounds.
M 203 Practical	Organic Practical	The course on organic practical will help the students to analyse an organic compound. It will help to identify an organic compound by the systematic way. a) Detection of N, S, Halogens b) Test for functional groups c) Solubility, melting point, boiling point d) Preparation of a derivative and determination of its melting point
M 301	Structure and Bonding	This chapter will lead to a clear idea about chemical bonding in terms of valence bond approach. Students will be introduced to different concepts like electronegativity, dipole moment, formal charge, percent ionic character, resonance and resonance energy etc. The course will help students to learn- the structure of hydrogen like atoms and their representation in quantum mechanical terms, the inadequacy in classical mechanics, the necessity of quantum mechanical equation for solving the hydrogen like system. They will be able to set up expressions for different atomic orbital. students will be able to learn the electron spin and the exclusion principle. They will also be able to write electronic configuration of many electron atoms and will understand effective nuclear charge of the atoms and the penetration effect.
M 302	Inorganic Chemistry	The outcome of the chapter (Chemical Bonding II) is to understand the shapes of polyatomic molecules through VSEPR theory and hybridization concept and their influence on bond length, bond angle and other properties. The outcome of the chapter (Ionic Bonds and Solids) is that students will be able to learn different types of crystalline solids as well as different parameters associated with them like unit cell, crystal lattices, Bravais lattices, Miller indices and Miller planes, crystal systems, ccp, hcp, radius ratio etc. and they also able to understand some concepts related to ionic solids viz. lattice energy, Born-Haber cycle, Fajan's rule, molecular polarizability etc. The course will help students to learn- Advanced theories of bonding in simple homo nuclear and hetero nuclear diatomic molecules. They will be able to represent graphically the energy levels and ground state electronic configuration of diatomic molecules. These knowledge will be extended to simple tri atomic molecules.The multiple bonding, their orbital pictures and also aromiticity in organic molecules. The modern theory of metallic bonding and explanation of metallic properties out of it.
M 303 Practical	Practical	This Practical paper deals with the qualitative analysis of a mixture of salts containing different cations and anaions which may include insoluble counterparts and interfering radicals. Students are trained up in a proper manner so that they could be able to identify the unknown radicals in a systematic way.

M 401	Inorganic Chemistry	The chapter (Chemistry of Non transition Elements I) portrays some miscellaneous concepts like Polarizability and Polarising power, Fajan's rules, HSAB concepts, Latimer and Frost diagram, properties of some non-aqueous solvents, ortho and para hydrogen,clathrates, Diboranes, Allotropes of carbon, intercalation compounds,carbides,cyanogens etc. This portion of the chapter, Chemistry of Non transition Elements II, refers to allotropes of Phosphorous and sulphur and chemistry of their oxides, halides, hydrides etc and their oxoacids along with nitrogen, and per acids of sulphur. This chapter also through light on some special compounds of nitrogen like hydrazine, hydroxyl amine and azides. Formation and mechanism of ozone layer depletion as well as clinical use of NO and N2O are certainly some relevant topics those could be learned better. The course will help students to learn- the trends in physical and chemical properties of the elements and their compounds with reference to the periodic table of the elements.The homo and hetero catenation and the energies of metal-metal bond, metal-oxygen bond and metal-halogen bond.The melting and boiling points of the elements, their compounds, solubility and the relative acid – base strength of these compounds.
M 402	Inorganic Chemistry	The chapter(Chemistry of Non transition Elements) deals with the basics of some important class of compounds like interhalogen compounds, polyhalides, psedohalogen, oxides and oxoacids of halogen as well as noble gas compounds specially oxides and fluorides of Xenon. This chapter also deals with some inorganic compounds which have chains, rings and cage like structures viz. silicates, zeolites, borazine, phosphazenes, boron cage compounds etc. which have wide practical applications and are very important in terms of research point of view. The course will help students to learn- the metallic bonding, their physical properties and the alloys. ii) Occurrence of the metal in nature and their extraction from these natural sources. The allotropes of different metals and their relative stabilities. Structure and properties of oxides, hydroxides and halides of the non transition elements. From the course students will also be able to learn- the difference between the transition elements and the non transition elements. The special properties of the transition elements with reference to the non transition elements. The various series of transition elements and their relative properties. The basics of co-ordination compounds, their naming in IUPAC system and different types of isomerism shown by the co-ordination compounds. The structure and bonding in co-ordination compounds and preparation of some of the co-ordination compounds involving some typical ligands.
M 403 Practical	Practical	This practical paper include some general chemistry experiments and also some inorganic preparations which may enable the students to get familiar with the basic analytical tools and techniques which are relevant in Chemistry. Hands-on practicing in the laboratory may help the students in their future course of study.
M 501	Quantum Chemistry	Quantum chemistry is an important theoretical tools for understanding the behaviour of chemical systems. It yields vital information about structural chemistry of atoms and molecules including chemical bonds. Hence the subject becomes quite basic for the entire spectrum of chemical studies.
M 502	Physical Chemistry	The paper gives idea about different theory of molecular reaction dynamics, theory related to unimolecular reaction, potential energy surfaces, molecular beam technique etc.It also gives idea about the reaction that occur in solution, laser technique, flash photolysis etc.

M 503	Organic Chemistry	This course helps to understsnd mechanisms of molecular rearrangements. From the study students can learn mechanism of Whitmore 1,2 Shift, Wagner-Meerwein, Wolff, Hofmann, Lossen, Curtius, Schmidt, Beckman, Favorskii, Benzil- benzilic acid, Baeyer Villiger, Wittig, Pinacol, Fries rearrangement (aromatic electrophilic substitution) and Stevens (ion pairs in solvent cage/ radical pair). Students can understand various oxidation - reduction reactionand common oxidizing and reducing agents. They can have an idea about Pericyclic Reactions. The course is useful for understsnding definition and examples of 2+2 and 2+4 cycloadditions, Diels Alder reaction, 1,3 Dipolar Cycloaddition, sigmatopic rearrangements, Cope and Claisen rearrangements and electrocyclic reactions by Frontier Molecular Orbital Method and Corelation Diagram Method. This course helps to understsnd properties of Polynuclear Aromatics, Nitro and amino compounds, Organo S and organo P Compounds, Active methylene compounds and Heterocyclic compounds.
M 504	Inorganic Chemistry	The chapter (Bonding in Co-ordination compounds) enables the students to learn about symmetry and bonding in coordination compounds. Symmetry includes various symmetry elements and operations as well as different point groups. Crystal field theory and Molecular orbital theory have been used to explain the bonding as well as spectral and magnetic properties in Co-ordination compounds. This (Bio-inorganic Chemistry I) is very relevant topic through which one can clearly understand the biological role of various elements in our body and their mechanism of transportation. One can also realize how such elements are essential to us In terms of smooth functioning of the machineries inside our body.
M 505 Practical	Practical	After successful completion of the course students will be able to learn i) How to prepare a standard solution. ii) How to estimate inorganic ions by volumetric, complexometric gravimetric and redox methods. iii) How to estimate quantitatively a single component system. iv) How to separate and estimate individual ions in two component system. v) How to report the results they have obtained.
M 506 Practical	Practical	From this course students acquire experimental knowledge of organic preparation. The coourse includes the folloeing preparation (i)Benzoylation : Preparation of benzanilide from aniline. (ii). Nitration : Preparation of m-dinitrobenzene from nitrobenzene and p-nitroacetanilide from acetanilide. (iii). Halogenation : Preparation of p-bromoacetanilide from acetanilide and 2,4,6-tribromophenol from phenol. (iv). Diazo-coupling : Preparation of methyl orange. (v). Oxidation : Preparation of benzyl from benzoin. (vi). Reduction : Preparation of m-nitroaniline from m-dinitrobenzene.

M 601	Spectroscopy	Spectroscopy is always helpful in understanding the concept of atoms and molecules. Spectroscopy with diverse and invaluable techniques helps in determining atomic and molecular structures. From the chapter (introduction to spectroscopy) students can learn the nature of electromagnetic radiation, interaction of electromagnetic radiation with matter, Absorption and emission spectroscopy. Basic elements of practical spectroscopy. Representation of spectrum – the width of spectral line. Intensity of spectral lines. Selection rules for various transitions.The Beer-Lambert law, molar absorption coefficient and absorbance. The outcome of the chapter (Rotational, Vibrational and Raman Spectroscopy) is that the students can understand the basic concepts of rotational (microwave), vibrational (IR) and Raman spectroscopy which would definitely proven to be helpful in their future course of study specially would be quite relevant in the research field. The chapter on electronic spectroscopy helps students to learn electronic transitions and selection rule - spectrum of atomic hydrogen – fine structure, spectra of H-like atoms. The course also includes electronic transitions in diatomic molecules – Selection rule - Born Oppenheimer approximation – vibrational coarse structure - Frank Condon principle – electronic transitions in polyatomic molecules.Structure elucidation by electronic spectroscopy – chromophore, auxochrome –absorption due to ethylenic chromophore – Woodward's rule. Introduction to photoelectron spectroscopy and its applications in simple diatomic molecules. The chapter on spin resonance spectroscopy helps students to learn interaction between spin and magnetic field – Nuclear spin – Nuclear magnetic resonance spectroscopy – 1H NMR – presentation of the spectrum - chemical shift and its unit –chemical shifts for simple organic molecules (alkane, alkene, alkyne, arenas, aldehydes,carboxylic acids and esters). Spin-spin coupling and high resolution 1H NMR spectra of ethanol, ethyl benzoate, 2-iodopropane, cyanohydrin. The chapter also includes basic concept of electron spin resonance spectroscopy – presentation of the spectrum –hyperfine structure – esr of H-atom , deuterium atom. The chapter on mass spectroscopy helps students to learn mass spectroscoy - principle – idea of mass spectrometer – fragmentation pattern –nitrogen rule - simple applications in structure elucidation (butane, ethane, acetone) –McLafferty rearrangement (hexanoic acid, pentanal).
M 602	Physical Chemistry	From this paper students will be able to learn about the laws of crystallography, symmetry, Bragg's law, X-ray crystallography etc. Packing in solid, holes and radius ratio are also given in this chapter. Different types of defects and properties of solids are studied in this chapter. Macromolecule and colloids chapter gives idea about sol and colloids. Surface active agents, micelle formation, critical micelle concentration, electrical double layer etc are given in this chapter. Statistical thermodynamics gives idea about Boltzmann distribution, molecular partition function and its significance, different partition functions. From the study of this paper students will be able to calculate the heat capacity, residual entropy and equilibrium constants. Data analysis chapter gives the idea of types of errors, accuracy and precision, significant figures, least square analysis etc and standard deviation. It tells about the uncertainity in the measurement of physical quantities.

M 603	Organic Chemistry	From the course students will have knowledge on organic photochemistry, polymers and Fibres The course includes theory of photochemistry,Typical photoreactions (Photoreaction of benzophenone, photolytic reactions of ketones), Norrish type I & Norrish type II reactions, cis-trans isomerisation and dimerisation. Polymers and fibres include preparation of vinyl polymers, synthesis of terylene, nylon, Elastomers (natural rubber, synthetic rubber). Students will be able to fmiliar with biochemistry. The course includes structure of cell, carbohydrates, proteins, nucleic acids, enzymes and their function as catalysts, metalloenzymes, carboxypeptidase and peptide hydrolysis. Coenzymes and vitamins. Structure of RNA and DNA, gene and genetic code: biosynthesis of DNA (replication), RNA (transcription) and proteins (translation) are also included in the course. From the course students will have knowledge on natural products and medicinal chemistry. The course on natural products include definition, isolation and classificationTerpenes, alkaloids and carbohydrates. The course on medicinal chemistry include drugs-physiological effect of their structure, antibiotics and their action, anticancer and antimalarial drugs. Immunity and AIDS. Sulpha drugs- their mechanism of action, preparation of aspirin, quinine, chloroquin, paracetamol, phenacitin, sulphanilamide and other sulpha drugs are also included in the course.
M 604	Inorganic Chemistry	This chapter (Bio-inorganic Chemistry II) deals with metalloproteins and their role in different processes like photosynthesis, respiration, nitrogen fixation etc. and also include toxicity due to metal ions and effect of gases and pollutants on our environment. This chapter also through light on the importance of metal salts in diet, diagnosis, chemotherapy as well as in medicines. Through this topic (Nuclear Chemistry) students will able to understand different nuclear particles, nuclear reactions, transmutation of elements, artificial radioactivity, radio isotopes, tracer techniques, radio carbon dating etc. and their importance.
M 605 Practical	Practical	Practical paper gives the idea of experimental method for the determination of co-efficient of viscosity, surface tension of liquid, mutual solubility curve of phenol and water, molecular mass of volatile liquid, specific rotation of an optically active substance by polarometer, specific rate of hydrolysis of methyl acetate catalysed by hydrogen, Beer Lambert law, adsorption process, distribution of iodine between CCl4 and water, conductometric and potentiometric titration of different acids and bases.
M 606	Project work	Project work helps students to be familiar with basics of research and it increases inerest on problem solving techniques. Further it encourages students to purse research in future.
E 101	General Chemistry	Here students can know about the concept of quantum theory, how bonds are formed between two or more atoms, shapes of molecules, their electronegativity, hydrogen bonding, different states related to matter as well as different properties of these states etc.
E 201	General Chemistry	Here students can know about hydrocarbons (compounds of carbon and hydrogen), their preparations, reactions, properties, stereochemistry and also get information about the different laws of thermodynamics, feasibility of a reaction etc.
E 301	General Chemistry	Here students get information about the physical properties, chemical reactivity and important compounds of non-transition elements, general trends in their size, ionization energy, electronegativity etc. Also can know about the coordination complexes (transition elements) and about galvanic cells, electrode potential, dry cell, fuel cells and their importance, conduction of electrolytic solutions etc.
E 302 Practical	Practical	In the practical section ,the students easily analyse the given sample of organic compound to detect elements and functional groups present in organic compounds. They also get familiar with determination of solubility of a salt such as NaCl, KCl etc.
E 401	General Chemistry	Students enable to understand the nature of alcohols and some particular chemical reactions. Also enable to understand the nitrogen derivatives of aromatic compounds and their preparation and some properties. With these they also take interest in some physical part and get much more conscious and viewing the topics in a scientific manner.

E 402	Practical	In the practical section ,the students easily identify and analyse the cations and anions from an inorganic mixture which is supplied .The estimation or finding out of some metal ions by some standard reagents also they do it by full enthusiasm in a very systematic way.
E 501	General Chemistry	The students enable to understand some properties of solids and their applications in day to day life. The newly introduced chapter i.e Spectroscopy creates them more curiosity to learn in detail i.e in a depth manner.The nuclear chemistry which deals with radioactivity, nuclear transmutation and nuclear properties , their toxicity for human and animal life also makes them conscious and probability of coming questions in mind rapidly increases how to solve any hazardous reactions which are coming out from the nuclear plant.
E 502	Practical	The students enable to know how to prepare an organic compound with minimum by product which causes pollution in environment. They also enable to know about some physical apparatus while doing physical experiment like Ostwald Viscometer, etc which transform or mould their personality in doing practicals.
E 601	General Chemistry	Students enable to know altogether about industrial, environmental and biological chemistry. It gives them a full knowledge about the environment pollution source chemicals and also some roles of medicines in human life and their side effects.
E 602 Practical	Practical	Students enable to know to determine any unknown equivalent mass of an oxalic acid by doing titrations which they also can calculate theoretically. It also enable them to prepare some stable inorganic compounds in a good yield as eco friendly .
Physics Major - 101Th	Mathematical Methods-I and Mechanics	After successful completion of this course the student will be able to i. use the idea of vector algebra, vector differential operator and its uses and learn the physical interpretation of gradient, divergence and curl and its applications in Physics. ii. understand the conservative and non-conservative nature of force and field, importance of inertial and non-inertial frame of reference, origin of Coriolis force and its effect on the motion of object in earth's field, centre of mass motion and angular momentum of system of particles, calculation of moment of inertia and its application of compound pendulum, Gravitation and the use of compound pendulum in determination of earth's gravity.
Physics Major - 102Th	Waves and Oscillations and Ray Optics	After successful completion of this course the student will be able to i. Understand harmonic oscillator and its validation for damped and forced vibration and extension of this idea to wave motions and different related phenomenon. Learn to apply Fourier theorem to understand complex periodic motion into its components of harmonic oscillation. ii.Use of Fermat's principle in understanding reflection, refraction and to derive various formulas in plane as well as curved surfaces using geometrical methods, use of reflection and transmission matrix in understanding reflection in spherical surfaces and refraction through thin lenses, uses of lens system and related formulas in different optical instruments, different kind of aberration induced defects in images and its remedy.
Physics Major - 103Pr	Practical	After successful completion of this course the student will be able to i. Use and identify different components of electronic circuits active and passive components in a circuits, learn repairing and maintenance of some of the equipments in the laboratory, uses of different instruments of varied precession and the uses of multimeter. ii. will be able to practically verify some of the laws and results of mechanics.

