

1.1.1. Programme outcomes and Course Outcomes of the programmes offered

<b>Department:</b>	<b>Department of Botany</b>	
<b>Programme:</b>	<b>M. Sc. in Botany</b>	
<b>PSOs</b>	<ol style="list-style-type: none"> <li>1. Graduates will demonstrate advanced understanding and proficiency in specialized areas of botanical sciences, such as plant taxonomy, plant physiology, plant pathology and microbiology, plant genetics, and plant ecology.</li> <li>2. Graduates will possess the ability to design and conduct independent research projects in botany, including formulating research questions, designing experiments, collecting and analyzing data, and drawing scientifically valid conclusions.</li> <li>3. Graduates will be able to interpret and analyze complex botanical data using statistical and computational methods, and effectively communicate their findings through written reports and oral presentations.</li> <li>4. Graduates will have acquired proficiency in a wide range of laboratory techniques and methodologies commonly used in botanical research, including microscopy, molecular biology techniques, tissue culture, chromatography, and spectroscopy.</li> </ol>	
<b>Course Code</b>		<b>Course Outcomes</b>
BOT1016	Diversity I (Algae, Fungi, Bryophytes)	<ol style="list-style-type: none"> <li>1. Recognize specialization in fungi, their mutualistic relationships, decomposition processes, and economic importance.</li> <li>2. Categorize diverse groups of algae, understanding their morphology, reproduction and ecological roles.</li> <li>3. Explain the characteristics of fungi, bacteria, and viruses, and comprehend their varying modes of reproduction and recent trends in classification.</li> <li>4. Analyze the lichen's structure, function, and reproduction, recognizing their role as ecological indicators.</li> <li>5. Evaluate the evolution and diversity of bryophytes, their role as a pollution indicator and in monitoring the environment.</li> </ol>
BOT1026	Diversity II (Pteridophytes, Gymnosperm and Angiosperm)	<ol style="list-style-type: none"> <li>1. Analyze evolutionary trends in vascular cryptogams, including heterospory and seed habit development, telome concept implications, and morphological diversity, emphasizing the significance of soral structures in fern evolution.</li> <li>2. Critically evaluate the importance of fossilization processes and techniques in understanding plant evolution, comparing various fossil groups like Psilophytales, Zosterophyllales, and Sphenophyllales to discern their relevance to evolutionary trends and plant diversification.</li> <li>3. Assess the phylogenetic relationships and adaptations of gymnosperms, including major taxa like Ginkgoales, Coniferales, Taxales, and Gnetales, through comparative analysis of their characteristics, affinities, and evolutionary relationships, considering adaptations to diverse ecological niches.</li> <li>4. Critically examine the evolution of plant taxonomy and nomenclature systems, analyzing historical backgrounds, principles of the International Code of Nomenclature (ICN), and the role of botanical gardens and herbaria in documenting plant diversity.</li> <li>5. Synthesize phylogenetic relationships and morphological adaptations in angiosperms, analyzing major orders like Magnoliales, Ranunculales, and Poales, and interpreting the significance of floral adaptations for diversification and ecological interactions.</li> </ol>

<p>BOT1036</p>	<p>Ecology, Environment and Resource Management</p>	<ol style="list-style-type: none"> <li>1. Critically analyze ecological principles and dynamics, incorporating factors affecting habitats and niches, resource partitioning, character displacement, community structure, population dynamics, and succession mechanisms.</li> <li>2. Critically assess biodiversity conservation strategies, considering the significance of conservation, principles of in-situ and ex-situ approaches, and the impact of environmental factors on preservation.</li> <li>3. Evaluate the impact of environmental pollution and climate change by assessing various sources and types of pollutants, analyzing effects on soil components due to pesticides, and examining consequences such as greenhouse effects, ozone layer depletion, and acid rain.</li> <li>4. Examine botanical diversity and plant resource utilization, analyzing the origin, evolution, cultivation, and various uses of plants while evaluating the impacts of initiatives such as the Green Revolution and innovations like GMOs, INM, and IPM on global food demands.</li> <li>5. Analyze phytogeographic patterns and endemism, focusing on principles, theories, and hypotheses of dynamic phytogeography, including the center of origin of cultivated plants, plant migration theories, and concepts such as endemism and megacenters of endemism, with particular attention to the characteristic flora of North-East India and global phytogeographic regions.</li> </ol>
<p>BOT1044</p>	<p>Practical: Algae, Fungi, Bryophytes and Pteridophytes</p>	<ol style="list-style-type: none"> <li>1. Classify and compare algal thallus organization and reproductive structures, integrating practical observation with taxonomic knowledge.</li> <li>2. Proficiently perform microbiological staining techniques including Gram, flagella, capsule, and acid-fast staining of bacteria, utilizing critical thinking to interpret staining results for bacterial identification.</li> <li>3. Identify and document symptoms of virus-infected plants, applying diagnostic skills to classify viral diseases based on observed symptoms.</li> <li>4. Analyze fungal morphology, anatomy, and reproduction, lichen morphology and anatomy, and important Bryophyte genera in North-East India, employing comparative analysis and observational skills to understand regional biodiversity and ecological adaptations.</li> <li>5. Compare significant fossil and extant Pteridophytes, utilizing comparative analysis to grasp evolutionary trends, adaptations, and ecological significance within the group.</li> </ol>
<p>BOT1054</p>	<p>Practical: Gymnosperm, Angiosperm, Ecology</p>	<ol style="list-style-type: none"> <li>1. Calculate the minimum size and number of quadrates needed for studying herbaceous communities, demonstrating proficiency in quantitative ecological research design through analysis.</li> <li>2. Quantify plant community characteristics using the quadrat method and apply statistical analysis to interpret ecological data, demonstrating analytical skills in ecological research through application.</li> <li>3. Through practical exercises, students will estimate above and below-ground biomass from a unit area, employing measurement techniques and mathematical calculations to ecological assessments.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Analyze the impact of biotic disturbances on botanical composition, applying ecological principles to assess temporal changes in plant communities, demonstrating practical understanding of ecological dynamics through application.</li> <li>5. Assess plant community similarity using quantitative methods, employing indices of similarity and dissimilarity to compare ecological data, demonstrating proficiency in quantitative ecological analysis through utilization.</li> </ol>
BOT2016	Cytogenetics, Plant Breeding & Evolution	<ol style="list-style-type: none"> <li>1. Comprehend the structural and functional aspects of cellular organelles and chromosomes as well as cell cycle regulation.</li> <li>2. Illustrate the mechanisms behind DNA damage, repair, inborn errors of metabolism and inherited diseases.</li> <li>3. Analyze the complexities of genome organization, crossing over and inheritance mechanisms.</li> <li>4. Apply knowledge of transcriptional regulation in prokaryotes and molecular basis of mutation.</li> <li>5. Design and implement breeding strategies, assess the impact of environment on traits, and understand principles of evolution.</li> </ol>
BOT2026	Microbiology and Plant Pathology	<ol style="list-style-type: none"> <li>1. Interrelate species-strain distinctions, ICTV categorization, microbial ecological relevance, and microbiome ideas to understand microbial diversity.</li> <li>2. Mastering microbiological techniques of sterilisation, population estimation, pure culture, and culture preservation and maintenance.</li> <li>3. Examine microbial genetics and physiology through comparisons of reproductive modes, evaluation of genetic recombination's evolutionary importance, analysis of nutritional needs and growth conditions, and critique of genetic-physiological interactions in various environments.</li> <li>4. Evaluate immune diseases' pathophysiology, analyze serological reactions and diagnostic methods, and synthesize microbial applications across sectors to demonstrate practicality.</li> <li>5. Justify plant pathology principles through critical analysis of disease mechanisms and host-pathogen interaction, emphasizing their agricultural impact and plant-microbe dynamics in Northeast India.</li> </ol>
BOT2036	Plant Physiology and Biochemistry	<ol style="list-style-type: none"> <li>1. Comprehend the structure and functions of bio-molecules and model membrane emphasizing on active and passive transport, intracellular transport, and electrical properties of membranes.</li> <li>2. Describe the aspects of enzyme catalysis including kinetics and regulation, while understanding nitrogen assimilation, amino acid biosynthesis, protein synthesis and post-translational modification.</li> <li>3. Explain the aspects of photosynthesis and respiration emphasizing on light and dark reactions, photorespiration, TCA cycle, electron transport chain and cyanide resistant pathway.</li> <li>4. Illustrate the biosynthesis, mechanism of action and physiological effects of different plant hormones and photoreceptors and explore the mechanisms of stomatal movement.</li> <li>5. Analyse critically the translocation of water, ions, photo-assimilates and macromolecules from soil, across membranes, through cells, and vascular elements.</li> </ol>
BOT2044	Practical Paper: Microbiology, Plant pathology and Cytogenetics	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of chromosome behavior and anomalies in plant cells during mitosis and meiosis.</li> <li>2. Attain proficiency in isolating and cultivating microbes from environmental samples.</li> <li>3. Master identification and characterization techniques of isolated pure microbial cultures and</li> </ol>