Physics Major - 201Th	Mathematical Methods-II and Properties of Matter	After successful completion of this course the student will be able to i. gather knowledge of vector interration essential for Engineering, Physics and Mathematics, the idea of line integral, surface integral, volume integral and their applications in physics. They will learn the applications of different theorems in various fields of physics, the uses of Curvilinear Co-ordinate systems etc, uses, Dirac-Delta function and Green's function are in quantum mechanics and also in the theoretical development of every branch of Physics. ii. learn the general properties of matter like elasticity, surface tension and the viscosity and the related phenomena. Learn the correlations of different elastic constants, torsion and bending of beams and related engineering applications, the viscous flow of liquids and the related laws, uses of viscometer and Poisseulie's equation.
Physics Major - 202Th	Heat and Thermodynamics	After successful completion of this course the student will be able to i. application of kinetic theory, its application in finding the expression for pressure exerted by gas and deriving different gas laws, degree of freedom and the energy distribution, velocity distribution and the transport phenomena. Different equations of state and the law of corresponding state, determination of critical constants and their significance, conductivity and Fourrier equation of rectilinear flow and its solution. ii. inter-conversion of heat and work, heat transfer mechanism, idea of internal energy, different laws of thermodynamics and their applications in different thermodynamic processes, uses of indicator diagram, the working of heat engine and the related results, the Carnot's theorem and Carnot's cycle and its use in realization of absolute scale of temperature, The entropy function and the concept of disorder and available and unavailable energy.
Physics Major - 203Pr	Practical	After successful completion of this course the student will be able to practically verify some of the laws and results of optics and heat, would be able to determine temperature of any liquid using thermistor, refractive index of any given liquid, surface tension of liquid etc.
Physics Major - 301Th	MathematicalMethods-III and Electrostatics	After successful completion of this course the student will be able to i. the ideas of matrix. It helps in the solution of linear algebraic equations, linear transformations and solutions of various types of differential equations. It also helps to solve the problems relating rigid body motions, oscillations and transformation of different co-ordinate systems. It applies in the quantum mechanics and in the theory of representation of groups. ii. understand deals with the behavior of stationary electric charges. It gives idea about charges, electric fields and electric potential which help in future in different fields. Study of Gauss's law, electric dipole, electrical images, different types of capacitors, polarization etc. give a tremendous knowledge about that and finally it helps students to prepare themselves for the university level examinations. It helps in various applications in practical life i.e. household electric connections, vacuum cleaners, ironing, inverter etc. without any hazard.
Physics Major - 302Th	Current Electricity and Magnetostatics	After successful completion of this course the student will be able to i. understand current density, Ohms law and its applications. They will also be able to analyze complex electrical network using Kirchoff's law. Understand electromagnetic induction and reciprocity theorem, transient growth and decay of current in different types of electrical circuits, alternating current and different methods of analysis of alternating current circuits, power factor and quality factor of different a.c. circuits. ii. learn motion of charged particle in magnetic field and the related phenomena, understand the uses of Biot- Sevart law and Ampere's circuital law in different situations and the divergence and curl of magnetic field.
Physics Major - 303Pr	Practical	After successful completion of this course the student will be able to find out the magnetic elements of earth experimentally. They will be able to use meter bridge and potentiometer for various kind of electrical measurements and will be able to practically verify the growth and decay of currents in different circuits.

Physics Major - 401Th	Mathematical Methods-IV and Introduction to Computer and Computer Language	After successful completion of this course the student will be able to i. Understand and use of series solution of complex differential equations, probability theory and introduction to computer programming, get the idea of Legendre differential equation, Hermites Differential Equation and the polynomials. They will also be able to use Probability theory and get the idea of probability distribution. ii. understand the functional organization and the architecture of digital computer and microprocessor, have the knowledge of high level language and be able to write simple computer programming in C++. Understand the steps for writing computer programs that includes flowchart, Algorithm, Structure and the program.
Physics Major - 402Th	Wave Optics and Special theory ofRelativity	After successful completion of this course the student will be able to i.understand the wave theory of light and the principal of superposition and the related phenomena like interference and diffraction of light, meaning of coherence and the nature of frienges produced due to superposition of light waves. They will also be able to use Fresnel's bipriem ad analyse Newton's ring in finding wavelength of light, ii. understand the formulation of special theory of relativity and the need of a new model of kinematics, negation of ether concept and the postulates of special theory of relativity. They will be able to understand and use of various transformation equations, get the concept of relativistic momentum and energy, the idea of space time and concept of four vector and Minkowaski space.
Physics Major - 403(Pr)	Practical	After completion of this course students will learn the uses of different optical instruments in determining various optical parameters. They will also learn to use Keters pendulum for precise determination of the acceleration due to gravity.
Physics Major - 501Th	Mathematical Methods-V and Classical Mechanics	After successful completion of this course the student will be able to i. know the complex analysis and its uses in understanding quantum mechanics and other branches of modern physics. ii. know how physics has evolved from the day of Newton. This study helps a student to know the behavior of physical world in microscopic level. This course also helps a student to bridge the classical and quantum mechanics and to study modern field theory.
Physics Major - 502Th	Atomic Physics	On completion of this course students will be able to understand the structure of atoms, origin and analysis of positive rays, different mass spectrographs, different models of atom and the origin and significance of atomic spectra and fine structure and hyperfine structure of the atomic spectra. They will also learn the origin and the application X-rays, scattering of light and related phenomenons like the Raman effect and its application.
Physics Major - 503Th	Quantum Mechanics and Astrophysics	i. On Completion of this course a student will be able to know about the limitation of classical physics. A student will be able to grasp the preliminary concepts of old quantum theory and the details of the quantum picture of material particle which is the backbone of quantum Mechanics. A student will be able to know the fundamental rules of quantum mechanics and its application to study physical systems by deriving Schrodinger wave equation and by applying this equation to solve physics system like Harmonic oscillator, Hydrogen Atoms etc. By studying this course a student will be able to do research work in theoretical physics. ii. This course gives the concept of time, idea of different co-ordinate systems to find out location and motion of celestial bodies, ideas on magnitude systems and evolution of stars. This branch is very much effective in present lives because still now some of us continue their life depending in some superstitions. Knowledge of astrophysics develop the mental strength of humans as they know the real fact of the universe after studying astrophysics
Physics Major - 504Th	Electronics	On successful completion of this course a student will learn about electronic devices and circuits and its uses in various field in physics and daily filed. They will be able to analyse and assemble different filter circuit, rectifiers and regulated power supply, different classes of amplifiers, oscillators and feedback circuits. They will also learn sideband techniques and communication system and devices. They will be able to get idea of different analogue and digital electronic devices. Further this course will educate and enable them for designing different electronic circuits.

Physics Major - 505(Pr)	Practical	After successful completion of this course the student will learn the use of different sophisticated instruments like Spectrometers, Biprism, Platinum Resistance Thermometer etc. to calculate some important physical parameters and to valitade some laws of physics experimentally.
Physics Major - 506(Pr)	Practical	On completion of this course a student will learn to assemble and study frequency responses and transfer characteristics of Operational Amplifier, to verify De Morgan's theorem using Integrated Circuits, different characteristics curves of transistors in different mode of operations, uses of breadboard in assembling different logical circuits for application in digital electronics, the uses of Cathod Ray Oscilloscope etc.
Physics Major - 601Th	Nuclear Physics	After successful completion of this course a student know the structure of the nucleus, its stability and nuclear forces. They will also understand the different decay processes of the nucleus and the origin and uses of radioactivity, different models of the nucleus, nuclear binding energy, nuclear reactions and energy release processes. They will also learn the working principle of particle accelerators and detectors and their uses in different fields.
Physics Major - 602Th	Mathematical Methods-IV and Solid state Physics	After successful completion of this course a student will be able to i. understand the covariant nature of the physical laws in terms of tensor, different laws of tensor combination, coordinate transformations that will help in understanding the general theory of relativity in future. ii. understand the structure of solid in terms direct and reciprocal lattice space, causes of the observed physical properties of the crystalline and amorphous solids, will be able to explain the observed physical properties of solids in terms of the motion of electrons in the periodic lattice space, will be able to understand the metal, insulator and semiconductor on the basis of band structure, the superconducting behavior etc.. They will also gain knowledge on magnetic properties of solid and their behavior in magnetic field.
Physics Major - 603Th	Modern Optics and Electromagnetic Theory	On successful completion of this course a student will be able to i. Understand optics of crystalline solids, the liquid crystal display, principle and uses of laser, formation of image by holographic technique, principle of optical fibre communication, communication through optical fibre, principle and working of different eyepieces and the working of prism spectrograph. ii. Understand electromagnetic field equations in differential and integral form first obtained by Maxwell's, pointing vectors, equation of electromagnetic waves and their propagation through conducting and non conducting media, reflections, refractions and polarization of e.m. waves.
Physics Major - 604Th	Statistical Mechanics and Computer Applications	This course will help the students to understand the use of statistical mechanics for derivation of distribution of velocities, energies, electronic specific heat, black body radiation formula etc. Different statistics such as Maxwell-Boltzmann, Fermi-Dirac and Bose Einstein statistics are included in the course. This course enables the student to understand the basics of statistical system, hypothesis and theorems and their application. This course also includes computer programming part where the main emphasis is given to numerical analysis. From series generation, solution of quadratic equation, this course enables the student to write program to solve linear equations as well as differential equation and value of integration using least square, Runge-Kutta 4th order method and Simpson's integration rule respectively.
Physics Major - 605(Pr)	Practical	This course will enable the students to understand mainly different electronic components and circuitry. The students will understand LCR circuit, Q factor, Anderson's bridge, ripple factor of half-wave and full-wave rectifier, use of CRO after completion of the course. This course also includes determination of mechanical equivalent of heat, temperature coefficient and use of GM counter.
Physics Major - 606(Prj)	Project	This course helps the students to make project out of the physics syllabus. The students will be able to do hand-on-project on their own under supervision of teacher. This course also includes hand on training on computer programming and to make computer program of mean, deviation, least square fitting, arranging numerical data, roots of quadratic equation and generation of Fibonacci series.

E 101(Th)	Mechanics, Properties of Matter and Waves and oscillations	This course will help a student to learn mechanics and properties of matter, waves and sound. In mechanics this course helps to know the basic idea about conservative force and different aspects of rotational motion that includes angular momentum,,moment of inertia. This course also includes gravitational potentials, planetary motion,escape velocity etc. The later part includes compound pendulum. This part also helps a student to learn about general properties of mater like elasticity, surface tension and viscosity. The second main part in this course is waves and sound. In this part, a student will be able to learn the simple harmonic motion, damped and forced vibration, the wave motion, beats, Doppler effect, sound waves, ultrasonics and their uses.
E 201(Th)	Current Electricity, Electrstatics and Magnetism	This course will help the student to understand the current electricity that includes continuity equation, kirchoff's law, moving coil galvanometer, electromagnetic induction, growth and decay of current in LCR circuits and also the alternating current, transformer, motor etc. The students will also learn theorems and use of electrostatics such as Gauss's theorem and application, Capacitor and their types and circuitry and dielectrics. After completion of this course the students will be able to understand the basics of magnetism that includes magnetic shell, magnetization, and electric current as source of magnetic field. They will also have idea of different types of magnetic materials.
E 301(Th)	Heat and Thermodynamics	This course is very crucial for all of the students from the point of view of understanding the nature First of all it deal with the basic theory of radiation, thermometry, basically on platinum resistance thermometer and thermocouple thermometer. The third part contains the phase transition. Day to day life phenomena of phase transition is generally remains unanalyzed by most of us and we even fail to realize their inner mechanism due to inadequate knowledge of atomic, molecular and statistical mechanical world. This part of course show how matter can persists in various phase simultaneously and differently provided we maintain some specific measure of thermodynamic quantities like pressure, volume and temperature and why different reaction are shown by different thermodynamic systems to different thermodynamically imposed constraints. It also enables students to calculate heat required and generated in phase transitions which in turn will be a measure to predict the possibility or impossibility of such events. Lastly Maxwell's thermodynamic relation provides a way to connect macroscopic thermodynamic world to microscopic statistical mechanical world. This course will also help a student to learn about kinetic theory of gases, basic laws of thermodynamics etc.
E 302(Pr)	Practical	This course will help the students to do the experiment on Searle's apparatus for determination of Young's modulus, bar pendulum for acceleration due to gravity, resonant air column for determination of velocity of sound and electrical experiment such as specific resistance of material of a wire using meter bridge, emf of cell by potentiometer, Carey Foster bridge and conversion of galvanometer into voltmeter.
E 401(Th)	Optics	This course starts with Fermat's principle that will lead students to know how extrimization of optical path predicts actual path of light ray between two points and applying it they may realize what is the actual cause behind formulas related to refraction and reflection. By this they will also get taste of some more generalized logics that nature allows for all type of dynamics. This course also covers the wave theory of light and its phenomenon like interference, diffraction and polarizations. After understanding the theory of interference and diffraction, students can perform the experiment of Newton's rings, biprism and single slit and learn how Michelson interferometer works. Polarization is a crucial theory to understand how ray of light can be polarized in a single plane. Designing of polarized sunglasses, instruments is based on this theory. The student will also be able to learn the theory of laser, its operation, production and application.
E 402 (Pr)	Practical	This paper will help student how to perform experiments like: determination of rigidity modulus, moment of inertia, focal length of a convex mirror, refractive index of liquid and meterbridge, potentiometer experiment.

E 501(Th)	Mathematical Physics, Atomic Physics, Relativity and Renewable Energy sources	In mathematical section student will learn the algebra of vector and scalar and line, surface and volume integral and its relating theorems: Gauss, stokes, greens theorem. This course will help them to understand curvilinear coordinates and their implications. It includes the Atomic physics part where the students will come know about positive rays and their analysis with different spectrographs. It includes vector atom model, Zeeman effect. Students will also understand origin and characteristics of X-rays, Bragg's law and matter waves. This course also includes Relativity part, where they understand the Michelson-Morley experiment, postulates of special theory of relativity, Lorentz transformation, time dilation, length contraction, mass variation. On completion of this course they will also have idea about different renewable energy sources with main emphasis on solar energy.
E 502(Pr)	Practical	This course will help the students to understand and verify by doing experiments such as magnetometer, capillary rise method for determination of surface tension, spectrometer, Newton's ring for wavelength measurement, ballistic galvanometer and photo cell.
E 601(Th)	Nuclear Physics, Electronics, Electromagnetic waves and Solid-state Physics	The first part of the course will help the students to understand the concept of nucleus and different inferences such as mass defect, binding energy, nuclear reactions. The student will also be able to understand radioactive decays, radioisotopes, particle accelerators, ionization chamber and cosmic ray analysis. The second portion of the course will make the students to get knowledge about different aspects of electronics such as semiconductors, diode, rectifiers and their efficiency, power transfer theorem, transistor, amplifiers and oscillators. The course also helps student know the electromagnetic theory using Maxwell's equations. The last part of the course includes Solid state physics that helps the students to understand different states of substances such as crystalline, amorphous, crystal systems, bravais lattice, bonding in solids and free electron theory in metals.
E 602(Pr)	Practical	This course will help the students to do different physics experiments such as determination of g by Kater's pendulum, determination of J by Joule's calorimeter, determination of minimum deviation of light rays by prism, assemble of different gates using diode and transistor and characteristics of PN diode and zener diode.
M-104	Asomiya Sahityor Buranji Aru Lipi	Students will learn about the Folk literature. They will be aware of three stages of Old Assamese Literature: Pre Sankari, Sankari& Post Sankari Literature. They will be ware of Assamese scripts.
M-105	Prachin Asomiya Kobita	The Students will be aware of classical literature as well as Charyyapada.
M-204	Asomiya Sahityor Buranji	The students will learn about the post Sankari literature and its different stages. They will be concerned to the Arunodai, Jonaki and Avahan era also.
M-205	Adhunik Asomiya Kobita	The students will given a concrete idea on Assamese Romantic poetry as well as Realistic (Sampratic) poetry. They will be ware of different poets of this period.
M-304	Asomiya Bhasa	The students will be concerned with the history of Assamese Language from Vaidic to modern Assamese through Pali –Prakrit and Apabhransa. They will be concerned with the Phonetical, morphological and Lexical changes of language.
M-305	Asomiya Sahityor Bisesh Adhyayan	The students will provide knowledge about the great Saint Sankardeva, his philosophy and literature. Those who selecte Lakshminath Bezbarua, they will get knowledge on his writings as well as his great contribution to the Assamese literature.
M-401	Asomiya Byakaran	The students will get knowledge on Assamese grammar, its history as well as structure of Assamese language with special reference to Phonology, Morphology and Lexicography.
M-402	Asomiya Jati Aru Sanskritir Parichaymulak Adhyayan	The students will get concrete knowledge on Assamese tribe and culture. They well be concerned with the unity and tradition of Assamese tribe as well as culture.
M-501	Purani Asomiya Natak	The students will get knowledge on rising and development of Assamese drama. They will get knowledge on the art of drama of Sankari and post Sankari period. The student will get knowledge as a public instruction of this period.
M-502	Purani Asomiya Katha Sahitya	The students will get knowledge on old Assamese prose literature. They will get a concrete knowledge of historical evolution of Assamese prose.

M-503	Brajabuli Sahityar Adhyayan	Brajabuli literature is the precious collection of Indian Vaishnavite literature. Though it is not a very large in collection but it has a great impact on Indian literature. Students will get benefited through its study.	
M-504	Pali Prakrit sahitya Aru Byakaran	Asssamese language is formatted from Sanskrit through Pali-Prakrit and Apabhrmsa, students will get knowledge about the formation and development through this stages.	
M-505	Sahitya Samalochana	Students will get knowledge of Western literary theory by its study. It will help them in creative writings.	
M-506	Bhasar Swarup	Students will get various knowledge of linguistics Aspects. They will be aware of definition of language, elements of language, language family and different sides of language.	
M-601	Adhunik Asomiya Natak	They will get a concrete idea of modern Assamese drama and trend of modern Assamese drama.	
M-602	Adhunik Asomiya Katha Sahitya	They will get knowledge of modern Assamese prose literature from Hem Chandra Barua to Banikanta Kakati.	
M-603	Adhunik Bharatiya Sahitya Adhyayan	Students will get concrete idea on Bangla And Hindi literature by the study of Ravindra Nath, Prem Chand , Manik Bandopaddhaya Rtc.	
M-604	Asomiya Chuti Galpa Aru Upanyas	Students will get concrete idea of Assamese short story, Novel and its trends.	
M-605	Chanda Alangkar	Students will get knowledge of structure of poetry, with special reference to metre and rhymes.	
M-606	Bhasa Bijnanar Parichay	Students will get knowledge of parts of phonology, morphology and Lexicography.	
E103	Asomiya Kabita	Students will get knowledge of old Assamese poetry, Romantic And modern Assamese poetry.	
E203	Asomiya Gadya	Students will get knowledge of Assamese prose.	
E-308	Asomiya Natak	Students will get knowledge of Assamese drama from Ankiya Natak to modern Asasamese . Eg. Social drama, Farce, one act play etc.	
E-408	Asomiya Chuti Galpa , Upanyas Aru Rachana	Students will get concrete knowledge of Assamese short story and novel. Study of essay writing will help them in creative writing.	
E-101	Asomiya Sahityor Buranji Aru Lipi	Students will get knowledge of classification of folk -literature. It will help them to know about the stages of Assamese literature & script.	
E-201	Asomiya Bhasa	The students will be concerned with the history of Assamese Language from Vaidic to modern Assamese through Pali –Prakrit and Apabhransa. They will be concerned with the Phonetical, morphological and Lexical changes of language.	
E-304	Asomiya Sahityor Buranji	The students will concerned of on post Sankari literature and its different stages. They will be concerned to the Arunodai, Jonaki and Avahan era also.	
E-403	Asomiya Byakaran	The students will get knowledge on Assamese grammar, its history as well as structure of Assamese language with special reference to Phonology, Morphology and Lexicography.	
E-503	Asomiya Kabita	The Students will be ware of classical literature as well as Charyyapada. The students will given a concrete idea on Assamese Romantic poetry as well as Realistic (Sampratic) poetry. They will be ware of different poets of this period.	
E-504	Asomiya Natak	Students will get knowledge of Assamese drama from Ankiya Natak to modern Assamese . eg. Social drama, Furse, one act play etc.	
E-603	Asomiya Gadya (Nirbachita Rachana)	The students will get knowledge on old Assamese prose literature. They will get a concrete knowledge of historical evolution of Assamese prose.	
E-604	Asomiya Chuti Galpa aru Upanyas	Students will get concrete idea of Assamese short story, Novel and its trends.	
ASM 1016	Rise and Development of Assamese Language	Students will acquire knowledge of regional languages of India. They will get knowledge about rock inscription. Copper inscription and relation between language and religion. As well as the language of Assamese literature.	
ASM 1026	History of Assamese Literature : 1889-2015	Students will get knowledge of about the history of Assamese literature and its trends. They will get knowledge about the technique different literary arts.	

ASM 1036	Study of Culture in Assam	The culture of Assam is full of diversity and integrity. As It is a land of different tribes, the culture of Assam is full of varieties. The course give knowledge the rise and development of the culture from Pre historic age to the modern period.
ASM 1046	History of Sanskrit Literature: History, Features and Genres	The course provide a concrete idea of Indian heritage & culture. The students will acquire knowledge real life through the old Kavya, Mahakavya and drama. They seem to feel proud by the study of old Indian literature.
ASM 1054	Creative Writing	The students can learn about creating writings This paper is teaching learning practice of all kinds of creative literature, such as poetry, dram short-story , novel etc.
ASM 2016	Assamese Poetry : 1889-2015	Through the selected pieces of Assamese Romantic and realistic poems of Assamese literature students will get a concrete ideas of Characteristics features of Assamese poetry.
ASM 2026	Assamese Prose : 1846-2015	Through the selected pieces of prose literature students will get idea of Assamese prose literature.
ASM 2036	Assamese Drama and Performance : 1857-2015	Through the study of selected dramas students will acuire knowledge of Assamese drama and its different aspects.
ASM 2046	Indian Criticism	The students will get idea of eastern criticism, such as Guna, Ritivada as well as Bhaktivada etc.
ASM 2054	Editing	This will help students to acquire practical knowledge about the editing. eg book editing, Magazine editing etc.
ASM 3016	Assamese Novel: 1890-2015	Students will get ideas of Assamese novel from the beginning to 2015 by the study of the selected novels of the syllabus.
ASM 3026	Translation : Theory and Practice	Theory of translation is become an important subject of this time. Its has great significance in economical, political, social as well as scientific and literary aspects. The theoretical and applied knowledge will help in self establishment also.
ASM 3066	Varieties of Assamese Language	Students will get idea of the main dialects of Assamese: Dialect of Upper Assam, middle Assam and lower Assam. At the same time they get knowledge of Ethnic language and tribal dialect and its characteristics.
ASM 3096	Assamese Vaisnavite, Saiva and Sakta Literature	Students will be concerned about the Bhakti movement of India and Assam and Bhakti Dharma and its philosophical aspects. They get knowledge of of Saiva, Sakta literature and Puranas. It seem to be increase their spiritual feelings.
ASM 4016	Textual Criticism and Manuscript Reading	Textual Criticism and manuscripts reading is an important subject. By the study of old manuscripts students will aware of illustrated manuscripts.
ASM 4026	Applied Linguistics	Students will get knowledge different theories of Applied linguistics and modern linguistics.
ASM 4046	Assamese Short Story : 1889-2015	Students will get knowledge of the trends of Assamese short story of nineteenth and twentieth centuries .
ASM 4086	Western Literary Criticism	Through the study of Areastotle , Longinus, Eliot students will be aware of the influence of this literate. Students also get opportunity to study of Modernism, post modernism, Sanjuktivada Post Sanjuktivada, Feminism etc.
101	Understanding Geography	The paper intends to acquaint the students with : Nature and scope of Geography: Geography as a spatial science, Geography as interdisciplinary and integrated discipline. .Development of Geography through ages – ancient, medieval, modern and contemporary .Physical Geography and Human Geography: Nature, Contents and Interrelationship. .Some basic concepts: spatial variation, spatio-temporal variation, spatial association, spatial interaction, spatial diffusion, spatial organization, human ecology, system concept.
102	Basis of Geomorphology	The aim of this paper is to acquaint the students with: • The place of Geomorphology in Physical Geography, Branches of Geomorphology – Structural, Fluvial, Glacial, Arid, Coastal and Tropical • Structure and composition of earth's crust and interior • Origin and development of major landforms. • Concept of Isostasy and Eustatism • Earth Movements - Orogenic and Epeirogenic movements • Mountain Building Theories. • Concept and theory of Plate Tectonics • Development of landforms under Normal, Arid and Glacial conditions. • Concept of relief and relief features – mountains, plateaus, hills, foothills, valleys, plains and floodplains.

103	Geomorphology Practical	This paper helps to make students understand: • Relief representation through serial profiles, superimposed profiles, composite profiles and projected profiles • Demarcation of basin and representation of basin relief through profiles and their interpretation Representation and Interpretation of Relief and Slope. • Expression of slope in gradient and percentage forms. • Preparation of Relative Relief Map. • Drawing and analysis of Average Slope Map. • Drawing of Longitudinal Profiles of (i) Himalayan and (ii) Indian Peninsular Rivers from Topographical Maps. • Mapping of the major crustal plates of the earth . Identification of Common Rocks and Listing of their Characteristics
201	Oceanography and Climatology	This paper tries to make aware its student with: . Nature and scope of Oceanography • Distributional pattern of land, sea and oceans • Bottom Relief of Oceans – Atlantic Ocean, Indian Ocean, Pacific Ocean • Waves and currents of Ocean water – Origin, type, characteristics and impact of ocean current and waves, • Ocean deposits- their types distribution and characteristics • Man and ocean: Ocean resources and their influences on man • Nature and scope of Climatology and its importance in Geography • Structure, composition and characteristics of Earth's atmosphere • Elements and factors of weather and climate • Distribution of temperature over the earth's surface.
202	World Regional Geography	The paper intends to acquaint the students with : • Brief regional account of the continents: Physiography, Climate, Natural Vegetation, Population growth, Density and distribution, major population density zones. • Developed and developing nations: Demographic, Social and Economic Profile. • Regional Geography of Asia: Location, Physiography, Climate, Population growth and distribution, agriculture and industries
203	Practicals on Oceanography, Climatology and World Regional Geography	This paper tries to make aware its student with: Drawing and interpretation of • Hypsometric/ hypsographic curves of land surface and ocean bottom • Bathymetric curves of Atlantic and Indian Oceans • Ocean currents on a Mercator's Chart • Major sea ports on a world map • Bottom relief features of Indian and Atlantic ocean • Construction of a schematic diagram of the vertical layers of earth's atmosphere and tabulation of compositional characteristics • Drawing and interpretation of rainfall-temperature-humidity graph of tropical, sub-tropical and temperate regions/stations • Drawing of climograph and hythergraph and their interpretation • Study of weather condition depicted by Indian Weather maps and prediction of weather conditions for next 48 hours • Calculation of average annual rainfall and variability of annual rainfall, and mapping and interpretation thereof • Showing trend of world population growth by line/bar graph • Mapping and interpretation of world population density • Demarcation of developed, developing and underdeveloped countries on a world map based onappropriate social and economic indicators • Showing location of the megalopolis, and metropolitan and port cities of the world • Mapping and interrelationship of climatic and vegetation zones of Asia. • Showing the distribution of major rivers and lakes on a map of Asia

301	Soil and Biogeography	This paper tries to make aware its student with: • Nature and scope of soil geography • Soil as a basic component of environment. • Soil profile (Soil horizon) – their characteristics and significance • Physical properties of soil: Soil texture, classification of soil according to texture • Chemical properties of soil: Soil colour, pH value • Processes and factors of soil formation • Soil types and their characteristics • Definition and scope of biogeography • Biosphere: its concept and components, vertical and horizontal limits of biosphere • Ecology and ecosystem: concept and relevance in biogeography • Concept of biodiversity, its types and conservational issues • Nature and distribution of biodiversity in N.E. India and Assam • Man as an agent of environmental/ecological change
302	Economic Geography	This paper tries to make aware its student with: • Meaning and scope, Approaches in economic geography. • Concept of resources and resource classification, conservation of resources. • Distribution and production of resources in global context: Forests, Coal, Iron ore, Water • Classification of economic activity • Agriculture: physical and socio-economic factors influencing agriculture; types of agriculture; major food crops and cash crops, their distribution and production. • Industry: Factors of industrial location, classification of industries, distribution and production some selected industries.
303	Practicals on Oceanography, Climatology and World Regional Geography	. Construction and interpretation of soil profile. • Drawing and interpretation of soil map of India/North East India • Mapping of vegetation of India/north east India • Representation of soil-vegetation relationship. • Mapping of the national parks and sanctuaries of India with the major species therein. • Cartographic representation of economic data of India/N.E. India in spatio-temporal contexts : pie-graph, line graph, bar graph and choropleth mapping • Trend analysis of production, etc. of India/N.E. India using moving average method • Transport network analysis using connectivity indices (alpha, beta & gamma). .Field study report.
401	Forms and Processes in Geography	This paper tries to make aware its student with: • Geomorphic agents: concept, types and processes • Endogenetic processes of folded and faulted landform development • Exogenetic processes of landform development. • Concept of drainage basin, catchment and watershed • River as a fluvio-geomorphic agent; evolution of drainage network and basin; drainage pattern and its relationship with underlying rock structure; development of basin landform features. • channel pattern, channel changes with time, characteristics of channel long and cross profiles • Flood, river bank erosion and landslide as geomorphic hazards – their causes, processes and impact on land and people. • Geomorphic Hazard Management and Planning
402	Human Geography	This paper tries to make aware its student with: • Development of Human Geography; Contributions of German and French Geographers. . Determinism, possibilism, human ecology and positivism; Schools: ecology, landscape, locational, welfare and humanistic. • Physical and human environment; impact of environment on man; impact of man on environment; environmental problems. • Human adjustment, mode of living and emerging problems in different environments: cold desert, mountain, plain, hot desert, coastal and riverine lands. .Major races : Physical characteristics and distribution of the major racial groups (Caucasoid, Mongoloid and Negroid); Origin and diffusion of major racial groups in the world; Linguistic and religious regions in the world.

403	Practicals on Geographic Processes	• Drawing and delineation of relief zones such as - Structural mountain zone, Hill zone, Plateau zone, Foot-hill zone, Piedmont zone, Alluvial plain zone and Floodplain and Active floodplain zone. • Delineation of different floodplain zones, e.g. occasionally flood-affected, chronically flood-affected and active floodplain zones from topographical map; identification, demarcation and naming of floodplain features with analysis of their development and associated geomorphic processes. • Delineation of a drainage basin from topographical map. Ordering of streams following Horton's and Strahler's methods and analysis thereon using Bifurcation Ratio. • Preparation of stage-discharge hydrograph. • Analysis of stage-discharge relationships (taking mean monthly data) with the help of regression technique. • Channel pattern analysis: Drawing of three representative sections of river channels of the Brahmaputra or its tributaries representing straight, meandering and braided channel patterns and their comparative analysis in terms of forms and associated processes of their development • Analysis of geometry of meanders, calculation of sinuosity index and braiding index (Brice method, 1964) to analyse channel pattern.
501	Concept of Regional Development Planning &Geography of Development of USA and Japan	This paper tries to make aware its student with: • Concept of Region, Regionalism and Regional Planning • Concept of Development, Sectoral Development and Regional Development, and development indicators. • Resource base of Japan and USA: Natural and Human • Development Policies of Japan and USA • Sectoral Development Patterns in USA and Japan • Regional Development Patterns in USA/Japan • Industrial Location factors in Japan and USA • Iron and Steel Industries in Japan and USA • Ship-building Industries in Japan • Automobile Industries in USA
502	Regional Geography of India and SAARC Nations	This paper tries to make aware its student with: • Locational significance, unity and diversity • Physical Environment: Physiographic Characteristics – climate, soil and natural vegetation • Population characteristics: Peopling growth, distribution, density, structure and composition • Agriculture: Agricultural development and Indian economy, modernization of Indian agriculture, agro-climatic regions and special characteristics, agricultural trade. • Industry: Industrial development and Indian economy, distribution production pattern of major Industries (Iron and steel, cotton textile, petrochemicals, sugar, paper and cement industries), Industrial policies and industrial trade. • Transport: Roads and railways, air transport and pipe transport .Regional Geography of SAARC Nations: Locational significance, unity & diversity, conflict & co-operation, trade & commerce.

503	Cartographic and Qualitative Methods	The paper intends to acquaint the students with : . The nature and scope of cartography, development trend, traditional versus modern Geography • Concept of base map and map types, map design and layout Thematic mapping types and techniques • Principles of plane and geodetic surveying • Principles of triangulation • Principles and techniques of surveying by Plane Table, Prismatic Compass, Dumpy Level and Theodolite; Principles of traversing, contouring and leveling • Map projection – Definition, classification and history of map projections • Basic principles of constructing Zenithal, cylindrical and conical projections • Concept of orthomorphism, equal-area, equi-distance • Quantification in Geography. • Sampling techniques and their utilities in geographical studies • Measures of central tendency and dispersion and their application in geographical studies • Time series analysis techniques: Moving average and least squares methods • Concept of correlation; Application of linear bi-variate correlation and regression analysis in geographical studies
504	Population and Settlement Geography	The paper intends to acquaint the students with : .Meaning and scope of population geography; Malthus theory of population growth; and Demographic Transition Model .Components of population growth; trend of world population growth; factors influencing distribution and density of population; major population density zones in the world; Definition, types, and causes and consequences of migration. .Age-Sex composition; literacy and education; and work participation and occupational composition; concept of population-resource relationship with reference to optimum population, over population and under population. .Meaning and scope of settlement geography; concept of hierarchy of settlements and Christaller's Central Place Theory. .Factors influencing origin and growth of rural and urban settlements; Morphology and functional characteristics of rural and urban settlements.
505	Practicals on Cartographic Methods (Surveying and Map Methods)	· Plane table surveying (Radiation & Intersection methods) • Traverse Surveying with Prismatic Compass and Theodolite (Open and Closed Traverse); Computation of Reduced Bearing, Consecutive and Independent Co-ordinates. • Profile leveling and contouring by Dumpy Level / Theodolite. • Construction of graticules based on Mathematical derivation and calculation ; (a) Zenithal group (polar cases)- Gnomonic, Stereographic, Orthographic, Equal-area (b) Cylindrical group : Cylindrical equal area and Gall's Stereographic projection. (c) Conical Group: Conical Projection with two standard parallels and Bonne's Projection. (d) Conventional Group : Sinusoidal. • Choropleth mapping by grouping the data following Natural Break, Equal interval and Standard Deviation method (Density of population/Land Use/Cropping pattern. • Pie-graph for representation of land use, cropping pattern, rural-urban composition, etc.