		<p>understand, evaluate and assess quality of different water sources.</p> <ol style="list-style-type: none"> <li>Identify study and characterize pathogenic fungi affecting plants and comprehend their lifecycles.</li> <li>Demonstrate understanding of chromosome behavior and anomalies in plant cells during mitosis and meiosis.</li> </ol>
BOT2054	Practical: Plant Physiology Biochemistry	<ol style="list-style-type: none"> <li>Estimate proteins by extracting from plant materials using Lowry's method while understanding the preparation of normal, molar, molal and ppm solutions.</li> <li>Extract and determine reducing and non reducing sugars as well as oil/fat from plant materials.</li> <li>Evaluate total phenols by extracting plant phenols.</li> <li>Determine chlorophyll a/b ratio and total chlorophyll in C3, C4 and CAM plants.</li> <li>Separate amino acids from mixture by thin layer, or paper chromatography.</li> </ol>
BOT3016	Reproductive and Developmental Botany, Biostatistics	<ol style="list-style-type: none"> <li>Define and outline the factors associated with the plant development</li> <li>Explain the regulatory mechanisms of potent cell or stem cell differentiations due to cytoplasmic determinants, morphogens, genome imprinting etc. leading to the development of various plant parts such as leaf, stem, flower, axis, endosperm and other specialized cell/tissue development.</li> <li>Critically assess embryogenesis, endosperms, polyembryony, seed development, Seed dispersal along with apomixis, apospory.</li> <li>Analyse the process of Sporogenesis and Gametogenesis in plants, pollination, fertilization.</li> <li>Justify the importance of mutants and transgenics in the analysis of plant developments.</li> </ol>
BOT3026	Molecular Biology, Plant Biotechnology & Bioinformatics	<ol style="list-style-type: none"> <li>Appraise with physical properties of DNA, understand and demonstrate DNA replication, RNA synthesis and processing.</li> <li>Differentiate cell signaling receptors and signal transduction pathways, understand concept of bacterial chemotaxis and quorum sensing.</li> <li>Demonstrate proficiency in genetic engineering and molecular marker techniques, Awareness of IPR, biosafety issues related to GMO.</li> <li>Describe, compare and select appropriate tissue culture techniques for various applications.</li> <li>Demonstrate molecular basis of plant growth and development and analyze DNA and Protein sequences.</li> </ol>
BOT3036	Research Methodology and Bioinstrumentation	<ol style="list-style-type: none"> <li>Demonstrate proficiency in applying ethical principles to research practices, ensuring credibility and reliability while addressing plagiarism concerns in scholarly work.</li> <li>Develop proficiency in selecting sampling techniques, applying safety protocols, and evaluating experimental designs for reliability in scientific investigations, ensuring precision and adherence to safety standards for valid findings.</li> <li>Demonstrate mastery in chemical preparation and standardization techniques, ensuring accuracy and reliability in laboratory experiments, while understanding the importance of buffer solutions for maintaining experimental integrity, thereby enhancing experimental outcomes.</li> <li>Apply advanced staining and imaging techniques proficiently, assess microscopy principles for research purposes, and critically analyze plant specimen characteristics.</li> <li>Apply spectroscopic and chromatographic techniques for analysis, assess method suitability, and optimize experimental parameters.</li> </ol>