506	Practical on Cartographic and Qualitative Methods	• Population data representation and interpretation - Trend of Growth, Calculation of Growth Rates and Population Projection of Assam and North East India or India. • Construction of Age-Sex Pyramid for developed and less developed countries. • Enlargement and Reduction of Maps by Graphical and Instrumental Methods. • Reading and Analysis of Topographical Maps. • Preparation of Thematic Map/and Generation of Data from the topographical maps (land use map and area under different land-use categories) • Weather Map Interpretation and Analysis, Study of Temperature, Pressure, Wind system, Rainfall, Cloud condition, Sea condition, etc. and weather prediction. • Computation of Measures of Central Tendency, Standard Deviation and Coefficient of Variation for a given sets of geographical data. • Determination of Spatial Mean and Median Centres of Settlements, Services and Population using Cartographic Measures. • Computation and Interpretation of Correlation Coefficient by Spearman's and Karl Pearson's Method for a given geographic data set including t-test • Linear Regression Analysis for bi-variate geographic data sets.
601	Environment and Development	The paper intends to acquaint the students with : . Concept of Environment, Environmental Issues • Concept of Development, Sustainable Development • Concept of Environment and Development: Ethical, Ecological and Socio-Economic Issues • Major Environmental Problems: Climate Change, Desertification, Environmental Pollution (Air, Land and Water), Earthquake and Flood Hazards • Concept of Sustainable Management • Management of Environment and Development: Role of Geography • Management of Earthquake and Flood Hazard
602	Social and Political Geography	The paper intends to acquaint the students with : • Meaning, nature and scope of Social Geography • Approaches to the study of Social Geography Concepts in Social Geography : Society and environment, type of society, Social Space, Social differentiation and integration • Urbanization, westernization and social change • Nature, scope and subject matter of political geography Approaches to the study of political geography • State, nation, nation-state and nation building
603	Regional Geography of N.E. India with Special Focus on Assam	The paper intends to acquaint the students with : • Physical characteristics : Physiography, drainage, climate, soil and natural vegetation • Population characteristics : peopling ,growth, distribution and density, age sex composition, rural-urban composition and religious composition. • Economic basis : Agriculture and Industries. • Transport and communication system • Disparity in socio-economic development; socio-economic problems • Regions of Assam and their population, agriculture and industrial characteristics (Brahmaputra valley, the Barak Valley, Hill region) • Tourism and its potentiality in Assam • Biodiversity and its conservation issues

604	Principles and Applications of Remote Sensing, GIS and GPS	This paper tries to make aware its student with: • Basic concept of Remote Sensing • Components of Remote Sensing – Electromagnetic Radiation (EMR), Sensors and Sensor carrying platforms • Types of Remote Sensing – Aerial Remote Sensing and Satellite Remote Sensing • Concept of photogrammetry, Types of aerial photographs, Elements of vertical photographs • History of Remote Sensing, Development of Aerial and Satellite Remote Sensing in India • Applications of Remote Sensing in Geographical studies. • Introduction to GIS – Definition and components of GIS • Functional units of GIS • Nature and types of Geographic data: spatial and non-spatial • Spatial data structure – Raster and Vector data • Applications of GIS in thematic representation and analysis of change and spatial interrelationship of various geographical phenomena (including physical and cultural resources) • Concept of GPS • Functions and working principles of GPS • Geographical data acquisition techniques • Application of GPS in geographical surveying and mapping of geographical features
605	Practical on Advanceed Techniques in Geography	· Visual interpretation of aerial photograph: Identification and mapping of physical/cultural features from the aerial photograph using stereoscope, determination of scale from aerial photographs • Visual interpretation of satellite imagery: delineation and mapping of physiographic units from satellite images • Identification and drawing of physical/cultural features from satellite imagery • Geographical (spatial and non-spatial) data entry, tabulation, and charting bar graph, pie graph) etc. using MS Excel or any Spreadsheet/Graphic programme • Spatial Data input for GIS application : map and satellite image scanning and editing • Georeferencing (geocoding) of maps and satellite image, digitization and data layer creation. • Data transformation: Raster to Vector and Vector to Raster model using appropriate software (ILWIS/Arc GIS) • Mapping of various geographic features (point, line, area/polygon) from the image using Arc GIS/ERDAS imagine/ ILWIS • Surveying and mapping of an area/plot of land with physical/cultural features using GPS,
606	Project Work	Students are directed to prepare a Project report individually with statement of the problem, significance of the problem, objectives and methodology including appropriate data collection, processing and analysis method and chapter plan. This will help them in future research work.
E101	Physical Geography I	This paper tries to make aware its student with: .Nature and Scope of Physical Geography .Types of Landform – First, Second and Third Order. ,Endogenetic and Exogenetic forces. Weathering, erosion , transportation and deposition. .Cycle concept in Geomorphology. .Ocean bottom, marine resources and economic importance and major ocean currents and its impact on economy and Climate.
E201	Physical Geography II	This paper tries to make aware its student with: Atmosphere – its composition and structure. Elements of weather. Heat zones and global wind system. Monsoon, Indian monsoon and its characteristics. Meaning , scope of Biogeography. Ecosystems. Major biomes of the world. Nature and scope of soil geography. Soil Profile, Soil types and Soil formation.
E301	Human Geography	

E302	Practical on Physical Geography	The paper intends to acquaint the students with : Relief representation techniques, Conventional symbols used in topographic maps, Drawing and interpretation of weather maps. Drawing of distributional maps – Natural vegetation, national parks, soil types etc. of Assam.
E401	Cartographic and Qualitative Techniques in Geography	The paper intends to acquaint the students with : Importance of cartography in geographic studies, Thematic mapping – types and characteristics. Surveying, Remote sensing and Global positioning system and concept of GIS. Measures of central tendency, Correlation co-efficient and its usefulness in Geographic studies.
E402	Practical on Human Geography	The paper intends to acquaint the students with : Population data representation : Population growth, density, distribution, territorial distribution of tribal communities, etc. of Assam/ N.E. India/India. Drawing of different types of settlements. Major house types of Assam /N.E. India/ India Drawing of urban centres of Assam/N.E. India/India.
E501	Regional Geography	This paper tries to make aware its student with:
E502	Cartographic and Qualitative Techniques (Practical)	This paper tries to make aware its student with:
E601	Economic, Political and Environmental Geography	This paper tries to make aware its student with:
E602	Map Work and Interpretation (Practical)	This paper tries to make aware its student with: Regional profile of the world at continent level – Physical, population and economic. Asia –Location, Physiography, climate, vegetation, population, agriculture and industries. India -- Location, physiography, climate, vegetation, population, agriculture and industries Assam - Location, physiography, climate, vegetation, population, agriculture and industries
1.1. B.Sc.IT	Communicative English	This course is designed to introduce students to aspects of effective communication, both oral and written. Various units of the paper are expected to acquaint I.T. students with various levels of communication necessary in everyday life, the emphasis throughout is on helping them acquire the basic skills- particularly the ability to write and speak plain and correct English.
1.2.	Mathematics –I	This paper gives the depth knowledge of sequence and series as well as infinite series and comparison test ,ratio test etc. Geometric representation of complex numbers the Argand palne. Study about De Moiver's theorem, Gregor's series , Hyperbolic functions. Depth study about Abstractr algebra i.e. Group theory, Ring Theory etc.
1.3.	Digital Logic	The student will be able to, Gain knowledge between different types of number systems, and their conversions. Design various Logic gates and simplify Boolean equations. Design various Flip Flops, Shift registers and determining outputs. Study different types of counters.
1.4.	Computer fundamental and Programming	Now computer use has become an essential skill to have. Whether we need to know how to complete school work, get a job, or for personal use; knowing the basics functions is essential. Computer Fundamental is the knowledge and ability to use computers and technology efficiently. Computer fundamental can also refer to the comfort level someone has with using computer programs and other applications that are associated with computers. Programming is important for speeding up the input and output processes in a machine. Programming is important to automate, collect, manage, calculate, and analyze processing of data and information accurately. Programming is important to create software and applications that help computer and mobile users in daily life. Due to all these reasons, it's really important to learn how to use programming languages in our daily life.
1.5.	Practical	Implementing basic mathematical calculation using C programming.
2.1.	Mathematics – II	To find out the roots of practical problems by studying mathematics section.

2.2.	ICT Hardware	ICT helps a user to know the various peripherals of computer systems and also the fundamental knowledge of computer like how a computer is assemble and also the knowledge of various utilities like driver installation, de-fragmentation etc.	
2.3.	Data Structure and Algorithm	This subject contains a basic concept of linear and non linear data structure. Brief description of static and dynamic memory allocation for example array and different types of linked lists. Various algorithms related to add and delete memories from array, linked lists, stacks, queues. Fundamental concept of trees and graphs. Concept of time and space complexity of various searching and sorting algorithms.	
2.4.	Operating Systems	This paper focuses on operating systems design and implementation. Topics include operating system architecture, process management, inter-process communication, memory management, and device drivers. Practical work will include programming in an operating system.	
2.5.	Practical	The practical introduces to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like windows OS linux OS etc. Applying the data structure like stack,queue,array, linked list implementation using C language	
3.1.	Environmental Studies	Study of natural resources, environment and need for public awareness. Descriptive study upon shortfalls of pollution, using crud oils heavily.	
3.2.	Computer Organization	This paper gives the concept of how a computer system internally correlates with its basic components with their functional units, study of instruction and instruction's format, addressing modes. Study various data transfer techniques in digital computer. Provides a good concept in control logic design i.e. Hardware and Micro programmed CPU organization with assembly language programming. Clear study about interrupts and DMA access control and address translation in working mode of a system.	
3.3.	Object Oriented Programming	Based on C++ language. Concept of classes and objects. Helps in basic concept of object oriented programming.	
3.4.	Database Management System	DBMS is important because it manages the data efficiently and allows users to perform multiple tasks on it with the ease. Without DBMS, we might have to do it manually and would have taken more time. Also DBMS helps preserving the data in many forms and which we can use anywhere and may be after ages, to keep a record of what we have done to what we will do, everything has to be kept in form of some record. And DBMS provides efficient ways to accomplish that task. DBMSs include MySQL, Microsoft SQL Server, Oracle, IBM DB2 etc.	
3.5.	Practical	By using object oriented features like inheritance, polymorphism, overloading, abstraction etc for build a program. Detail use of objects and classes in practical.	
4.1.	Programming in Java	Concept of core java programming. Concept of complete object oriented programming. Programs related to creation of basic designs.	
4.2.	Software Engineering	Software Engineering applies the knowledge and theoretical understanding gained through computer science to building high-quality software products. As a maturing discipline, software is becoming more and more important in our everyday lives. There is a growing need for talented software developers across every industry. As technology advances, the ability to build quality software while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.	
4.3.	Data Communication and Computer Networks	Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model. Classify the routing protocols and analyse how to assign the IP addresses for the given network. Describe the functions of data link layer and explain the protocols. Explain the types of transmission media with real time applications	
4.4.	Theoretical Foundation of Computing	To understand the relation between Regular Language and Finite Automata and machines. Understand, design, construct, analyse and interpret Regular languages, Expression and Grammars. Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator. Design different types of Push down Automata as Simple Parser. To learn how to design PDA as acceptor and TM as Calculators.	

4.5.	Practical	Implementing pure object oriented programming. Making basic designs using core java. Demonstration about features of java like platform independent programming.
5.1.	Compiler Design	Programming language are more important for computer science. It gives the knowledge about various programming language. But Compiler provides the theoretical and practical knowledge that is needed to implement a programming language.
5.2.	Web Technology	Concepts of webpage and websites. Client and server side scripting language. Basic HTML and XHTML for designing. Description about web server architecture and working. Helps to design webpage and small websites.
5.3.	Computer Graphics	To list the basic concepts & components used in computer graphics. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. To describe the importance of viewing and projections. To design an application with the principles of virtual reality. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
5.4.	Microprocessor	This paper gives i. Differentiate various types of computers and processors. ii. Knowledge regarding the inner blocks of processor and their specific functions iii. Knowledge in types of instructions and their usages. iv. Write different program using instructions of 8085 microprocessor v. Differentiate various interrupts with their priorities.
5.5.	Practical	
6.1.	System Administration	Make appropriate decisions during the configuration process to create a properly functioning linux environment. Use programs and utilities to administer a linux machine. Explain how a linux server can be integrated within a multi platform environment. Analyze the need for security measures for a linux environment.
6.2.	System Analysis And Design (Electives)	Systems analysis and design, as performed by systems analysts, seeks to understand what humans need to analyze data input or data flow systematically, process or transform data, store data, and output information in the context of a particular business. Furthermore, systems analysis and design is used to analyze, design, and implement improvements in the support of users and the functioning of businesses that can be accomplished through the use of computerized information systems.
6.3.	Practical	This paper helps the student to implements the Linux commands. Creating shell program in Linux environment.
6.4.	Project	The outcome of the project is to train train the students to independently search, identify and study real life important topics in CS/IT to developed skills among students in particular field of CS/IT and to expose students to the world of technology, innovation and research.
BCA1.1	Computer Fundamental & ICT Hardware	Now computer use has become an essential skill to have. Whether we need to know how to complete school work, get a job, or for personal use; knowing the basics functions is essential. Computer Fundamental is the knowledge and ability to use computers and technology efficiently. Computer fundamental can also refer to the comfort level someone has with using computer programs and other applications that are associated with computers. ICT helps a user to know the various peripherals of computer systems and also the fundamental knowledge of computer like how a computer is assemble and also the knowledge of various utilities like driver installation, de-fragmentation etc.
BCA1.2	Communicative English	This course is designed to introduce students to aspects of effective communication, both oral and written. Various units of the paper are expected to acquaint I.T. students with various levels of communication necessary in everyday life, the emphasis throughout is on helping them acquire the basic skills- particularly the ability to write and speak plain and correct English.

BCA 1.3	Introduction to C Programming	**Programming is important for speeding up the input and output processes in a machine. Programming is important to automate, collect, manage, calculate, and analyze processing of data and information accurately. Programming is important to create software and applications that help computer and mobile users in daily life. Due to all these reasons, it's really important to learn how to use programming languages in our daily life.**
BCA1.4	Mathematics – I	This paper gives the depth knowledge of sequence and series as well as infinite series and comparison test ,ratio test etc. Geometric representation of complex numbers the Argand palne. Study about De Moiver's theorem, Gregor's series , Hyperbolic functions. Depth study about Abstractr algebra i.e. Group theory, Ring Theory etc.
BCA1.5	Laboratory - C Programming (BCA 1.3) and ICT Hardware (BCA 1.1)	Implementing basic mathematical calculation using C programming. ICT helps a user to know the various peripherals of computer systems and also the fundamental knowledge of computer like how a computer is assemble and also the knowledge of various utilities like driver installation, de-fragmentation etc.
BCA 2.1	Data Structure and Algorithm	This subject contains a basic concept of linear and non linear data structure. Brief description of static and dynamic memory allocation for example array and different types of linked lists. Various algorithms related to add and delete memories from array, linked lists, stacks, queues. Fundamental concept of trees and graphs. Concept of time and space complexity of various searching and sorting algorithms.
BCA 2.2	Computer Based Accounting and Financial Management	Computerized accounting allows users to input information into accounting software programs. Accounting software processes data and creates reports much faster Calculations are done automatically in software programs, minimizing errors and increasing efficiency. Once data is input, you can create reports literally by pressing a button in a computerized system.
BCA 2.3	Digital Logic Fundamentals	The student will be able to, Gain knowledge between different types of number systems, and their conversions. Design various Logic gates and simplify Boolean equations. Design various Flip Flops, Shift registers and determining outputs. Study different types of counters.
BCA 2.4	Mathematics – II	To find out the roots of practical problems by studying mathematics section. Basic knowledge of calculus, limit ,functions ,derivations etc.
BCA 2.5	Laboratory - Data Structure and Algorithm (BCA 2.1) and Accounting and Financial Management (BCA 2.2)	Applying the data structure like stack,queue,array, linked list implementation using C language. Time and space complexity of those algorithms. Basic accounting using Tally software. Creation of trading, profit and loss account and balance sheet.
BCA 2.6	Environmental Studies	Environmental studies is a multidisciplinary academic field which systematically studies human interaction with the environment in the interests of solving complex problems. Environmental studies brings together the principles of the physical sciences, commerce/economics and social sciences so as to solve contemporary environmental problems. It is a broad field of study that includes the natural environment, the built environment, and the sets of relationships between them. The field encompasses study in basic principles of ecology and environmental science, as well as associated subjects such as ethics, geography, anthropology, policy, politics, urban planning, law, economics, philosophy, sociologyand social justice, planning, pollution control and natural resource management.
BCA 3.1	Software Engineering	Software Engineering applies the knowledge and theoretical understanding gained through computer science to building high-quality software products. As a maturing discipline, software is becoming more and more important in our everyday lives. There is a growing need for talented software developers across every industry. As technology advances, the ability to build quality software while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.
BCA 3.2	Computer Organization and Architecture	This paper gives the concept of how a computer system internally correlates with its basic components with their functional units, study of instruction and instruction's format, addressing modes. Study various data transfer techniques in digital computer. Provides a good concept in control logic design i.e. Hardware and Microprogrammed CPU organization with assembly language programming. Clear study about interrupts and DMA access control and address translation in working mode of a system.

BCA 3.3	Database Management System.	DBMS is important because it manages the data efficiently and allows users to perform multiple tasks on it with the ease. Without DBMS, we might have to do it manually and would have taken more time. Also DBMS helps preserving the data in many forms and which we can use anywhere and may be after ages, to keep a record of what we have done to what we will do, everything has to be kept in form of some record. And DBMS provides efficient ways to accomplish that task. DBMSs include MySQL, Microsoft SQL Server, Oracle, IBM DB2 etc.	
BCA 3.4	Object Oriented Programming in C++	Based on C++ language. Concept of classes and objects. Helps in basic concept of object oriented programming.	
BCA 3.5	Laboratory - C++ programming (BCA 3.4) and DBMS (BCA 3.3)	By using object oriented features like inheritance, polymorphism, overloading, abstraction etc for build a program. Detail use of objects and classes in practical. Implementation of different types of SQL queries like insert, update, delete, view etc. Also study about database normalization and basic concept to create the backend of a project.	
BCA 4.1	Operating System	This paper focuses on operating systems design and implementation. Topics include operating system architecture, process management, inter-process communication, memory management, and device drivers. Practical work will include programming in an operating system.	
BCA 4.2	Web Technology	Concepts of webpage and websites. Client and server side scripting language. Basic HTML and XHTML for designing. Description about web server architecture and working. Helps to design webpage and small websites.	
BCA 4.3	Java Programming	Concept of core java programming. Concept of complete object oriented programming. Programs related to creation of basic designs.	
BCA 4.4	Minor Project	In web technology students need to develop a frontend design of a software using html and dhtml. Java is used to create server side scripting of that particular software.	
BCA 4.5	Laboratory - Operating System (BCA 4.1), Web Technology (BCA 4.2) and Java Programming (BCA 4.3)	Concept about creating Shell program along with html css. Description about Visual Basic to develop application program. Core java Program	
BCA 5.1	System Administration using Linux	Make appropriate decisions during the configuration process to create a properly functioning Linux environment. Use programs and utilities to administer a Linux machine. Explain how a Linux server can be integrated within a multi platform environment. Analyze the need for security measures for a Linux environment.	
BCA 5.2	Computer Networks	Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model. Classify the routing protocols and analyse how to assign the IP addresses for the given network. Describe the functions of data link layer and explain the protocols. Explain the types of transmission media with real time applications	
BCA 5.3	Open Source Software	The term "open source" refers to something people can modify and share because its design is publicly accessible. The term originated in the context of software development to designate a specific approach to creating computer programs. Today, however, "open source" designates a broader set of values—what we call "the open source way." Open source projects, products, or initiatives embrace and celebrate principles of open exchange, collaborative participation, rapid prototyping, transparency, meritocracy, and community-oriented development.	
BCA 5.4	Elective – 5.4	This paper gives i. Differentiate various types of computers and processors. ii. Knowledge regarding the inner blocks of processor and their specific functions iii. Knowledge in types of instructions and their usages. iv. Write different program using instructions of 8085A microprocessor Differentiate various interrupts with their priorities.	
BCA 5.5	Laboratory - System Administration using Linux (BCA 5.1) and Open Source Software (BCA 5.3)	This paper helps the students to implement the open source software packages like Latex, Python and Scilab.	
BCA 6.1	Elective 6.1	This paper brings the concepts of documenting software development activities.	

BCA 6.2	Elective 6.2	This paper helps the students about proper utilization of Information Technology.
BCA 6.3	Project Work	The outcome of this project work for developing such a computerization system is to reduce the paper work and save time of management tasks. Thereby increasing the efficiency and decreasing the work load. This project work provides the flexibility of generating the required documents on screen as well as on printer as and when required
M104 P.Sc.	Political Theory-I	Unit 1: The contents of this unit will impart the students about the meaning of political theory. Students can know about the importance of Political theory and various approaches for the study of political science. Unit 2: This unit deals with the concept of power, authority and legitimacy. Students can learn about the various natures, kinds and sources of power, authority and legitimacy. Unit 3: This unit will provide the students about the dimensions of Marxism, liberalism and ideology. Unit 4: This unit will provide the learners about insights the liberal, Marxist and Gandhian perspective of state. And dimension of sovereignty and globalization can be studied in this unit.
M105	Politics in India-I	U-1: This unit will provide the students various aspects of Indian constitution as for example: Colonial legacies, Acts, Legacies of national movement etc. It deals with the Constitutional developments during freedom movement. U-2: This unit studies about the Preamble, fundamental rights & Duties, Directive Principles of state policy of Indian constitution. U-3: This unit imparts the students about various aspects of President and prime Minister, Lok Sabha, Rajya Sabha Governor and Chief Minister state legislature. U-4: Students can have the knowledge about the importance and working of Judiciary system in India.
M204	Political Theory-II	U-1: The objective of this paper is to provide the various aspects of Democracy. It deals with Elitist, Pluralist and Marxist theory of democracies. U-2: Students can have Understanding about the: • Broad meaning of Liberal and Marxist perspectives on development. • Alternative views of development: sustainable development, human development and Gandhian model of development U-3: This unit acquaint the student about the Justice and Multiculturalism in the world. U-4: This unit will give knowledge about the • Nature of state in third world • Neo-colonialism: basic features • Dependency theory: views of Andre Gunder Frank
M205	Politics in India-II	U-1: This unit focuses the dimension of Centre- state relations in India. U-2: This unit deals with the Party system in India. It covers the aspects of National parties-INC, BJP, CPI, CPM and Regional parties-DMK and AGP etc. U-3: This unit has the aim of providing the working of Election system in India such as: • First past- the- post system • Proportional representative system • Election commission • U-4: This unit acquaint the awareness and dimensions of Challenges to National Integration such as: • Terrorism • Regionalism • Casteism

M304	International Relations-I	U-1: This unit will provide the students about the Evolution, Nature, and Scope of International Relations. U-2: This unit studies about the Liberalism approach, Realism of Morgenthau, K. Waltz and Systems theory- M. Kaplan. U-3: This unit will provide the Basic concepts in International Relations such as: • Balance of Power • Collective security • National Interest and ideology U-4: This unit can provide about the aspects of First world war, Second world war and Cold war.
M305	Public Administration-I	U-1: This unit deals with the Concept, Scope, growth and importance of public administration. It gives the knowledge of Good Governance and new public management. U-2: This unit deals with the Scientific management theory, Bureaucratic theory, Human relations theory. U-3: This unit will give knowledge to students about the Hierarchy-Span of control-unity of command. It also studies the aspects of Centralization-Decentralization and Supervision-coordination-delegation etc. U-4: This unit reflects the aspects of Line and staff and its functions. It highlights the functions of Chief executive. It also studies the Department, public corporations, independent regulatory commissions etc.
M404	International Relations-II	U-1: This unit deeply studies basic Foreign policy, diplomacy, Conflict resolution and Non alignment. U-2: This unit will acquaint the students about the broad knowledge of formation and role United Nations in the world. It also highlights the UN and Millennium Development Goals. U-3: This unit studies about the Concept of security-traditional and non-traditional. It covers the issue of arms control and Nuclear non proliferation U-4: This unit provide various dimensions of • Colonialism and neo-colonialism • IMF, World Bank, WTO • Impact of globalization on third world economies
M405	Public Administration-II	U-1: This unit will help the students to acquire knowledge regarding various aspects of recruitment and Public service commission. It also highlights the Importance of civil service in modern state. U-2: This unit deals with the Financial Administration such as • budgeting • Budgetary process • Performance Budgeting etc. U-3: This unit provides broad insights of Development Administration, viewed by Fred W. Riggs. It also reflects the aspects of Bureaucracy and development. U-4: This unit intends to impart the varius dimensions of Concept of accountability, Control over administration, Redressal of public grievances-Lok Pal, Lokayukta, RTI etc.
M501	Western Political Thinkers	U-1: This unit will help the students to study about the contribution of Greek Political Thinkers such as Plato, Aristotle. U-2: This unit studies about the thoughts of Medieval and Early modern thinkers such as St. Augustine and Machiavelli. U-3: This unit deals with the discourse of the Contractualists such as Hobbes, Locke, and Rousseau. U-4: This unit provides the students the tenets of Marxian political thought.
M502	Select Constitutions-I	U-1: This unit studies about various aspects of Constitution and Constitutionalism. U-2: This unit highlights the entire aspects of constitution and political system of the United Kingdom. U-3: This unit elaborates about the constitution and political system of United states of America. U-4: This unit has a comparative study of UK and US constitutions and political systems. It also highlights about the comparative study of speaker of U.S and U.K.

M503 B	General Sociology-I	U-1: This unit deals with the Definition, growth and scope of sociology. It also reflects the relationship of sociology with political science, Economics and history. U-2: This unit deals with the in-depth study of Historical method, Statistical method, Scientific or experimental method and Social survey method. U-3: This unit reflects about the Key concepts of sociology such as Family, society, community, role and status. U-4: This unit studies various dimensions of Social stratification. It also studies about the nature of caste and class. It also covers the concept and nature of Gender.
M504 A	Contemporary Political Issues	U-1: This unit provide dimension of environmental issues to learners. It reflects the Brundtland commission report, sustainable development, Rio declaration and Copenhagen declaration. U-2: This unit emphasize upon various issues of Terrorism and kinds of terrorism. It emphasizes the study of terrorism in terrorism in north east India. U-3: This unit studies Human development & human security with reference to HDI and HPI. U-4: This unit deals with gender exclusion and gender justice. This unit includes Beijing declaration, 1995 and emphasizes on gender development & gender budgeting.
M505 B	Political Sociology-I	U-1: This unit elaborately studies historical development of political sociology. It focuses the Subject matter and utility of political sociology U-2: This unit highlights the various aspects of Political culture. U-3: This unit deals with study of agencies and role of socialization. U-4: This unit will help the students to acquire the knowledge of problems of political mobility.
M506 B	Human Rights	U-1: This unit deals with the growth and evolution of human rights. U-2: This unit studies various approaches and perspectives such as • Universal Approach • Cultural Relativist Approach • Marxian Perspective U-3: This unit highlights various human rights acts such as International bill of rights-UDHR, ICCPR, ICESCR, Optional Protocols. It also covers the study on convention on elimination of all forms of discrimination against women, convention on rights of the child. U-4: This unit focuses on following aspects • Amnesty International • Human rights watch • International committee of the red cross
M601	Indian Political Thinkers	U-1: This unit studies the political thought of Manu and Kautilya. It also emphasize on Manu's view on caste and women. U-2: This unit studies about the political thought and contributions in social reforms of Raja Ram Mohan Roy and Phule. U-3: This unit reflects the political thought and contributions of M.N. Roy and Gandhi. U-4: This unit studies elaborately about the political thinking and contributions of Nehru, Ambedkar and J.P Narayan towards the development of India.
M602	Select Constitutions-II	U-1: This unit deals with the entire political system of Peoples republic of China. The president and the state council are studied in this unit. U-2: This unit highlights the various rights of citizens of China. It also reflects the aspects of party system of China. U-3: This unit provides various aspects of political system of Switzerland. U-4: This unit focuses the working of Direct Democracy of Switzerland. It also reflects the working of Political parties and interest groups.
M603 D	General Sociology-II	U-1: This unit broadly studies about the Meaning, Evolution, Variability and Functions of Culture. U-2: This unit explores various dimensions of Social Control in the society. U-3: This unit elaborates about various theories of Social Change. U-4: This unit studies about the process and factors of the process of socialization.

M604 C	Contemporary Political Ideologies	U-1: This unit studies about the Neo-liberalism and Neo-liberal state of Hayek and Nozick. U-2: This unit deals with various trends of Feminism. It also covers the Different forms of feminism viewed by Liberal and Marxist. U-3: This unit explains about various trends and dimensions of Religious Fundamentalism in the world. It has special emphasis on terrorism of Asia. U-4: This unit studies about the emergence and working of multiculturalism in the society. It reflects the trends of multiculturalism in India.
M605 D	Political Sociology-II	U-1: This unit deals with the Elite theories of Pareto, Mosca, Mitchell and C. Wright Mill based on political power. U-2: This unit studies about various aspects of Political Change in the society. U-3: This unit will help the learners to acquire knowledge about the concept of political development and modernization. U-4: This unit studies about the bureaucracy, society and politics.
M606 D	Human Rights in India	U-1: This unit deals with the origin and development of human rights in India. It also mentions about the Protection of Human Rights Act, 1993. U-2: This unit studies: • National human rights commission and Assam Human Rights Commission • National Commission for Women • National commission for S.C and National commission for S.T for the protection of human rights. U-3: This unit studies: • Rights of Indigenous people • Terrorism in NE India • Environmental Issues-Narmada Bachao movement, Chipko movement. U-4: This unit explores the human rights of vulnerable groups such as women, children, and minority.
E101	Political Theory -I	U-1: This unit deals with the Concept and Approaches to the study of political science. It covers Philosophical approach, Legal-Institutional approach, behavioural and post behavioural approach. U-2: This unit studies about various aspects of power, authority and legitimacy. U-3: This unit mentions about the dimensions of major concepts in political theory such as rights, citizenship, justice and liberty. U-4: This unit studies elaborately about the Liberal and Marxist Perspectives on state.
E201	Political Theory -II	U-1: This unit finds out the concept of Liberalism and Marxism Ideology. U-2: This unit deals with the Liberal, Elitist, Pluralist and Marxist theories on democracy. U-3: This unit studies about various aspects of • Sustainable development • Human development • Gandhian views on development. U-4: This unit highlights about the moral values such as Non violence and Swaraj in politics as advocated by Gandhiji.
E303	Politics in India-I	U-1: This unit studies about the legacies of Indian political system. U-2: This unit traces back to the formation of the Indian constitution by focusing government of India Acts of 1909, 1919 & 1935. U-3: This unit studies about the basic features of Indian constitution such as preamble, fundamental rights etc. U-4: This unit examines the working of Indian federalism and Centre- state relation.
E403	Politics in India -II	U-1: This unit studies about the working position president, prime minister. It also deals with the position and role of Governor, chief minister. U-2: This unit elaborately studies about the Judicial system and working of India. U-3: This unit helps the student to acquire the knowledge of working of political parties in India. U-4: This unit studies about the role of Pressure groups in India.

E503	Public Administration -I	U-1: This unit gives understandings about the Growth and Evolution of Public Administration as a discipline. U-2: This unit elaborately studies scientific management and bureaucratic theories. U-3: This unit studies about the hierarchy-span of control, centralization and decentralization. It also focuses ethics and values in public administration. U-4: This unit studies on line, staff, chief executive, department, public corporations etc.
E504	Select Constitutions-I	U-1: This unit studies broadly about the Constitution and Constitutionalism. U-2: This unit studies about the entire political system of United Kingdom such as Monarchy, Cabinet, Parliament, Rule of law and the Judicial system. U-3: This unit studies about the broad aspects of political system of United states of America such as federal system, national government, president, Congress, Supreme court etc. U-4: This unit reflects the Comparative study of U.K and U.S constitutions.
E603	Public Administration-II	U-1: This unit introduces the students about the recruitment, promotion, Public service commission of Personnel Administration. U-2: This unit broadly studies about the financial administration such as principles of budgeting and budgetary process. U-3: This unit provides the knowledge of development administration viewed by Fred W. Riggs. U-4: This unit reflects about the concept of accountability, control over administration and redressal of public grievances.
E604	Select Constitutions-II	U-1: This unit studies about the communist revolution, working of national peoples' congress, power of president and the state council. It also focuses the working of peoples' courts and peoples' procuratorates of China. U-2: This unit elaborates about the rights and duties of citizens and role of the communist party of China. U-3: This unit studies about the Swiss political tradition, working of legislature, executive and judiciary. U-4: This unit explains about the working of Swiss federalism and direct democracy of Switzerland.
M-101	Biosystematics and Taxonomy	The aim of this paper is to acquaint the students with definition, basic concept and importance of systematic and taxonomy. It would furnish the student with different taxonomic procedures including taxonomic collection, preservation, methods of identification and taxonomic keys. This paper also deals with different theories of biological classification and with the concept of species. The student will also get to know about the basic concept of International Code of Zoological Nomenclature (ICZN).
M-102	Animal Diversity-I (Non-Chordates)	The aim of this paper is to acquaint the students with General characters and classification of Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata up to orders with examples. The study of protozoans such as Plasmodium, Giardia, Entamoeba etc helps to identify different diseases and its symptoms which are directly related to human health. The study of life history of Ascaris, Fasciola Taenia, Ancylostoma, Wuchereria etc enlightens the pathogenic effects on human and other animals. The study of Peripatus which is a connecting link between two phyla has a significance in evolution. This paper also focus on the Coral and Coral Reef formation Coelom, Coelomoduct and Nephridia of Annelida, Structure and significance of Trochophore larva, Appendages and digestive system of Prawn. Significance of Peripatus in evolution, digestive and nervous system of Pila, Torsion in Gastropoda, water-vascular system and Larvae of phylum Echinodermata.
M-103(P)	Practical	This paper enables the student to understand and dissect practically in depth the anatomical structures of the system. This unit helps the student to prepare different temporary and permanent slides which enables the student to observe the fine structure of the organism. This unit also provides information regarding the procedure of making permanent slides. This unit also helps to identify different museum specimens (invertebrates) which enlighten the student the biodiversity of organisms.

M-201	Animal Diversity-II (Chordates)	The aim of this paper is to acquaint the students with General characters, outline of classification and plan of body organization in chordates Protochordates : General characters, classification of Protochordata upto suborders with examples. Hemichordata : Morphology and affinities of Balanoglossus. Urochordata: Structure and Retrogressive metamorphosis in Urochordata, Cephalochordata : Structure and affinities of Amphioxus. Agnathostomata : Distinctive characters and classification, Ammocoete larva - its importance in evolution, Differences between Lamprey and Hagfish, Pisces : General characters, Classification up to orders with examples, Circulatory system, Nervous system and Sense organ of Scoliodon. Accessory respiratory organ and swim bladder in fish. Migration of fishes. Amphibia :General characters, Classification up to orders with examples Reptilia General Characters Classification up to order with examples. Anatomical peculiarities and affinities of Sphenodon, Biting mechanism of poisonous snake. Aves Distinctive characters and classification up to orders with examples. Air sacs-significance and importance , Flight and perching mechanism in birds, Migration of bird. Mammalia Distinctive characters and classification up to orders with examples. General organization and affinities of Monotremata and Marsupialia. Receptor and sense organs in Mammals. Dentition in Mammals
M-202	Ecology, wildlife conservation and Management	The aim of this paper is to acquaint the students with Definition, Aim and scope of ecology. Ecological niche, habitat, biosphere, biome and ecotone. Ecosystem – Types Aquatic and Terrestrial, Food chain and ecosystem, Energetic, Biotic factors, Biogeochemical cycles- Nitrogen and phosphorus., Pollution- Air, water, Soil and Noise. This paper also deals with definition of wildlife- Wildlife Act. 1972, Principles of wildlife conservation and management. Wildlife Sanctuaries and National Parks of N.E Region with special reference to Kaziranga National Park and Manas National Park.Conservation strategies of endangered species. IUCN Red list categories. Endangered mammalian species of NE India. Concept of Biosphere Reserve programmes, Ethology of Pigmy Hog and Golden langur. Carrying capacity and its impact on wildlife population, Protective behaviour and family ties in primates.
M-203(P)	Practical	This unit enables the student to understand practically in depth of the different system of vertebrates. This unit provides practical knowledge regarding the histological structure of different organs of vertebrates including skin, stomach, intestine, liver, pancrease,kidney, testes, ovary of mammals. It also provides detailed study of bone including different type of skull in birds. This unit also provides study of different museum specimens (vertebrates) which enlighten the student the biodiversity of organisms. This unit also enables to study practically on environmental biology which includes estimation of dissolve oxygen, free carbon dioxide, pH of water sample.
M-301	Comparative Anatomy & Histology	The aim of this paper is to acquaint the students with Integument and its derivatives in vertebrates, Comparative anatomy of Heart, Aortic arches and succession of kidney in Vertebrates. Organs of hearing and balancing in vertebrates. Comparative anatomy of Thyroid. Comparative anatomy of respiratory system in vertebrates. Comparative anatomy of brain in vertebrates. This paper also deals with Differentiation and organization of cells and maintenance of tissues. Animal tissues - Types, structure and their functions : Epithelial, Muscular, Connective tissues (cartilage, bone, blood, lymph, areolar, adipose, reticular) and Nervous tissue. Basic principles of fixation and staining. Classification, Composition and properties of dye. Use of mordants and metachromatic dyes. Principle and procedure of histological staining of carbohydrates, amino acids, proteins, lipids and nucleic acids.