BOT3044	Practical - Anatomy, Reproductive and Developmental Botany, Biostatistics	<ol style="list-style-type: none"> <li>1. Recall information related to plant anatomy, morphology, and techniques for slide preparation, incorporating statistical methods, while comprehending the developmental stages of leaf, stem, and root structures, including microsporogenesis, megasporogenesis, embryosacs, and endosperms.</li> <li>2. Applying principles of comparative anatomy to analyze anomalous secondary growth patterns, as well as applying advanced microscopy techniques for detailed examination of permanent slides.</li> <li>3. Analyzing and comparing anomalous secondary growth patterns, microsporogenesis, megasporogenesis, embryosacs, and endosperms, as well as analyzing experimental data using statistical methods.</li> <li>4. Evaluating the accuracy and precision of pollen grain slide preparation, as well as evaluating the consistency and precision of microtome sectioning and staining.</li> <li>5. Synthesizing knowledge acquired through field studies and visits to enhance understanding of plant diversity and research methodologies.</li> </ol>
BOT3054	Practical- Molecular Biology, Plant Biotechnology & Bioinformatics	<ol style="list-style-type: none"> <li>1. Recall protein and DNA isolation techniques, PCR reactions, tissue and mushroom culture methods, and bioinformatic tools, alongside understanding gel electrophoresis, DNA quantification, and sequence analysis methods.</li> <li>2. Applying protein isolation techniques, DNA isolation methods, restriction digestion outcomes, PCR reactions, tissue culture techniques, mushroom culture methods, synthetic seed development, and bioinformatic tools to various contexts.</li> <li>3. Analyzing gel electrophoresis results, electrophoresis data, restriction fragment patterns, PCR reactions, tissue culture success rates, mushroom growth parameters, synthetic seed viability, sequence alignments, sequence searches, and protein modeling outcomes.</li> <li>4. Evaluating protein and DNA samples based on gel electrophoresis results, DNA quality and quantity, restriction digestion outcomes, PCR efficiency, tissue culture success rates, mushroom growth parameters, synthetic seed viability, and bioinformatic predictions.</li> <li>5. Developing genetic maps, synthesizing seeds, predicting gene functions, and generating protein tertiary structures using predictive algorithms and bioinformatic tools.</li> </ol>
BOT4015	Angiosperm Taxonomy Special Paper I	<ol style="list-style-type: none"> <li>1. Analyze the underlying principles of taxonomy and differentiate between various classificatory systems, including pre- and post-Darwinian classifications, and the recent development of the APG System in Angiosperms.</li> <li>2. Apply taxometric methods to categorize plants, character coding, and measuring resemblances, culminating in the application of cluster analysis for phylogenetic inference.</li> <li>3. Evaluate taxonomic structures by identifying the hierarchical concept of taxa and interpreting the material basis of taxonomy through character correlation, character weighing along with knowledge of variations, isolation, and speciation.</li> <li>4. Critically assess botanical nomenclature its historical development, major rules, typification, effective and valid publication, authors' citation, principles of priority.</li> <li>5. Synthesize knowledge of cladistic taxonomy, character analysis, and cladogram construction and analysis to interpret evolutionary relationships among organisms, integrating principles from phenetic and phylogenetic approaches.</li> </ol>
BOT4025	Angiosperm Taxonomy Special Paper II	<ol style="list-style-type: none"> <li>1. Evaluate various sources of taxonomic characters, including morphology, anatomy, palynology, embryology, cytology, phytochemistry, and serology, to categorize organisms</li> </ol>

		<p>effectively.</p> <ol style="list-style-type: none"> <li>2. Apply modern approaches to taxonomy, particularly the molecular approach, including diagnostic tools and polymerase chain reaction (PCR) analysis, and explore the applications of molecular markers in plant taxonomy.</li> <li>3. Analyze the significance of biosystematics and role of computers and commonly available software in taxonomic studies.</li> <li>4. Assess taxonomic literature, classical and recent, focusing on world and Indian flora, taxonomic journals, icons, checklists, and illustrations, to comprehend the diversity of plant species.</li> <li>5. Implement techniques for the process of identification, including herbarium techniques such as collection, identification, and documentation, and recognize the roles and importance of herbaria, botanical gardens, and museums in taxonomic studies, emphasizing major institutions in the world and India.</li> </ol>
BOT4035	Angiosperm Taxonomy Special Paper III	<ol style="list-style-type: none"> <li>1. Recall the concept of phytogeography, major theories in phytogeography and identifying botanical provinces of India, enlisting the IUCN categories and describe the significance of hotspots, emphasizing India's status as a megadiversity country.</li> <li>2. Interpret the characteristics of the flora of Northeast India, distinguishing between endemic, exotic, and Rare, Endangered, and Threatened (RET) plants, and discuss their multiplication and conservation.</li> <li>3. Apply knowledge of the origin and evolution of angiosperms to identify characteristic features of early angiosperms and distinguish between primitive and advanced angiosperms.</li> <li>4. Analyze the phylogeny and evolution of various angiospermic taxa, including Magnoliales, Ranunculales, Euphorbiales, Scrophulariales, Lamiales, Asterales, Alismatales, Orchidales, Poales, and Zingiberales, identifying key characteristics and relationships between taxa.</li> <li>5. Evaluate the significance of different theories and concepts in phytogeography and angiosperm evolution, assessing their contributions to our understanding of plant distribution and diversity.</li> </ol>
BOT4045	Angiosperm Taxonomy Special Paper Dissertation	<ol style="list-style-type: none"> <li>1. Analyze and evaluate the morphological and anatomical characteristics of diverse angiosperm families, demonstrating the ability to classify and differentiate them effectively.</li> <li>2. Apply advanced taxonomic principles and methodologies to identify and categorize unknown angiosperm specimens, showcasing proficiency in botanical classification techniques.</li> <li>3. Design and conduct independent research projects investigating the phylogenetic relationships within specific angiosperm taxa, demonstrating advanced skills in data collection, analysis, and interpretation.</li> <li>4. Synthesize information from diverse scholarly sources to critically evaluate current trends and controversies in angiosperm taxonomy, illustrating a deep understanding of the field's theoretical and practical dimensions.</li> <li>5. Demonstrate effective communication skills through the presentation and defense of a comprehensive dissertation, integrating empirical findings and theoretical insights to contribute to the advancement of angiosperm taxonomy knowledge.</li> </ol>

BOT4054	Angiosperm Taxonomy Special Paper Practical	<ol style="list-style-type: none"> <li>1. Apply knowledge of Taxonomy to collect, describe, and illustrate locally available angiospermic plants and species identification using botanical keys.</li> <li>2. Analyze nomenclatural problems encountered in floristic studies, proposing solutions and applying correct botanical nomenclature principles.</li> <li>3. Practice the identification of taxa and herbarium specimens, utilizing hands-on techniques and botanical knowledge acquired during the course.</li> <li>4. Evaluate the distribution of various centres of the Botanical Survey of India (BSI), botanical gardens, and herbaria across different regions of India, understanding their roles in plant conservation and documentation.</li> <li>5. Develop comprehensive floristic reports based on collected specimens, incorporating detailed descriptions, analytical drawings, and taxonomic identifications up to the species level</li> </ol>
BOT4065	Cytology, Genetics and plant Breeding Special Paper I	<ol style="list-style-type: none"> <li>1. Comprehend cell architecture, division cycle and function in depth, focusing on possessing a strong foundation in cytology.</li> <li>2. Evaluate and apply knowledge of Chromosomal structure and interaction; Understand concepts of penetrance and expressivity.</li> <li>3. Gather in-depth knowledge of epigenetics, chromatin modifications and their influence on gene expression.</li> <li>4. Critically analyze genome organization in different life forms; understand the concept of pseudogenes and multigene families.</li> <li>5. To understand and analyze the molecular basis of gene mutations and familiarize with genetic distance and phylogenetic analysis.</li> </ol>
BOT4075	Cytology, Genetics and plant Breeding Special Paper II	<ol style="list-style-type: none"> <li>1. Apply knowledge of transcription processes and regulatory elements in prokaryotes and eukaryotes.</li> <li>2. Analyze genomes and proteins using computational and experimental methods.</li> <li>3. Comprehend the structure and processing of different RNA types and the regulation through RNA processing and decay</li> <li>4. Understand metagenomic approaches, in silico computational techniques for gene functions, and high-throughput analysis of gene functions</li> <li>5. Demonstrate proficiency in various techniques of molecular genetics to define genomic structures and critical evaluate concerns related to genetic engineering including biosafety, ethics and environmental effects.</li> </ol>
BOT4085	Cytology, Genetics and plant Breeding Special Paper III	<ol style="list-style-type: none"> <li>1. Comprehend quantitative and evolutionary genetics, polygenic inheritance, heritability measurement, QTL mapping using molecular marker.</li> <li>2. Understand and apply principles of plant breeding, hybridization, and major crop species improvement concepts.</li> <li>3. Gain knowledge of chromosome variation in higher plants, haploids breeding, mutations, and effects of mutagens on crop improvement.</li> <li>4. Grasp the application of genetic engineering in crop improvement, resistance development, environmental tolerance and molecular farming.</li> <li>5. Demonstrate proficiency in Agrobacterium mediated gene transfer and the development of plant vectors for transformation and critically analyze the applications of plant tissue culture techniques.</li> </ol>

BOT4095	Cytology, Genetics and plant Breeding Special Paper Dissertation	<ol style="list-style-type: none"> <li>1. Develop deep understanding of genetics principles and be able to analyze how genes are transmitted.</li> <li>2. Identify and solve problems with innovative solutions in the field of Botany.</li> <li>3. Understand the theory and fundamentals of Cytology in the context of plant cells, their function and structure.</li> <li>4. Apply breeding principles to create and improve plant varieties while keeping the environmental impact in mind.</li> <li>5. Employ advanced lab techniques in research and data collection to contribute to the discipline of Botany.</li> </ol>
BOT4104	Cytology, Genetics and plant Breeding Special Paper Practical	<ol style="list-style-type: none"> <li>1. Generate, analyze, and interpret karyotypes and idiograms from mitotic metaphase stage.</li> <li>2. Apprehend and examine the frequencies in meiosis cell division.</li> <li>3. Gain expertise in pollen mother cells and root tips analysis using various staining techniques.</li> <li>4. Acquire knowledge on the influence of natural and induced chromosomal aberrations on Plant Breeding.</li> <li>5. Master the process of genomic DNA isolation and manipulation from plant materials and DNA/Protein sequence analysis using bioinformatics tools.</li> </ol>
BOT4115	Plant Ecology Special Paper I	<ol style="list-style-type: none"> <li>1. Comprehending the historical development, population characteristics, species interactions, ecological communities, biogeochemical cycles, population regulation mechanisms, ecological niches, succession processes, and remote sensing/GIS principles.</li> <li>2. Applying knowledge of historical development to analyze interactions between ecological factors, applying population dynamics understanding to evaluate ecological amplitude and adaptations, applying ecological parameters to describe community attributes, and applying remote sensing and GIS techniques to environmental studies.</li> <li>3. Analyzing limiting factors affecting ecosystems, analyzing types of species interactions and their ecological implications, evaluating species diversity, interpreting ecological significance of interspecific associations, and analyzing mechanisms of ecological succession.</li> <li>4. Assessing the importance of biogeochemical cycles, population regulation mechanisms, succession processes in ecosystems, and the effectiveness of remote sensing and GIS in environmental studies</li> <li>5. Creating novel insights on ecological interactions, innovating population regulation approaches, devising ecosystem management strategies using succession processes, and pioneering new applications for remote sensing and GIS in environmental studies.</li> </ol>
BOT4125	Plant Ecology Special Paper II	<ol style="list-style-type: none"> <li>1. Grasping the organization, roles, and dynamics of ecosystems including methods of measurement, global patterns, stability, resistance, resilience, and the impacts of perturbations on plants and ecosystems.</li> <li>2. Applying knowledge of ecosystem modeling, statistical ecology, and pattern analysis techniques.</li> <li>3. Analyzing the causes of wetland degradation, examining principles of conservation ecology, and evaluating the impact of genetic variation loss on natural populations.</li> <li>4. Assessing the importance of wetlands, critiquing conservation principles and ethics, and evaluating biodiversity monitoring methods and their relationship to ecosystem services.</li> <li>5. Developing strategies for habitat conservation, proposing solutions to threats to biodiversity, and contributing to conservation efforts through legal frameworks and international/national programs.</li> </ol>



BOT4135	Plant Ecology Special Paper III	<ol style="list-style-type: none"> <li>1. Understanding environmental management, sustainable development principles, pollution impact on water quality and phytoplankton, and utilizing bio-indicators and biomonitoring techniques for air and water quality.</li> <li>2. Applying knowledge of environmental monitoring methods to evaluate pollution impacts, applying bio-indicators and treatment methods for pollution mitigation, and applying active and passive monitoring techniques for air pollution.</li> <li>3. Examining the efficacy of green belt designs in addressing environmental concerns, evaluating environmental policies, treaties, and India's environmental movement, and scrutinising the goals and provisions of environmental acts and programmes.</li> <li>4. Evaluating the concepts, aims, strategies, and tools for ecosystem restoration and reconstruction, and evaluating the effectiveness of bioremediation, biotransformation, biodegradation, and phytoremediation in combating global contaminations.</li> <li>5. Developing strategies for ecosystem restoration and reconstruction, and proposing innovative approaches for bioremediation, biotransformation, biodegradation, and phytoremediation.</li> </ol>
BOT4145	Plant Ecology Special Paper Dissertation	<ol style="list-style-type: none"> <li>1. Analyze plant ecological interactions across diverse habitats, demonstrating proficiency in identifying key ecological factors influencing plant distribution and community dynamics.</li> <li>2. Evaluate the impact of environmental factors on plant population dynamics and ecosystem functioning, understanding plants association, synthesizing empirical data to elucidate patterns and processes.</li> <li>3. Demonstrate advanced skills in experimental design and data analysis relevant to plant ecology research, applying statistical techniques to address research questions effectively.</li> <li>4. Develop and defend a comprehensive research project in application of organisms in solving environmental problems, degraded ecosystem restorations through the dissertation, integrating theoretical concepts with empirical evidence to contribute to the field's knowledge base.</li> <li>5. Engage in critical discussions and reflections during viva-voce sessions, demonstrating a deep understanding of plant ecology principles and their application in real-world contexts.</li> </ol>
BOT4154	Plant Ecology Special Paper Practical	<ol style="list-style-type: none"> <li>1. Acquiring knowledge to estimate environmental parameters like light intensity, relative humidity, wind speed, rainfall, and temperature changes, as well as identify vegetation types, delineate boundaries, analyse vegetation patterns, and understand ecological dynamics and landscape processes.</li> <li>2. Efficiently performing soil physicochemical and water quality determination techniques, quantifying litter contribution, estimating decomposition rates, and assessing primary productivity in different environments.</li> <li>3. Critically analysing and interpreting data on soil and water quality, soil respiration, and ecosystem energy capture efficiency.</li> <li>4. Critically assessing plant reproductive strategies, the role of allelopathy, morpho-anatomical variations in plant species, and ecological data required for computer study optimization.</li> <li>5. Developing hands-on experience in field techniques, data analysis, interpretation of plant community characteristics, and visualization of ecological data.</li> </ol>
BOT4165	Microbiology Special Paper I	<ol style="list-style-type: none"> <li>1. Recall key interactions of microbes with each other, plants, and animals; Explain the significance of microbes in extreme environments; Evaluate the effectiveness of microbial interventions in environmental remediation, hydrocarbon recovery, mining, energy production and agricultural productivity</li> </ol>