M-302	Cell Biology	The aim of this paper is to acquaint the students with the basic unit of life- the cell in all living organisms. This paper emphasizes the students with the structure of prokaryotic and eukaryotic cells and also encompassing the structural organization of the cell. Ultra structure and function of Mitochondria, Golgi bodies, Endoplasmic reticulum, Ribosome, Lysosome, exo and endocytosis. Cellular energy transaction-role of Mitochondria and Chloroplast. Cytoskeleton: Structure and function of centriole, Microtubules and Microfilaments - structure and dynamics. Mitotic apparatus and chromosome movements. Cilia and flagella- Structure and cell movement Chromosome- structure and functions. Cell division - Cell division cycles. Mechanics of cell cycle, Membrane transport of small molecules and the ionic basis of membrane excitability. Intranuclear organization of the cell.
M-303(P)	Practical	This unit includes practically understanding of different types of cell mainly prokaryotic and eukaryotic cell. It also includes the staining techniques of nucleus and nucleolus. This unit also helps to understand the preparation of different physiological solution including how to prepare histological slides of different organs such as liver, stomach, intestine, kidney, intestine, pancreas, testis and ovary. This paper also helps the student to go in detailed in different tissue through permanent slides.
M-401	Developmental Biology	The aim of this paper is to acquaint the students with the various stages of development of different organism. The process of gametogenesis and fertilization helps the student to get the information on how the life of an animal starts and develops before birth. This paper also focuses on different membranes act as extra embryonic membrane in an embryo as well as placenta through which an embryo can deal with all the physiological activities of their life inside the mother body. The tropic namely organizer and induction and regeneration focus on different tissue of animal which is responsible for the process of formation of different organs.
M-402	Genetics	The aim of this paper is to acquaint the students with the concept of gene which is the factor responsible for all the hereditary factors. Varieties of gene expressions- multiple alleles, lethal genes, pleiotropic genes, gene interactions, epistasis. Linkage-its mechanism and significance, Experiment of linkage, Linkage map. This paper also focuses on genetic recombination and the prospects of Crossing over its types, mechanism and significance, Synaptinemal complex and genetic recombination including recombination in Virus and bacteria, significance of crossing over. The study of chromosome helps to determine the sex of an organism by their structural variation. It would also furnish the student with molecular genetics. Nucleic acids-DNA and RNA, Chemical structure and function, Replication of DNA. The aim of this paper is to acquaint the students with different Genetic diseases in man including structural and numerical changes in chromosomes. It would also furnish the student with the sudden change of gene and its consequences. Cytogenetic effect of ionizing and non ionizing radiation. Human Karyotype - Nomenclature, Human genome.
M-403(P)	Practical	This unit enables the student to study the different developmental stages of frog through prepared slides and models. It also helps the student to prepare whole mount preparation of different stages of chick embryo development. This paper also includes studying the different process of cell division. Practically the student will study mitosis and meiosis type cell division. It would also help the student to get the anatomical structure of largest chromosome i.e, polytene chromosome and also about the structure of sex chromatin from buccal epithelium.
M-501	Animal Physiology	The aim of this paper is to acquaint the students with the concept of Animal physiology which is one of the most fascinating fields on inter disciplinary science. This paper enlightens students with the daily requirements of nutrients in our body and also helps to understand the process of breakdown of different food components in human digestive system. The circulatory system furnishes the students to understand how heart transports blood to different parts of the body. It also focus on how the body of an organism performs the function of excretion, the bodily process of discharging wastes, how the organism co-ordinates its action by transmission of nerve signals to and from different parts of the body, how the movement of the human body occurs, maintain posture and circulates blood throughout the body.

M-502	Biochemistry & Bioenergetics	The aim of this paper is to acquaint the students with chemical foundation of biology and on the molecular basis of life including carbohydrate, protein and lipid. Assembly of macromolecular complexes, ribosome, chromatin and plasma membrane. This paper also enlightens students with the Enzymes- Nature and classification- Mechanism of enzyme action, Enzyme Kinetics. Ornithine cycle. Oxidation and biosynthesis of fatty acids. This paper also deals with First and second laws of thermodynamics. Oxidation- reduction potential with special reference to mitochondrial electron transport system. ATP in metabolism and in free energy production. Theories of oxidative phosphorylation
M-503	Endocrinology & Immunology	The aim of this paper is to acquaint the students with the study of the endocrine system in human body. This paper focuses mainly on how different endocrine gland including Pituitary, Thyroid, Pancreas Adrenal and Gonads secretes hormones. This paper also deals with the classification of hormones. Mechanism of hormone action. Synthesis of thyroxin. Pancreatic hormones and metabolic regulation, physiological action of insulin and glucagon. Hormonal control of calcium homeostasis, chemistry and control of secretion of parathormone, calcium and vitamin D This paper enables the student to understand the inbuilt system in the body of an animal's which acts as a defense against the pathogens of various diseases. It focuses on the resistance of the body against diseases. It also deals with basic immunological concepts Innate and Acquired immunity. Components of immune system. Cell mediated and Humoral immune system. The students will enlighten to understand the structure and function of antibodies in human body and also on the antigen- antibody interaction. It would furnish the student with different hyper immunity such as allergy, immune deficiency and autoimmunity conditions.
M-504	Biological Techniques and Biostatistics	The aim of this paper is to acquaint the students with different techniques which involve fundamental elements of the wine making industry and monitoring of soil, water and lake and river, aquarium management by pH meter, identification of planktons by centrifuge machine. Estimation of phosphorus and potassium with the help of spectrophotometer. This all biological techniques are important tools in forensic science and analytical chemistry. This paper also enables the student to understand the separation techniques in biological science. Microsocopy- Working principle of light, electron Phase contrast and fluorescence microscopy. Microtomy, Cryopreservation of egg and sperms, Use of radioisotope in biology. Autoradiography. This paper also deals with the application of statistics in biology. It includes different sampling techniques- Sample units and their selection. It enables the student to correlate between different data with the help of correlation and regression analysis-linear. It also enables the student to use graphical representation of data with the help of Histogram, Bar-diagram,Pie diagram. This paper also deals with the application of computers in biological fields. It enables the student to apply computer application in data processing, language, computer programmes for biostatistical analysis. The background information provide in computer biology is design to facilitate understanding of the simulation and often the student some traditional experiment.
M-505(P)	Practical	This unit enables the student to study practically the phenomenon of physiology of human body. It enables the student to detect its own blood group, Rh factor, WBC, RBC count. Also provides the procedure to find out the abnormal constituents in urine.
M-506 (P)	Practical	This paper provides the student practically how to find out content of carbohydrates, total soluble protein, and lipids in a given sample. It also enlightens the student to find out the presence of salivary amylase enzyme and pepsin enzyme activity. This enables the student to understand the separation techniques which involves the separation of different amino acids. It helps to estimate the concentration of ascorbic acid in different citrus fruits. This unit enables the student to how to detect and locate the position of endocrine glands in different vertebrates. It also provides the histological structure of studied endocrine glands.

M-601	Animal Behaviour	The aim of this paper is to acquaint the students with the study of animal behavior and is a relatively new area of scientific investigation. It enables the student to study animal behavior with different approaches including psychological, physiological and zoological. This paper also deals with entire fields of pattern of behavior and the neural and hormonal controls of behavior. This paper focuses on different types of Learning behavior. Habituation Conditional reflex, Insight learning, Association learning, Reasoning and Imprinting. This paper also provides the social interaction of different individuals in a community. This paper focuses on how animal transfer information from one animal to another by means of sound, visible sign or behavior, taste or odor, electrical impulse, touch or a combination of these.
M-602	Evolution and Adaptation	The aim of this paper is to acquaint the students with the concept of Evolution- Origin of life, Spontaneous generation, formation of organic compound. Evidences of organic evolution Embryological and biochemical. Theories of organic evolution. Darwinism and Neo-Darwinism. Lamarckism and Neo-Lamarckism. Germplasm theory, Mutation theory. Modern synthetic theory. Concept of micro, macro and mega evolution. Phylogeny of Horse, Evolution of Man. Origin of Bird. Speciation- Genetic and Geographical Zoo-geography, Factor influencing animal distribution. Geological time scale. Fossils- Definition, fossilization and significance, dating of fossils. This paper also deals with Principles of adaptation. Types of adaptation- Aquatic, terrestrial and Volant adaptation. Adaptive Radiation in mammal, Cryptic and warning coloration, Mimicry.
M-603	Economic Zoology	The aim of this paper is to acquaint the students with the concept of economic zoology in different fields of sericulture, apiculture, aquaculture and lac culture. This paper also deals with nature of silk, Concise account of four varieties of silk products and economics in India (Eri, Muga, Pat, Tasar). This paper focus on the life cycle of muga and eri silkworm and different diseases with prevention and control measures. It would also enlighten the student with the rearing and reeling practices of muga and eri silkworm. This paper also deals with honey bee with their cast distribution and bee keeping techniques which enables them to produce honey in large amount. This paper also deals with the concept of Aquaculture including their economic prospects. One of the important branches of aquaculture is pond management system. The student will get the overall scientific idea on how to culture and manage different fish species in pond ecosystem and also fish culture along with other species for more output. Induced breeding Integrated fish farming. This paper also deals with the prospect of Lac Culture with their application. This paper also deals with management of pest, types of pest and emphasize on the importance and principle of pest control. Pesticides and their hazards Role of natural products in pest control, Integrated pest management.
M-604	Biotechnology, Bioinformatics and Computer application	The aim of this paper is to acquaint the students with the concept of genetic engineering and their enzymology. This paper mainly focuses on recombinant DNA technology and its prospects in modern life. It helps to get the idea on different techniques of tissue culture and cell harvesting methods. The student will also get the idea of cloning and its related field. Moreover this paper also gives the information on cryopreservation through which a cell can be preserved under freezing condition for a longer period of time. This paper also deals with the basic key concept of computer programming and operating system for data analysis and presentation. It also helps to solve out different statistical analytical data in the applied fields of biology.
M-605(P)	Practical	This unit enables the student to identify different varieties of silkworm (eri, muga and mulberry) and their life cycle. It also enables the student to study of different life history of honey bee. It also enlightens the student of different types of pest including paddy, jute, sugarcane, tea, store grain and vegetables and their importance. This paper also helps the student to identify different commercially important fishes and dissection of pituitary gland of fishes. It also helps the student to prepare slides of different segments of insects and pollen basket of honey bee.

M-606 (P)*	Either Practical Paper or Project	This unit includes the project report submission of the student. The student while doing the project gets an overall idea of starting a research work. It gives the student the idea how to evaluate and analyze the data and to present the data using statistical methods. Moreover, this paper provides the student the basic knowledge to start a research work in practical sense. This paper also includes the student visit to Advanced Laboratories or National Parks or Wildlife Sanctuary. This helps the student to gain knowledge outside the class to facilitate learning. It helps the student how to prepare a report for educational knowledge.
E-101	Biosystematics, Taxonomy, Wildlife Conservation & Management	The aim of this paper is to acquaint the students with definition, basic concept and importance of systematic and taxonomy. It would furnish the student with different taxonomic procedures including taxonomic collection, preservation, methods of identification and taxonomic keys. This paper also deals with different theories of biological classification and with the concept of species. The student will also get to know about the basic concept of International Code of Zoological Nomenclature (ICZN). This paper also deals with definition of wildlife, wildlife protection act, 1972. Principles of wildlife protection and management. Wildlife in N. E region with special reference to Kaziranga and Manas National Park. Conservation of Wildlife and importance of biodiversity.
E-201	Ecology, Evolution and Adaptation	The aim of this paper is to acquaint the students with definition, aim and scope of ecology and its subdivisions of ecology. Ecosystems-concept, Ecosystem energetics. Ecological succession. Pollution-Air, water, soil and Noise This paper also deals with definition of concept of Evolution, Macro and Micro Evolution. Origin of life-Spontaneous generation, formation of organic compounds, sources of Energy and food. Evidences of organic evolution, Embryological Paleontological and Biochemical Evidences. Darwinism and Neo Darwinism. Lamarckism and Neo Lamarckism. Evolution of Man. This paper also deals with Principles of adaptation. Types of adaptations. Volant and aquatic adaptation. Cryptic and warning coloration, Mimicry.
E-301	Animal Diversity-I (Non Chordates)	The aim of this paper is to acquaint the students with General characters and classification of Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata up to orders with examples. This unit also furnishes the students with nutrition, locomotion and reproduction in Protozoa, Anatomical structures and functions with special reference to canal system of Sycon Anatomical structures and functions of Obelia, Structure and life history of Fasciola. Morphology and life history of Ascaris. Anatomical structure and life history of Ascaris, Anatomical structures and functions of Leech, natomical structures and appendages of Prawn. Mouthparts, life history of Mosquito and Housefly and their roles as vector Anatomical structures and functions of Pila Anatomical structures and functions of starfish with special reference to water-vascular system.
E-302(Practical)	Animal Diversity-I (Non Chordates)	This unit enables the student to study the identification of museum specimens of different phylum of non-chordates. It deals with the study of prepared slide of different parts of invertebrate species. The process of preparation of temporary as well as permanent slides introduces the student with biochemical mechanism of slide preparation. This paper enables the student to understand and dissect practically in depth the anatomical structures of the non-chordates.

E-401	Animal Diversity-II (Chordates)	The aim of this paper is to acquaint the students with General characters, outline of classification and plan of body organization in chordates Protochordate General characters, classification of Protochordata upto suborders with examples. Hemichordata (Balanoglossus). Urochordata (Herdmania) Cephalochordata (Amphioxus). Agnathostomata : Distinctive characters and classification, Ammocoete larva - its importance in evolution, Differences between Lamprey and Hagfish, Pisces : General characters, Classification up to orders with examples, Circulatory system, Nervous system and Sense organ of Scoliodon. Accessory respiratory organ and swim bladder in fish. Migration of fishes. Amphibia :General characters, Classification up to orders with examples Reptilia General Characters Classification up to order with examples. Anatomical peculiarities and affinities of Sphenodon, Biting mechanism of poisonous snake. Aves Distinctive characters and classification up to orders with examples. Air sacs-significance and importance, Flight and perching mechanism in birds, Migration of bird. Mammalia Distinctive characters and classification up to orders with examples. General organization and affinities of Monotremata and Marsupialia. Receptor and sense organs in Mammals. Dentition in Mammals.
E-402(Practical)	Animal Diversity-II (Chordates)	This unit enables the student to study the identification of museum specimen and bones of different chordates. It also helps the student to prepare the temporary and permanent slides by the proper mounting methods. It includes the dissection of chordates which will be very helpful for student to deal with the practical analysis of a species.
E-501	Cell Biology, Genetics & Developmental Biology	The aim of this paper is to acquaint the students with structure of Prokaryotic and Eukaryotic cells. Virus-Structure and assembly. Cell theory. Structure and function of plasma membrane, membrane transport. Cell reproduction-Mitosis and Meiosis. Ultra structure and function of Mitochondria. Golgi bodies, Endoplasmic Reticulum and Ribosome. Chromosome- Ultrastructure and organization, Giant chromosomes-Types and Significance. This paper also deals with the concept of Genetics, Linkage-its mechanism and significance. Crossing over-its mechanism types and significance. Linkage, Sex linked inheritance. Chromosomal sex determination. Varieties of gene expressions- multiple alleles, lethal genes, pleiotropic genes, epistasis Mutation- a) Chromosomal aberration b) Gene mutation c) Harmful and beneficial effects of mutation. This paper also deals with Developmental biology Gametogenesis – Spermatogenesis and Oogenesis. Fertilization- Sperm egg interactions, Activation of egg, Gamete fusion in Sea urchin. Types of egg and cleavage pattern. Concept of organizer and induction Extra embryonic membranes in Birds and Mammal. Reproductive cycles in vertebrates. Regeneration in Vertebrates and invertebrates. Parthenogenesis
E-502(Practical)	Cell Biology, Genetics & Developmental Biology	This unit includes practically understanding of different types of cell mainly prokaryotic and eukaryotic cell. It also includes the staining techniques of nucleus and nucleolus. This unit also helps to understand the preparation of different physiological solution including how to prepare histological slides of different organs such as liver, stomach, intestine, kidney, intestine, pancreas, testis and ovary. This paper also helps the student to go in detailed in different tissue through permanent slides. This unit enables the student to study the different developmental stages of frog through prepared slides and models. It also helps the student to prepare whole mount preparation of different stages of chick embryo development. It also helps to understand about the structure of sex chromatin from buccal epithelium.