		<ol style="list-style-type: none"> <li>2. Assess the soil microbial communities by applying methods for detecting and quantifying soil microbes and monitoring soil health.</li> <li>3. Illustrate the agriculturally important microbes with their role in biological nitrogen fixation, PGPRs, and phosphate solubilization; recognize crop diseases caused by plant pathogens and biocontrol of plant diseases</li> <li>4. Categorize the microorganisms involved in industrial and food microbiology; Illustrate different fermentation processes for production of industrial and food products; Explain the cause of food spoilage and different food borne diseases</li> <li>5. Explain the concept of IPR, Patent and patent filing, design and trade mark, GI, Plant Variety Protection and Farmer's Right; Analyze the implications of intellectual property rights (IPR) on economic growth and innovation; Integration of traditional knowledge and promoting fair benefit sharing.</li> </ol>
BOT4175	Microbiology Special Paper II	<ol style="list-style-type: none"> <li>1. Explain the genome diversity and evolution in microbes, describe replication of both circular and linear DNAs, and explain genetic recombination processes in both prokaryotic and eukaryotic microbes</li> <li>2. Illustrate the fine gene structure, gene regulation, gene interactions and RNA processing in both prokaryotic and eukaryotic microbes.</li> <li>3. Describe different omics approaches and explain their importance in modern biology for better understanding of system biology.</li> <li>4. Discuss and critically distinguish microorganisms with different metabolic potentials, and enumerate different anabolic and catabolic processes found in microbes.</li> <li>5. Basic understanding of genetic manipulation in genetic engineering and the application of microbial biotechnology in industries, agricultures, medical science and environmental engineering.</li> </ol>
BOT4185	Microbiology Special Paper III	<ol style="list-style-type: none"> <li>1. Identify the symptoms and pathogens of various infectious human diseases with modern tools and techniques for better management of the diseases</li> <li>2. List out and compare the effectiveness of various physical, chemical and biological control measures for microorganisms; enumerate the role and mode of action of different classes of antibiotics; discuss the basis of multidrug resistance in microbes</li> <li>3. Classify and enumerate different types of immunity (specific and non-specific), immune cells, antibodies, and antigen-antibody reactions.</li> <li>4. Describe the molecular basis of antibody diversity, antigen-antibody reactions, and the application of immuno-techniques in health sciences.</li> <li>5. Explain and comment on various physical, chemical and biological agents responsible for cancer development; stages of cancer development, complexity, and cancer treatments.</li> </ol>
BOT4195	Microbiology Special Paper Dissertation	<ol style="list-style-type: none"> <li>1. Hypothesize scientific questions</li> <li>2. Plan and execute research experiments</li> <li>3. Compile, analyze and interpret research data</li> <li>4. Critically discuss and summarize the research findings</li> <li>5. Develop new research hypothesis and proposals to address scientific issues</li> </ol>
BOT4204	Microbiology Special Paper practical	<ol style="list-style-type: none"> <li>1. Describe the principles of different microbial experiments and list out the requirements for the experiments</li> <li>2. Perform staining and biochemical tests for identification of microorganisms, analyze milk and</li> </ol>

		<p>water quality.</p> <ol style="list-style-type: none"> <li>3. Compare and evaluate the best methods of microbial study and functional characterization through various biochemical and molecular techniques</li> <li>4. Identify, innumerate and illustrate agriculturally beneficial and harmful microbes from different sources</li> <li>5. Perform molecular experiments for DNA and protein isolation and assess their quality and quantity.</li> </ol>
BOT4215	Mycology and Plant Pathology Special Paper I	<ol style="list-style-type: none"> <li>1. Analyze historical and contemporary aspects of mycology, focusing on development and cell structure, fungal taxonomy, and recent advancement in identification process.</li> <li>2. Critically analyse fungal reproduction and reproductive architecture, parasexuality, heterothallism, and spore dispersal methods and their ecological importance.</li> <li>3. Critically assess fungal growth, metabolism, dietary needs, and ecological functions, including specialization for survival.</li> <li>4. Analyze fungi's contributions to biogeochemical cycles, assess their populations across diverse habitats, and emphasize ecological adaptations and functions.</li> <li>5. Examine the economic, environmental, and intellectual property implications of modified fungi, biocontrol agents, and industrially important fungi.</li> </ol>
BOT4225	Mycology and Plant Pathology Special Paper II	<ol style="list-style-type: none"> <li>1. Examine historical development and significance of plant pathology, analyse the role of fungi, bacteria, viruses, and other organisms as causative agents of plant diseases, evaluate the economic losses incurred caused by phytopathogens.</li> <li>2. Evaluate the methods of diagnosing plant diseases, verifying Koch's postulates and the germ theory of diseases, analyzing pathogenesis, host range, stages of disease development, and the dissemination of plant pathogens.</li> <li>3. Critique epidemiological principles and techniques for disease forecasting, assessing the impact of environmental factors on disease spread, and appraise various methods of disease control such as chemical and biological control and integrated disease management (IDM).</li> <li>4. Appraise the genetic basis of plant diseases, examining the mechanisms of variability, types of plant resistance to pathogens, and the genetics of virulence in pathogens and resistance in hosts, while analyzing the roles of enzymes, toxins, and growth regulators in disease development.</li> <li>5. Interpret the symptomatology, disease cycle, and management strategies for significant plant diseases in Assam caused by fungi, bacteria, viruses, and nematodes, emphasizing control measures and management techniques.</li> </ol>
BOT4235	Mycology and Plant Pathology Special Paper III	<ol style="list-style-type: none"> <li>1. Examine plant defense and their response to pathogens, plant immunisation, focusing on systemic acquired resistance and induced resistance.</li> <li>2. Evaluate the use of biotechnology to combat plant diseases, including the identification and insertion of resistant genes into suitable hosts for crop improvement, strategies for developing disease-resistant plants, and the effects of GMOs like bt-cotton, bt-brinjal, and bt-chickpea.</li> <li>3. Assess the field of aerobiology in relation to plant diseases, examining air microflora, sampling techniques, factors influencing air microflora distribution, airborne plant diseases, and aero-allergens.</li> <li>4. Examine the rhizosphere and rhizoplane, root exudates, soil and root-borne pathogens, soil microbial interaction, biocontrol concept to manage soil borne pathogens</li> <li>5. Interpret the morphology and anatomy of infected seeds, evaluate pathogen transmission from</li> </ol>

		seeds to plants, assess the impact of toxins on seed quality and human and animal health, and analyse seed-borne disease management, seed health testing, quarantine, and seed certification protocols.
BOT4245	Mycology and Plant Pathology Special Paper Dissertation	<ol style="list-style-type: none"> <li>1. Analyze the principles and methodologies of mycology and plant pathology, integrating theoretical knowledge with practical applications through dissertation work.</li> <li>2. Evaluate the dissertation research findings, demonstrating a comprehensive understanding of mycological and plant pathological concepts during the viva-voce examination.</li> <li>3. Demonstrate practical skills and proficiency in conducting experiments, data analysis, and interpretation through internal assessment tasks.</li> <li>4. Apply theoretical knowledge and practical skills to address real-world challenges in mycology and plant pathology, showcasing competency and innovation in the dissertation project.</li> <li>5. Synthesize interdisciplinary perspectives and research methodologies to contribute effectively to the field of mycology and plant pathology, as evidenced through the dissertation, viva-voce, and internal assessment.</li> </ol>
BOT4254	Mycology and Plant Pathology Special Paper Practical	<ol style="list-style-type: none"> <li>1. Apply techniques to isolate and identify pathogens from diseased plant materials, while simultaneously demonstrating Koch's postulate through controlled experimental procedures to establish causal relationships between pathogens and diseases.</li> <li>2. Analyze fungal structures and reproductive strategies, evaluate fungicide impacts on plant pathogens for control efficacy, and interpret mycorrhizal fungi spore dynamics and root colonization quantitatively to understand ecological roles.</li> <li>3. Investigate the effects of physical and chemical factors on the growth of plant pathogens, utilizing experimental approaches to understand their environmental requirements and limitations.</li> <li>4. Critique the extraction process of cellulase, pectinase, or xylanase from diseased plants, exploring their enzymatic activities and implications in disease progression.</li> <li>5. Assess plant extracts' biocontrol potential against plant pathogens in vitro, alongside diagnostic methods for identifying causal organisms, and analyze soil microbial diversity for understanding soil microbe composition and abundance.</li> </ol>
BOT4265	Plant Physiology and Biochemistry Special Paper I	<ol style="list-style-type: none"> <li>1. Analyze membrane transport mechanisms, signal transduction mechanisms and pathways in both bacteria and plants as well as elucidate the roles of root microbe interactions, in nutrient uptake facilitation.</li> <li>2. Examine the genetic and molecular aspects of the flowering process, including photoperiodism and vernalization.</li> <li>3. Evaluate nitrogen and sulfur metabolism, including regulation, fixation, transport, and assimilation processes.</li> <li>4. Understand post-harvest physiology principles, including fruit ripening regulation and leafy vegetable metabolism during storage.</li> <li>5. Assess plant responses to various abiotic stresses, such as water deficit, salinity, heavy metal, oxidative stress, elevated CO<sub>2</sub> and biotic stress, and discuss the transgenic approach for stress mitigation.</li> </ol>
BOT4275	Plant Physiology and Biochemistry Special Paper II	<ol style="list-style-type: none"> <li>1. Comprehend the aspects of phosphorus nutrition, including soil forms, absorption processes, factors regulating 'P' uptake, plant fractions, and Pyrophosphate's involvement in plant metabolism.</li> </ol>

		<ol style="list-style-type: none"> <li>2. Explain photochemistry and photosynthesis, including evolution of photosynthetic apparatus, photo-oxidation of water, electron and proton transport mechanisms, PCR Cycle and their regulations, and ecological significance of CAM.</li> <li>3. Examine plant metabolism, including starch and sucrose biosynthesis regulation, synthesis and degradation of cellulose and pectin as well as metabolism and functions of oxalic acid, ascorbic acid, and malic acid.</li> <li>4. Understand plant respiration and lipid metabolism, analyzing anaerobic respiration, electron transport, ATP synthesis, pentose phosphate pathway, regulation of glycolysis and TCA Cycle, inhibitors, glyoxylate cycle, membrane lipids synthesis, and gluconeogenesis.</li> <li>5. Evaluate the role of Shikimate Pathway in biosynthesis of secondary metabolites, and analyze biosynthesis, and functions of terpenes, phenols, and nitrogenous compounds.</li> </ol>
BOT4285	Plant Physiology and Biochemistry Special Paper III	<ol style="list-style-type: none"> <li>1. Understand the aspects of growth and photomorphogenesis explaining the cellular localization, roles, biosynthesis, properties and mechanism of action of photomorphogenetic receptors.</li> <li>2. Illustrate the biochemical changes during development of seeds and explain the tropic and nastic movements in plants.</li> <li>3. Explain aspects including biochemical changes and regulation of senescence and Programmed Cell Death (PCD) and discuss the roles of tissue culture, and mutants in physiological studies.</li> <li>4. Comprehend enzyme kinetics with reference to Km value and enzyme inhibition while discussing the factors responsible for enzyme interaction.</li> <li>5. Discuss the discovery, role and mechanism of action of Plant Growth Regulators (PGRs) including Triacantanol, Brassins, Salicylic acid, Jasmonates and Polyamines and role of plant growth retardants such as, CCC, Maleic hydrazide, Trizoles and TIBA.</li> </ol>
BOT4295	Plant Physiology and Biochemistry Special Paper Dissertation	<ol style="list-style-type: none"> <li>1. Identify and assess a specific problem of local, national as well as global relevance to find out research based scientific solution.</li> <li>2. Demonstrate proficiency in conducting and presenting original research through the dissertation, oral defense and discussion on research findings.</li> <li>3. Apply critical analysis and evaluation skills in assessing internal assessments and coursework in plant physiology and biochemistry.</li> <li>4. Synthesize and apply advanced concepts and methodologies in plant physiology and biochemistry to address research questions and problems.</li> <li>5. Demonstrate practical proficiency in experimental techniques and methodologies relevant to plant physiology and biochemistry.</li> </ol>
BOT4304	Plant Physiology and Biochemistry Special Paper Practical	<ol style="list-style-type: none"> <li>1. Apply spectrophotometric techniques, to estimate starch, ascorbic acid, polyphenols, cellulose, and nitrate as well as analyze sugar and amino acids in phloem sap by paper chromatography.</li> <li>2. Measure relative water content (RWC) and osmotic potential in plant parts and assess PEG-induced water stress on seed germination</li> <li>3. Analyze the accumulation of free proline and oxalic acid as well as protein/amino acid profiles in stressed plants alongside examining the role of hormones in regulating leaf and petal senescence.</li> <li>4. Examine lipid accumulation during oil seed development and investigate seed germination under stressful conditions, as well as explore the effects of fungal infection on peroxidase activity.</li> <li>5. Examine the activity of free radical scavenging enzymes like catalase and superoxide dismutase, and evaluate the effects of plant growth regulators (PGRs) on seedling growth.</li> </ol>