E-601	Physiology, Biochemistry and Endocrinology	The aim of this paper is to acquaint the students with the concept of Animal physiology which is one of the most fascinating fields on inter disciplinary science. This paper enlightens students with the daily requirements of nutrients in our body and also helps to understand the process of breakdown of different food components in human digestive system. The respiratory system furnishes the students to understand how blood transports gases to different parts of the body. It also focus on how the body of an organism performs the function of excretion, the bodily process of discharging wastes, how the organism co-ordinates its action by transmission of nerve signals to and from different parts of the body, how the movement of the human body occurs, maintain posture and circulates blood throughout the body. The aim of this paper is to acquaint the students with chemical foundation of biology and on the molecular basis of life including carbohydrate, protein and lipid. Enzyme- classification and mechanism of enzymatic action, Cellular respiration. This paper also focuses on the brief outline of the organization of endocrine system in mammals with special reference to pituitary gland and gonads. Regulation of hormone secretion. This paper also focuses on the utility of biostatistics. Mean- Arithmetic, Geometric and Harmonic mean; Median and Mode. Standard deviation and standard error of mean. Graphic presentation of data-Histogram, Bar diagram, Pie diagram
E-602(Practical)	Physiology, Biochemistry and Endocrinology	This unit enables the student to study practically the phenomenon of physiology of human body. It enables the student to detect its own blood group, Rh factor, WBC, RBC count. This paper provides the student practically how to find out content of carbohydrates, total soluble protein, and lipids in a given sample. It also enlightens the student to find out the presence of salivary amylase enzyme activity. This unit enables the student to how to detect and locate the position of endocrine glands in different vertebrates. It also provides the histological structure of studied endocrine glands.
PGDCAP1	ICT Hardware	ICT helps a user to know the various peripherals of computer systems and also the fundamental knowledge of computer like how a computer is assemble and also the knowledge of various utilities like driver installation, de-fragmentation etc.
PGDCAP2	Programming in C	Programming is important for speeding up the input and output processes in a machine. Programming is important to automate, collect, manage, calculate, and analyze processing of data and information accurately. Programming is important to create software and applications that help computer and mobile users in daily life. Due to all these reasons, it's really important to learn how to use programming languages in our daily life.
PGDCAP3	Overview of Operating System (DOS, Windows, UNIX / Linux and Shell Programming)	This paper focuses on operating systems design and implementation. Topics include operating system architecture, process management, inter-process communication, memory management, and device drivers. Practical work will include programming in an operating system.
PGDCAP4	Introduction to Office Automation	Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks. Raw data storage, electronic transfer, and the management of electronic business information comprise the basic activities of an office automation system. Office automation helps in optimizing or automating existing office procedures.
PGDCAP5	Database Management System	DBMS is important because it manages the data efficiently and allows users to perform multiple tasks on it with the ease. Without DBMS, we might have to do it manually and would have taken more time. Also DBMS helps preserving the data in many forms and which we can use anywhere and may be after ages, to keep a record of what we have done to what we will do, everything has to be kept in form of some record. And DBMS provides efficient ways to accomplish that task. DBMSs include MySQL, Microsoft SQL Server, Oracle, IBM DB2 etc.
PGDCAP6	Data Structure through C language	This subject contains a basic concept of linear and non linear data structure. Brief description of static and dynamic memory allocation for example array and different types of linked lists. Various algorithms related to add and delete memories from array, linked lists, stacks, queues. Fundamental concept of trees and graphs. Concept of time and space complexity of various searching and sorting algorithms.

PGDCAP7	Internet and Web Technology	Concepts of webpage and websites. Client and server side scripting language. Basic HTML and XHTML for designing. Description about web server architecture and working. Helps to design webpage and small websites.
PGDCAEL3	Computer Graphics	To list the basic concepts & components used in computer graphics. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. To describe the importance of viewing and projections. To design an application with the principles of virtual reality. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
PGDCAP8	Project	In web technology students need to develop a frontend design of a software using html and dhtml. Java script is used to create server side scripting of that particular software.
M 104	Algebra and Trigonometry	The aim of this course is to familiarize the students with the notion of relations and functions, group theory, classical algebra, complex number and trigonometry, and matrix theory.The course contents: Relations, Equivalence relations, mapping, binary composition, Groups, subgroups,cosets, Lagrange's theorem on order of a subgroup of a finite group, Euler's theorem, Fermat's theorem, subgroup generated by a set, cyclic groups, permutation groups, normal subgroups, quotient groups, Complex numbers as ordered pairs of real numbers, geometrical representation and polar form of complex numbers,modulus,argument and their properties, complex equations of straight line and circle.De'Moiver's theorem, expansion of cosx and sinx in positive integral powers of x, logarithm of a complex number, exponential and trigonometric functions of a complex variable, Euler's expansion of cosine and sine, hyperbolic functions, inverse functions, Gregory's series, Relation between the roots and coefficients of a general polynomial equation in one variable, transformation of equations,Descarte's rule of signs, symmetric functions of roots, solution of cubic equation by Cardon's method, Symmetric, skew symmetric, Hermitian and skew Hermitian matrices, elementary operations on matrices, adjoint and inverse of a matrix, rank of a matrix, invariance of rank under elementary operations, normal form, solution of a system of linear equations by matrix method.
M105	Calculus	The objective of this course is to acquaint the students with various techniques of differentiation, sussecive differentiation, concept of tangent and normals, curvature, asymptotes and curve tracing, and technique of integration The course contents: Successive differentiation, standard order on nth order derivatives and Leibnit'z theorem, partial differentiation, partial derivatives of first and higher orders for functions of two and three variables, Euler's theorem on homogeneous functions, angle of intersection of two curves, length of tangent, normal, subtangent and subnormal, pedal equations, angle between radius vector and tangent, length of perpendicular from pole to the tangent, lengths of polar subtangent and polar subnormal, pedal equation of a curve from its polar equation, concavity and points of inflexion and their criteria, definition of curvature and radius of curvature, derivation of arc, formula for Radius of curvature, circle of curvature, definition and working rules for determination of asymptotes, Singular points, double points, cusp, node, conjugate point, multiple point, determination of multiple points of the curve f(x,y)=0, tracing of catenary,cissoid,asteroid, cycloid, folium of Descartes, cardioide, lemniscate, technique of integration, Rectification,Quadrature, volume and surface area of solids of revolution.
M204	Co-Ordinate Geometry	The objective of this course is to acquaint the students with two dimension and three dimension geometry. The course contents: Transformation of coordinate axes, pair of straight lines, Parabola, parametric coordinates, tangent and normal, ellipse and its conjugate diameters with properties, hyperbola and its asymptotes, general conics: tangent, condition of tangency, pole and polar, centre of a conic, equation of pair of tangents, reduction to standard forms, central conics, equation of the axes, and length of the axes, polar equation of a conic, tangent and normal and properties, Plane, straight lines and shortest distance, Sphere, cone and cylinder, central conicoids, ellipsoid, hyperboloid of one and two sheets, diametral planes, tangent lines, director sphere, polar plane, section with a given centre, enveloping cone and cylinder,

M205	Differential Equation	The objective of this course is to acquaint the students with the formation and solution of ordinary and partial differential equations and their applications. The course contents: Origin of ordinary differential equations, degree and order of ordinary differential equations, equations of 1st order and 1st degree, 1st order and higher degree differential equations, method of solving higher degree equations solvable for x,y and p.Clairaut's form and singular solutions, orthogonal trajectories, Linear ordinary differential equations with constant coefficients, Exact ordinary Differential equations, homogeneous linear ordinary differential equations and Bernoulli's equations, Linear differential equations of 2nd order with variable coefficients, standard methods, transformation of the equation by changing the dependent variable, independent variable, method of variation of parameters, Simultaneous linear differential equations, total differential equations, Partial differential equations of 1st order, Lagrange's solutions, some special types of equations which can be solved by methods other than he general method, Charpit's general method of solution.
M304	Abstract Algebra	The aim of this course is to acquaint the students with the abstract algebraic structures like groups, rings and fields. This course also deals with the concepts like homomorphism, isomorphism etc. The course contents: Homomorphism of groups, Fundamental theorems of homomorphism, Caley's theorem Rings Integral domains division rings and fields, subrings,characteristic of a ring, idempotent and nilpotent elements in a ring, principle ,prime, maximal ideals, simple rings, definition and examples of vector space and its subspaces, Inner automorphisms, automorphisms groups,conjugacy relation, normaliser, centre of a group, class equation and Cauchy's theorem, Sylow's theorems, Ring homomorphisms,quotient rings, field of quotients of an integral domain, Euclidean rings, polynomial rings.
M305	Linear Algebra and Vector	The objective of this course is to familiarze the students with various linear spaces and their properties. The course also deals with vector analysis. The course contents: Sums and direct sum of subspaces, linear span, linear dependence and independence and their basic properties, basis, finite dimensional vector spaces, existence theorem for bases, invariance of the number of elements of a basis, dimensions, existence of complementary subspace of a subspace of finite dimension, dimension of sum of subspaces, quotient spaces and its dimension, Linear transformations and their representation as matrices, the algebra of linear transformations, the rank nullity theorem, change of basis, dual spaces, Eigenvalues ,eigenvector, characteristic equation of a matrix, Cayley Hamilton theorem, minimal polynomial, characteristic and minimal polynomial of linear operators, existence an uniqueness of solution of a system of linear equations, Scalar triple product, vector triple product, product of four vectors, Continuity and derivability of a vector point function, partial derivatives of vector point function, gradient, curl and divergence, identities, vector integration, line, surface and volume integrals, Green, Stokes and Gauss' theorems.

M404	Real Analysis	Aim of this course is to enable students to identify the analytical aspects of Mathematical concepts. The course contents: Characterization of the real number system R as a complete Archimedean ordered field, neighbourhoods, open set, closed set, limit point of a set Bolzano-Weierestress theorem for a set, nested interval theorem. Sequence of real numbers, bounded and unbounded sequences, subsequences, limit of a sequence, Bolzano-Weierestress theorem for bounded sequences, limit superior and limit inferior, convergent and divergent sequence, Cauchy sequences, Cauchy's principle of convergence, convergence and divergence of monotonic sequences, algebraic operation on limits, sandwich theorem, Cauchy theorem on limit, Infinite series, convergence ,divergence and Cauchy's general principle of convergence, introduction and removal of brackets, multiplication of series and double series, comparison test, Cauchy's root test, D'Alembert's ratio test, Raabe's test, logarithmic test, Gauss test, Cauchy's condensation test, Cauchy's integral test for testing the convergence of series of positive terms, Abel's theorem, alternating series and Leibnitz's test, absolute and conditional convergence, statement and application of Riemann theorem and Dirichlet's theorem on the rearrangement of terms of an infinite series, (ϵ,δ) definition of limit and continuity of a function of single variable, properties of continuous functions in closed interval, sequential continuity, inverse function and monotonic function, uniform continuity, Derivability of a function of single variable, algebra of derivatives, Darboux's theorem, intermediate value theorem for derivatives, Roll's theorem, mean value theorems, intermediate forms, Taylor's theorem, Taylor's and Maclaurin's infinite series,maxima-minima of a function of single variable and two variables.
M405	Mechanics	The objective of this course is to provide the students deeper knowledge of Mechanics and the corresponding problem solving techniques. The course contents: Parallel forces, couples, reduction of coplanar forces, analytical condition of equilibrium of coplanar forces, friction, Centre of gravity of a plane area, arc and a sector of a curve, C.G of solids and surface of revolution, C.G of areas bounded by a given curve, Principle of virtual work-in two dimensions, forces in three dimensions, Poinsot's central axis, wrenches, null lines and planes, Stable and unstable equilibrium, Velocities and acceleration along radial and transverse directions and along tangential and normal directions, motion in a straight line under variable acceleration, simple harmonic motion and elastic string, Motion on smooth and rough plane curves, motion in resisting medium, motion of particles of varying mass, Central orbit and Kepler's laws of planetary motion.
M501	Real and Complex Analysis	Students will learn about limit continuity and differentiability of functions of several variables, R-integrability, Beta and Gamma functions and their applications. Students will also learn about Theorems on limit and continuity of a function of complex variable, uniform continuity, differentiability of a function of complex variable, analytic functions, CauchyRiemann equations, harmonic functions, differentials, derivatives of elementary functions, L'Hospital's rule , stereographic projection Rectifiable curves, integral along an oriented curve, fundamental Cauchy theorem, proof applying green's theorem, Cauchy integral formula, mobius transformation, fixed points, inverse points and critical mappings, conformal mappings, continuity of a function of complex variable, uniform continuity, differentiability of a function of complex variable, analytic functions, CauchyRiemann equations, harmonic functions, differentials, derivatives of elementary functions, L'Hospital's rule , stereographic projection.

M502	Topology	Students will be exposed to the metric structures. Knowledge of the generalization concepts arising out of Real Analysis.Course contents: Definition and examples of metric spaces, neighbourhoods, limit points, interior points, open and closed sets, closure and interior, equivalent metrics, subspace of a metric space, Cauchy sequences, completeness, Cantor's intersection theorem, Dense subsets, Baire's category theorem, separable, second countable and first countable spaces, continuous functions, extension theorem, uniform continuity,isometry and homeomorphism, Compactness, sequential compactness, totally bounded spaces, finite intersection property, continuous functions and compact sets, connectedness, components, continuous functions and connected sets, Definition and examples of topological spaces, metric topology, closed sets, closure, Kuratoski closure operator and neighbourhood systems, dense subsets, neighbourhoods, interior, exterior and boundary, accumulation points and derived sets, bases and sub bases, subspaces and relative topology, continuous functions and homeomorphism.
M503	Spherical Trigonometry and Astronomy	The purpose of this paper is to derive various trigonometric formulas for spherical triangles. The subject of spherical trigonometry has many navigational and astronomicalcal applications.Course contents: Section of a sphere by a plane, spherical triangles, properties of spherical and polar triangles, fundamental formulae of spherical triangles, sine formula, cosine formula, sinecosine formula, cot formula, Napier's rule of circular parts, The standard celestial sphere, system of coordinates, conversion of one coordinate system to the another system, diurnal motion of heavenly bodies, sidereal time, solar time(mean), rising and setting of stars, circumpolar star, dip of the horizon, rate of change of zenith distance and azimuth, examples, Planetary motion: annual motion of the sun, planetary motion, synodic period, orbital period,Keplar's law of planetary motion, deduction of Keplar's law from Newton's law of gravitation, the equation of the orbit, velocity of a planet in its orbit, components of linear velocity perpendicular to the radius vector and to the major axis, direct and retrograde motion in a plane, laws of refraction: refraction for small zenith distance, general formula for refraction,Cassini's hypothesis, differential equation for refraction, effect of refraction on sunrise, sunset, right ascension and declination, shape of the disc of the sun, Geocentric parallax, parallax of the moon, right ascension and declination, parallax on zenith distance and azimuth, stellar or annual parallax, effect of parallax on the star longitude, and latitude, effect of stellar parallax on right ascension and declination. Lunar eclipses section of the shadow cone at moon's geocentric distance, condition of lunar eclipse in terms of it, solar eclipses, the angle subtended at the earth's center by the centers of the sun and the moon at the beginning or end of a solar eclipse, condition of solar eclipse in terms of this angle, idea of ecliptic limits, frequency of eclipses.
M504	Rigid Dynamics	Students will be introduced to the theory of Rigid Dynamics and its applications in real situations. Course contents: Moments and products of inertia, parallel axes theorem, theorem of six constants, the momental ellipsoid, equimomental systems, principle axes, D'Alembert's principle, the general equation of motion of a rigid body, motion of the centre of inertia and motion relative to the centre of inertia, Motion about a fixed axis, the compound pendulum, centre of percussion, Motion of a body in two dimension under finite and impulsive force, Conservation of momentum and energy, generalized coordinates LaGrange's equations, initial motions. Aim of this course is to familiarized the students with the theory and various applications of probability theory. Course contents: Random experiment, sample space , events, classical definition of probability and the theorems of total and compound probability based on this definition, axiomatic approach to the notion of probability, important theorems based on this approach, conditional probability and independent events, Bay's theorem, Random variables, discrete and continuous probability distributions, probability function and distribution function, probability mass function and probability density function, joint distributions, marginal distribution, independent random variables, change of variables, conditional distribution, Mathematical expectation, basic theorems on expectation , variance and standard deviation, moments and moment generating functions, covariance, conditional expectation and conditional variance, Chebyshev's inequality, law of large numbers, Binomial, Poisson and Normal distributions.
M505	Probability	

M506	Optimization Theory	Aim of this course is to familiarized the students with the technique of optimization Course contents: Partitioning of matrices, simultaneous equations, basic solution, point sets, lines and hyper planes, convex sets and their properties, convex functions, convex cones, General linear programming problems, mathematical formulation of a linear programming problem, linear programming problem in matrix notation, feasible solution, basic solution, degenerate basic solution, necessary and sufficient condition for the existence of non-degenerate basic solution, graphical method for the solution of a linear programming problem, simplex method: fundamental theorem of linear programming problem, basic feasible solution from feasible solution, determination of improved basic feasible solution, optimality conditions, alternative optimal solution, conditions for alternative optimal solution, theory and application of the simplex method of solution of a linear programming problem, Charne's M-technique, two phase method, Principles of duality in linear programming problem, fundamental duality theorem, simple problems, The Transportation and Assignment problem.
M601	Hydrostatics	Students will be introduced to the fundamental concepts of Hydrostatics and applications. Course contents: Pressure equation, condition of equilibrium, lines of force, homogeneous and heterogeneous fluids, elastic fluids, surface of equal pressure, fluid at rest under action of gravity, rotating fluids, Fluid pressure on plane surfaces, centre of pressure, resultant pressure on curved surfaces, Equilibrium of a floating body, curves of buoyancy, surface of buoyancy, stability of equilibrium of floating bodies, meta centre, work done in producing a displacement, vessel containing a liquid, Gas law, mixture of gases, internal energy, adiabatic expansion, work done in compressing a gas, isothermal atmosphere, connective equilibrium.
M602	Numerical Analysis	Students will learn about the numerical methods of solving various types of equations, numarical integration etc. Course contents: Normalized floating point representation of real numbers and operations using it, normalization and its consequence, errors in arithmetic operations, absolute and relative error, truncation and round off errors, approximation and significant figures, Calculus of finite difference: different interpolation formulae with remainder terms, finite difference operators and their operations on function of a single variable, interpolation with equal and unequal intervals,Newton;s formulae, Lagrange's formula, Gauss, Bessel and sterling's formula,Hermite interpolation, Numerical differentiation and integration: Numerical differentiation with the help of different interpolation formulae, general quadrature formula, trapezoidal rule, Simpson's one third and three eighth rule, Weddel's rule, Newton-Cote's formula, Gauss quadrature formula,Chebycheve's formula, Solution of polynomial and transcendental equations: Bisection method, secant method, regula falsi method, Newton-Raphson method, rate of convergence and comparison of methods.
M603	Computer Programming in C	Students will be able to formulate programs for various methods to solve different types of problems. Brief introduction of central processing, main memory, secondary memory, input/output devices, operating system and its need, representation of numbers and characters in computer, machine level language and high level language, compiler,interpreter, assembler,linker, loader, editor, debugger, algorithm, flowchart and computer programmes, decision table and trees, efficiency and analysis of algorithm. Introduction to C-requirement of programming language to solve problems,Elementary data types/variables, constants and identifiers, integer, character, floating point and string constants, variable declaration,initializationof variables during declaration, constant data types),Syntax and semantics, reserved words, expression in C(operator precedence and associatively, unary, binary and ternary operators, C arithmetic operators, assignment operators, relational operators, logical and bitwise operators, L-value and R-value, expression statement, cast and size of operator, automatic type conversion, Conditional Statement:if,if-else, switch.Iterative statement: while, do while. For. Arrays and pointers(preliminary ideas). Other statements: break, continue, go to, return, null statement, block statement, Function (function declaration, calling a function by value, call by reference and its absence in C),storage class(automatic register,static,external);recursion and how it works(use of machine stack for storing return address, parameters and local variables),conversion of recursive programmes to non-recursive version.
M604	Discrete Mathematics	Students will be exposed to the fundamentals of Numbers and their properties. Course contents: Divisibility theory, Congruence's, Diophantine equation, Number theoretic function, :Propositional Calculus, Boolean Algebra.