<b>Department:</b>	<b>Department of Botany</b>	
<b>Programme:</b>	<b>M.Sc. in Microbiology</b>	
<b>PSOs</b>	<ol style="list-style-type: none"> <li>1. Analyze the plant-microbe interaction to elucidate intricate symbiotic relationships and ecological dynamics within diverse ecosystems.</li> <li>2. Understand the role of unculturable microbial flora in the environment, emphasizing the significance of metagenomic approaches in uncovering microbial diversity and function.</li> <li>3. Evaluate microbial genetic variation using advanced molecular techniques to elucidate evolutionary processes and phylogenetic relationships.</li> <li>4. Explore the diversity and economic values of microbes in the NE Region, emphasizing their potential applications in agriculture, healthcare, industry, and environmental management.</li> </ol>	
MICRO-1016	Microbial Diversity, Taxonomy & Systematics	<ol style="list-style-type: none"> <li>1. Develop an understanding of microbial diversity, including their distribution and occurrence in various environments.</li> <li>2. Detail: Delve into the intricacies of microbial identification and taxonomic studies, including the use of morphological, physiological, and biochemical characteristics.</li> <li>3. Analyze: Employ molecular techniques to analyze both culturable and non-culturable microorganisms, elucidating their genetic diversity and ecological roles.</li> <li>4. Explore: Explore the three domains of life (Bacteria, Archaea, and Eukarya) and their evolutionary relationships, highlighting the contributions of microbial evolution to the diversity of life on Earth.</li> <li>5. Characterize the structures and functions of microbial extracellular components, such as cell walls, capsules, and biofilms, elucidating their roles in microbial physiology, pathogenesis, and interactions with the environment.</li> </ol>
MICRO-1026	Soil and Agricultural Microbiology	<ol style="list-style-type: none"> <li>1. Identify soil properties and microbial populations, understand soil ecosystem interactions, and recognize implications for agricultural practices like organic farming and biologic pest control.</li> <li>2. Categorize microbial interactions with plants and animals, including endophytes and symbiotic relationships; understand community dynamics and plant pathogen management strategies.</li> <li>3. Explain biogeochemical cycling's significance in soil ecosystems, microbial community roles and diversity, and their adaptation to environmental conditions.</li> <li>4. Analyze microbial population ecology, including detection methods and activity measurement; understand plant pathogenic microorganism physiology and their impact on agriculture.</li> <li>5. Evaluate management strategies for plant diseases caused by fungi, bacteria, viruses, and nematodes; understand microbes' role in agriculture, horticulture, and plant production; assess microbial biodeterioration potential in agricultural produce.</li> </ol>
MICRO-1036	Physiology and biochemistry	<ol style="list-style-type: none"> <li>1. Understanding various reactions of bio-organic molecules, including the concept of pH for weak acids and bases, buffers, Henderson-Hasselbalch equation, and the significance of noncovalent chemical bonds in biomolecule stability.</li> <li>2. Applying thermodynamic laws and equations to biological systems, and applying concepts of entropy, enthalpy, free energy, and equilibrium constant to biochemical reactions.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Comparing types of noncovalent chemical bonds in terms of prevalence, strength, and importance in biological processes, and analyzing thermodynamic principles in biological systems.</li> <li>4. Evaluating the role of thermodynamic laws and equations in biological systems, and evaluating the free energy of hydrolytic and biological oxidation-reduction reactions.</li> <li>5. Developing an understanding of the biochemistry of biological nitrogen fixation, properties of nitrogenase, and its regulation, and synthesizing knowledge on the biosynthesis of amino acids, purine, and pyrimidine bases.</li> </ol>
MICRO-1044	Microbial Diversity, Taxonomy & Systematics, Soil and Agricultural Microbiology	<ol style="list-style-type: none"> <li>1. Identify and characterize diverse microorganisms like actinomycetes, yeast, fungi, bacteria, anaerobes, thermophiles, and cyanobacteria found in soil samples.</li> <li>2. Gain hands-on experience in cultivating pure microbial cultures, isolating AM fungi, studying PGPR, and mastering biochemical and staining techniques.</li> <li>3. Analyze root colonization and population dynamics of AM fungi to comprehend their roles in soil fertility and health.</li> <li>4. Utilize microbiological methods to isolate and characterize Rhizobium from soil and root nodules, and screen soil for PGPR activity.</li> <li>5. Assess the influence of physical and chemical factors on microbial growth and conduct microscopic observations and biochemical tests for bacterial identification.</li> </ol>
MICRO-1054	Physiology and Biochemistry	<ol style="list-style-type: none"> <li>1. Able to prepare acetate and phosphate buffers using specific chemicals and check the pH.</li> <li>2. Grab the principle of paper chromatography and be able to perform separation of sugar and amino acids using paper chromatography.</li> <li>3. Understand the principle of thin layer chromatography and able to separate sugar and amino acids using thin layer chromatography.</li> <li>4. Able to estimate supplied protein sample by Lowry's method.</li> <li>5. Understand the role of microorganisms, especially yeast and other fermentative microbes in carbohydrate fermentation and perform bread making using yeast.</li> </ol>
MICRO-2016	Microbial Genetics & Molecular Biology	<ol style="list-style-type: none"> <li>1. Recognize DNA replication, damage, and repair processes, genetic transfer methods like transformation, conjugation, and transduction, gene concepts, and gene/chromosome organization.</li> <li>2. Classify mutation types and causes, differentiate between structural and numerical chromosome alterations, and understand Mendelian and non-Mendelian inheritance laws, including linkage and mechanisms of gene expression control at transcription and translation levels.</li> <li>3. Explore genetic recombination's role in generating variability, gene and chromosome organization, including operons and chromatin structure, and gene expression control at transcription and translation levels, involving promoters, regulators, and suppressors.</li> <li>4. Analyze genetic implications of chromosomal alterations and mutations, gene mapping, and control of gene expression at transcription and translation levels, including histone modifications and gene interaction.</li> </ol>

		5. Assess genetic implications of mutations and chromosomal alterations, mechanisms of gene expression control including regulatory RNAs and protein modifications, and significance of cell signaling mechanisms in microbial genetics and molecular biology.
MICRO-2026	Bioinstrumentation and Microbial Techniques	<ol style="list-style-type: none"> <li>1. Recognize and describe microscopic techniques, radiography, confocal microscope.</li> <li>2. Categorize different histochemical and immunotechniques, tracer elements in biology, freezing mediated sampling, fixation and staining methods for EM, radioactive isotopes.</li> <li>3. Explain chromatography, biosensors, isotopic half-life, autoradiography, molecule detection methods including ELISA, RIA, western blot, immunoprecipitation, and various localization techniques such as FISH and GISH.</li> <li>4. Analyse Principles of different DNA sequencing techniques (Sanger's sequencing, Maxam and Gilburg sequencing), Next Generation Sequencing (Illumina and Solexa), discuss principles and types of spectroscopic techniques, centrifugation, electrophoresis.</li> <li>5. Evaluate the safety guidelines for radio isotopes.</li> </ol>
MICRO-2036	Immunology	<ol style="list-style-type: none"> <li>1. Understanding and describing terms such as immunology, immunity, immune response, and major historical events in the development of immunology.</li> <li>2. Explaining innate and adaptive immunity to foreign particles, including the major immunoglobulin classes, their structures, and functions.</li> <li>3. Gathering knowledge about the structure and organization of various cells and organs involved in the immune system and understanding their role in developing immunity in the body.</li> <li>4. Assembling and understanding the concepts of antigen-presenting cells (APCs) and major histocompatibility complex (MHC) molecules in the context of adaptive immunity, along with an in-depth understanding of cytokines, chemokines, and their receptors.</li> <li>5. Analyzing the concepts of immunization, vaccine development, and various approaches to vaccine development.</li> </ol>
MICRO-2044	Bioinstrumentation and immunology	<ol style="list-style-type: none"> <li>1. Understand the importance of calibration and be able to calibrate pH meter along with determining pH of a given sample.</li> <li>2. Able to determine sedimentation coefficients of a sample at different centrifugation speeds using a centrifuge.</li> <li>3. Determine different mobility of nucleic acid at different gel concentrations and at different voltages in electrophoresis.</li> <li>4. Able to determine the blood group of a person using blood group determining kit.</li> <li>5. Use UV-vis spectrophotometer and determine a sample's absorption at different wavelengths.</li> </ol>
MICRO-2054	Microbial Genetics & Molecular Biology	<ol style="list-style-type: none"> <li>1. Perform plasmid DNA extraction and determine the molecular weight of plasmid DNA.</li> <li>2. Apply PCR techniques to amplify desired genes.</li> <li>3. Analyze DNA through restriction digestion, ligation, and endonuclease mapping.</li> <li>4. Demonstrate the preparation of competent cells and transformation of plasmid DNA in E. coli.</li> <li>5. Evaluate the process of curing plasmid using agents such as Ethidium bromide, Acridine orange, Plumbagin, and Mitomycin C.</li> </ol>
MICRO-3016	Environmental Microbiology	<ol style="list-style-type: none"> <li>1. Identify water's role as a microbial habitat, factors influencing aquatic microbial communities, water purification methods, and waste disposal techniques in environmental microbiology.</li> <li>2. Classify bacteriological examination methods for water quality assessment, microbial responses to contaminants, and waste disposal methods, including advanced wastewater treatment.</li> </ol>