M605	Graph and Combinatorics	Aim of this paper is to introduce the students with graph theory and Exposure to the counting principles. Course contents: Elementary combinatorics, Rules of sum and product, two models of counting, sample and distribution model of counting. Examples and solution. Integer solution of an equilateral problem. Varities of Graphs, Walks and connectedness, degrees, problem of Ramsey, intersection graphs, operations on graphs, Block, Cut points. Bridges, Block graphs, Cut point graphs, Trees, Characterization of trees, Connectivity and Line connectivity, Graphical variation of Menger's theorem, Travessavility : Eulerian graphs, Hamiltonian graphs and their characterizations
M606	Project	The purpose of this paper is to select a topic by the student or any of his faculty for self study. The students develop a research attitude in them selves. The students prepares a report of their findings and submits to his supervisor or the institute.
E101	Classical Algebra and Trigonometry	The aim of this course is to familiarize the students with classical algebra, complex number and trigonometry and sequence and series.
E201	Abstract Algebra and Matrices	The aim of this course is to familiarize the students with group theory, ring theory and matrix theory.
E303	Calculus: Methods and applications	The students will be familiarized with the concepts like continuous functions, Differentiation, successive differentiation,Lebnitz's theorem, continuous functions of several variables,Rolle's theorem, Lagrange's Mean Value theorem, meaning of the signof derivative, Cauchy's Mean Value theorem, Taylor's theorem, Maclaurin's theorem, Maclaurin's infinite power series for a given function, maxima and minima, partial differentiations, curvature etc.
E403	Calculus: Coordinate Geometry and Vector Analysis	The objective of this course is to acquaint the students with two dimension and three dimension geometry. The students will also be familiarized with the concepts of vector analysis.
E503	Statics and Dynamics	Aim of this paper is to familiarized the students with various concepts of statics like Parallel forces, Couple, System of coplanar forces and conditions of equilibrium, Centre of gravity of plane curves and areas, arc and sector of a circle and a parabola, Friction, laws of friction, cone of friction, angle of friction, limiting friction, equilibrium of a particle on a rough inclined plane, Machines, Mechanical advantage, velocity ratio etc. The paper also deals with various concepts of Dynamics.
E504	Numerical Method and Spherical Astronomy	Students will learn about the numerical methods of solving various types of equations, numarical integration etc. Also the purpose of this paper is to derive various trigonometric formulas for spherical triangles. The subject of spherical trigonometry has many navigational and astronomicalcal applications.
E603	Linear Algebra and Complex analysis	The objective of this course is to familiarze the students with various linear spaces and their properties. The course also deals with theorems on limit and continuity of a function of complex variable, uniform continuity, differentiability of a function of complex variable, analytic functions, CauchyRiemann equations, harmonic functions etc.
E604	Advanced Calculus	The aim of this course is to familiarize the students with metric space, Riemann integral, Beta and Gamma functions etc.
T 1.1	General Geology and Structural Geology	This paper has involved study of the general structure of the earth, earthquakes , volcanoes and structural geology has involved the process of formation of the earth features.
T 2.1	Crystallography, Mineralogy, Optical Mineralogy	This paper encompasses study of the entire chemical and physical properties of the minerals in the earth.
T 3.1	Petrology: Igneous and Metamorphic	petrology involves study different rock properties
P 3.1	Crystallography, Physical and Optical Mineralogy, and Geological Field Work	This practical paper catters practical and field based knowledge of mineralogy , petrology and general relief features of the earthearth
T 4.1	Sedimentary Petrology and Palaentology	Sedimentary petrology involve study of the sedimentary properties of th earth features and rock cycle. Again, palaentology involve the study of the fossils thus to study palaeoenvironmental conditions of the earth.
P 4.1	Palaentology and Rock Hand Specimen	This practical paper involve the study of fossils and different types of rocks.

T 5.1	Economic Geology and Prospecting, Indian Mineral Deposits, Hydrogeology, Remote Sensing and Environmental Geology	This paper involve the study of economic mineral deposits and how these are explored and excavated , Hydrogeology involve study of the groundwater ,remote sensing involve the basic knowledge GIS and GPS
P 5.1	Economic Minerals, Petology and Geological Field Work	This practical paper is to study the some specific economic minerals and their physical and optical properties and to study the rocks
T 6.1	Principles of Stratigraphy, Indian Srtatigraphy and Geotechtonics	This paper involve the study of encient stratigraphy of earth formations with special reference to India and tectonic activities
P 6.1	Geomorphology, Geological Maps, Structural Problems and Hydrogeology	This practical paper involve the study of earth surface features , geological map, structural geology problem related to dip and strike and preparation of groundwater maps , to study flow directions.
Part I.1 (Year I)	English	Enhance the power of vocabulary which is attained only by the knowledge of synonyms and antonyms verbs, proverbs etc. Corrects the grammatical mistake with the knowledge of tenses and voices includes the abilities of writhing ie : correspondence, application resume, easy writing etc. they will also have an exposure on English literature with the help of Indian & world section contemporary writers book like Malgudi days and Silasmarner.
Part I.2 (Year I)	Sociology and Environmental Science	From unit one and two student will know the paper comprises to units paper outcome first one considering the themes seated to overview on sociology (meaning, scope ,methods).considers the Indian rural social trends in rural change. The paper considers the themes on basic concepts of environment, human health & envt , family welfare . it provides the scope for the student to learn resources ,ecosystem , environmental pollution .the themes provides the student a specified leering how to control or find out the controlling measures of environment pollution & natural disaster and this management.
Part I.3 (Year I)	General science	UNIT 1 the first 2 part of the syllabus is based on Newton's mechanics . student will learn how to deal physics in day to day life in this part. The next part is optics, where student will learn reflection, refraction phenomenon and can handle optical instruments. from the last section students can learn about the electricity and its properties.UNIT 2 the student will able to understand the basic structure, behaviors and properties of different elements, molecules, compound. The chemical laws and theories given in the unit will help the student to understand some import ants chemical processes happening in our day to day life .UNIT 3 the student will able to know about the life ,comparison between living organism and non living object. They also known about the cell, different types of cell tissue, classification of plants and animals, and the structure and function of blood, blood group and their significance.
Part I.4 (Year I)	History and Elements of Physical Education	It is the bas of phy edu as it provides with the knowledge of ancient times from where phy edu has evolved. Its gives the different between education and phy edu, gives the historical developments of phy edu of india during different periods,also of foreign countries like USSR, Greece, Rome, Egypt etc also the contribution of YMCA and its origins.
Part I.5 (Year I)	Anatomy and Phisiology	It includes the knowledge of the human structure ,how it is made and the knowledge and function of different organ system drowse attentions towards injuries and movements of the body.
Part I.6 (Year I)	Basic Computer Science and Information Technology	This paper gives the brief idea about how to use a computer proper way and designing the graphical layout.and also gives about proper idea of networking i.e internet and intranet
Part II.a (Year I)	Skills in Major Games(Indian and Foreign)	The students will learn about the fundamental skills, introductions the historical development tournaments held at national &International level and their rules and duties of officials of selects games like Indian : Kabbadi & kho kho and foreign game like Football & Volleyball

Part I.1 (Year II)	HealthEducation, Correctives and Rehabilitation	It provides the knowledge of hygiene and proper care of health. Uses and scope of health education and where we can implement them. It gives knowledge or enlightens the individual's perspective towards personal Huygens which protects from dieses. It also individual the protection of pollution. On another unit provides with knowledge of correct postures deformities and their remedial and dhow to rehabilitees its techniques and methods.
Part I.2 (Year II)	Physiology of Exercise	It also provides knowledge of the function of the different organ systems.but after any training or exercise it means the effect of training or exercise on different organ system.it also helps to know about body type and composition
Part I.3 (Year II)	Mathods in Physical Education	It includes the different methods used for teaching.i.e. the ways of teaching like command method, demonstration method etc.provides lesson plan and how to prepare it. Also gives knowledge about teaching aids and how to preapare.
Part I.4 (Year II)	Recreation and Yoga	Unit 1 2 3 includes or provides knowledge of recreation i.e . what we do in our leisure times. Also how to conduct a camping. Planning of recreational programme.Unit 4 provides the knowledge of yoga and its orgins and types
Part I.5 (Year II)	Management in Phyasical Education and sports	It includes the management parts ie : the administration the work of a manager and its qualification knowledge of proper facilities(outdoor - indoor) how to maintain equipment and care them, knowledge of preparing fixture time table and conducting event. Where and how to construct swimming pool, gymnasium, and also enlightens with the events like intramural and extramural.
Part II.1 (Year II)	Major Games	The students will learn about the fundamental skills, introductions the historical development tournaments held at national &International level and their rules and duties of officials of selects games like Indian : Kabbadi & kho kho and foreign game like Football & Volleyball
Part II.2 (Year II)	Athelatics	The students will learn about the fundamental skills track & fields events, rules of Track & fields Events and the duties of officials .
Part II.4 (Year II)	Yoga and Krihra	The student will learn yoga and asana ,with proper techniques and its benefits .Also learn how to teach its asana to students .
Part II.5 (Year II)	Indegenous Activity	The student willable to learn the Indian traditional self defence techniques with lathis and to maintain healthy life's they will learn surya namaskar .
Part I.1 (Year III)	Foundation of Physical Education and Sports	On that paper student will have some fundamental foundational knowledge from various aspect of Physical Education. Student will have foundational knowledge of sociology, biology, psychology, anatomical and physiological and biological subject put a ray an intercrelative between above subject with sports. Also student will know the importance, need and implication of above listed subject in the field of Physical Education and Sport.
Part I.2 (Year III)	Kinesiology and Bio-mechanics	Paper consists with five unit. There first three unit is deal with kinesiology. Here student will know about meaning, aim, importance and historical details of kinesiology and anatomy as well as body joints, movement and related terminologies with them. Also in third and forth unit student will have idea about biomechanics, nations, and equilibriums._As well as they will have knowledge an terminologies like liver, force, friction, locomotion and it is relation with sports performance.
Part I.3 (Year III)	Educational and Sports Psychology	In this paper student will learn about psychology specially sport psychology under five different unit. First unit student will know meaning, definition, scope, importance and methods of psychology and sports psychology.Second and third unit student will get knowledge about developmental psychology. Here growth & development, history and environment, motivation learning theories are discussed. On forth unit personality is discussed where various factors related with personality are viewed. On fifth unit counseling_and guideline method are included, where student are getting gimps of counselor task. Their qualities, task etc.

Part I.4 (Year III)	Test and Measurement in Physical Education	Test measurement are some important part in physical education. In this paper a first unit student will know the meaning, definition, history etc. On second unit student will going to know how to select a test and classification of test. On third and fourth unit student will know how to do evaluation with the help of statistic's. On fifth unit student will learn how to conduct fitness as well as sport test.
Part I.5 (Year III)	Officiating and Coaching	On unit one student will get knowledge what is officiating, duties and qualities of official, and how to improve standards of officials. On second unit student will know about coaching, on third unit they will know about training and coaching. On fourth and fifth unit they will know history and present status of games and sport, where they also got to know about various sport event. On fifth unit they will know about warming up and cool down, its meaning and effect on sort performance.
Part I.6 (Year III)	Fundamental of Sports Training	On first unit student will know basic of sport training aim, characteristics principal. And another unit they will know about lead and recovery, factors effecting it, methods of sports training aim and its content, endurance factor's determining endurance and last student will know the technique, tactics, skill and style and strategies of sport training.
Part II.a (Year III)	Specialization in Games	The students will learn about the fundamental skills with various types of skills with warming up & cooling down techniqus , introductions the historical development tournaments held at national &International level and their rules and duties of officials of selects games like Indian : Kabbadi & kho kho and foreign game like Football & Volleyball
Part II.b (Year III)	Specialization in Physical Activities	They will learn free hand exercise like Aerobic ,MASS PT and its benefits ,with propar techniques how to performed it
Part II.c (Year III)	Combatives and Indegenous Activities	The student willable to learn the Indian traditional self defence techniques with lathis and to maintain healthy life's they will learn surya namaskar
Part II.d (Year III)	Specialization in Athelatics	The students will learn about the fundamental skills of track & fields events main in Throwing ,Jumping & Running sector with various types of skills with warming up & cooling down techniqus , as well as the rules of Track & fields Events and the duties of officials .
Part II.e (Year III)	Cocurricular Activities	Student will attend a Educatonal tour to a model physical Education Institute like LNIPE ,& They will attend outdoor ctivities like treakking ,camping etc.
Part III (Year III)	Practice Teaching	It will help the students to know proper technique of teaching learning process while delivering a speech and demonstrate a skill of game to student. Which develop their proficiency in that field and make them perfect of their future prospect. Where student are mostly visit local school to teaching purpose, for outdoor exposure .

EVS301	Environmental Studies-I	This paper acquaints students with the Different factors of Environment, Weather and climate, Global environment and its segments – atmosphere, hydrosphere, lithosphere and biosphere, Multidisciplinary nature, scope and importance. In this paper students will have the opportunity to study Concept of habitats, ecosystem and biomes;Ecotone and edge effect; Ecological Niche and Ecological succession; Structure and function of an ecosystem – producers, consumers and decomposers; Energy flow in the system; Food chain, food webs and ecological pyramids; Introduction, types,characteristic features, structure and function of different ecosystems. This paper is also deals with Biodiversity and its conservation, species and ecosystem diversities; Bio- geographical classification of India; Value of biodiversity – consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, national and local level; India as a mega-diversity nation; Hot-spots of biodiversity; Threat to biodiversity – habitat loss, poaching of wild life, manwildlife conflicts; ndangered and endemic species of Northeast India; Conservation of biodiversity – in-situ and ex-situ conservation. Harnessing of natural resources and associated problems, Conservation of natural resources – Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyle. Forest resources and Water Resources. The objective of this paper is to acquaint students with Natural Resources- (a) Mineral Resources, (b) Energy Resources, (c) Land Resources and (d) Food Resources.
EVS401	Environmental Studies-II	In this paper students will have the opportunity to study Environmental Pollution- Causes, effects and control measures, Acid rain – causes and effects and Role of individuals in prevention of pollution. This paper acquaints students with the Environmental Pollution- Causes, effects and control measures of – (a) Noise, (b) Soil and (c) Nuclear pollution; Waste land reclamation; Problems of Solid wastes and their management; Disasters caused due to Floods, earthquake, cyclone and landslides,and their management. The objective of this paper is to acquaint students with Sustainable development; Problems related to energy, water conservation, rainwater harvesting, watershed management; Environmental ethics – issues and possible solutions; Consumerism and waste product; Problems related to development projects - Resettlement and rehabilitation of people, its problem and concern; Global environmental issues - Global warming and climate change; ozone layer depletion, Environmental protection acts – Air (prevention and control of pollution) act, Water (prevention and control of pollution) act, Wildlife protection act, Forest conservation act; Issues involved in enforcement of environmental legislation. This paper is also deals with Population growth, variation among nations; Population explosion – family welfare programme; Environment and human health; Sanitation; human rights; value education; women and child welfare. In the 5th unit of this course a Field Work Report should be submitted by each student to their concern teacher. The report may be based on the visit to a local area to document environmental assets – river/ forest/ grassland/ hill/ mountain; Visit to a local polluted site – urban/ rural/ industrial/ agricultural; study of common plants, insects, birds; Study of simple ecosystem, ponds, river, hill slopes etc.