		<ol style="list-style-type: none"> <li>3. Explain microbial pollutant degradation processes, biosensor applications in environmental monitoring, aerobiology fundamentals, and airborne microorganism identification for pollution control.</li> <li>4. Analyze disinfection kinetics, waterborne pathogen detection methods, microbial interactions with radionuclides and toxic metals, and impacts of genetically modified organisms on soil microorganisms.</li> <li>5. Evaluate challenges in microbiological pollutant degradation, bioremediation's role in environmental management, environmental impacts of waste disposal methods, and microorganisms' contributions to climate change mitigation and ecosystem balance.</li> </ol>
MICRO-3026	Medical Microbiology	<ol style="list-style-type: none"> <li>1. Recognize, identify, and describe the general aspects of medical microbiology, some important bacteria and viruses as human pathogen, immune defences, epidemiology and prevention of infections.</li> <li>2. Categorize some subcellular infectious entities, prokaryotic and eukaryotic microorganisms, types of defense mechanisms, normal Flora, different types of antimicrobial agents.</li> <li>3. Explain the host - pathogen interactions, genetics of regulation of bacterial virulence and pathogenicity, principles of antibiotic therapy.</li> <li>4. Analyse different diagnosis methods of viral diseases, viral replication without cell destruction, oncoviruses and tumor transformation, different modes of invitro virus detection (laboratory diagnosis, culturing, direct virus detection, virus detection following biochemical, amplification, serodiagnosis).</li> <li>5. Assess management strategies for antimicrobial resistance, site-specific infections, microbial roles in agriculture and plant tissue culture-based production, and the potential for microbial biodeterioration and biodegradation.</li> </ol>
MICRO-3036	Food and industrial microbiology	<ol style="list-style-type: none"> <li>1. Gather knowledge about the role of microorganisms and the principles in food processing, its spoilage, including their role in traditional fermented foods.</li> <li>2. Comprehend and apply the various methods for microbiological examination of food along with various advanced techniques in food microbiology.</li> <li>3. Understand different types of bioreactors, their operational modes which are used for laboratory, pilot and industrial scale fermentations and their processing parameters.</li> <li>4. Gain insight into industrial microbial products and their production processes, including organic acids, alcohols, wine, and pharmaceutical products utilizing diverse microorganisms.</li> <li>5. Assemble in-depth knowledge on principles of method validation, concept of ISO certification, preparation of SOPs and process validation as per WHO norms.</li> </ol>
MICRO-3044	Environmental Microbiology	<ol style="list-style-type: none"> <li>1. Perform bacteriological examination of water using multiple-tube fermentation test and determine air borne microflora.</li> <li>2. Analyze the biochemical oxygen demand (BOD) and chemical oxygen demand (COD) of water and determine the Most Probable Number (MPN) of coliform bacteria.</li> <li>3. Apply techniques for quantitative analysis of water and understand the process of enrichment culture and biodegradation of xenobiotics.</li> <li>4. Identify siderophore production by Azospirillum and Pseudomonas, and isolate and characterize chemolithotrophic microorganisms.</li> <li>5. Evaluate the growth of microbes in nitrogen-free media, determine the ability of microbes to degrade cellulose and lignin, and isolate thermotolerant/thermophilic microbes.</li> </ol>

MICRO-3054	Medical, food and industrial microbiology	<ol style="list-style-type: none"> <li>1. Explore the role of yeast in bread production.</li> <li>2. Quantify bacterial populations utilizing SPC and breed count methods to separate antibiotic-producing microbes, analyze their antimicrobial spectrum, and study microbial populations in varied contexts such skin, mouth, dental caries, and milk.</li> <li>3. Apply microbiological techniques to perform antibiotic sensitivity testing and conduct analysis of food samples, utilizing computer tools for data analysis including graph plotting, statistical analysis using Excel, and simulating population growth in batch and continuous cultures.</li> <li>4. Use graph plotting, Excel statistical analysis, and population growth simulation in batch and continuous cultures to make wine and sauerkraut using microbiological methods.</li> <li>5. Assess milk quality using the methylene blue reductase test.</li> </ol>
MICRO-4016	Genetic Engineering, IPR and Biosafety Regulation	<ol style="list-style-type: none"> <li>1. Understand molecular cloning principles, RNA/DNA fragment manipulation, gene expression strategies, and DNA sequencing methods, including microarray analysis.</li> <li>2. Classify recombinant DNA techniques, such as shotgun cloning and transformation, along with blotting methods for nucleic acid and protein detection, and various sequencing techniques like Maxam-Gilbert, Sanger's di-deoxy, and pyrosequencing.</li> <li>3. Explain recombinant DNA technology applications, intellectual property rights, biosafety concepts, and GMO regulation.</li> <li>4. Analyze recombinant selection methods, ethical and legal aspects of biotechnology, and impacts of GMOs on the environment and human health.</li> <li>5. Evaluate regulatory frameworks for rDNA research and GMOs, biosafety effectiveness, and ethical implications of genetic engineering and biotechnology regulations.</li> </ol>
MICRO-4026	Biostatistics & Bioinformatics	<ol style="list-style-type: none"> <li>1. Recognize and describe the quantitative methods in biology, introduction to multivariate analysis, the concepts of null hypothesis.</li> <li>2. Categorize the sampling methods, scales and variables, data organization, tabulation, frequency and probability distributions, graphical representation of distributions measures of central tendency and dispersal, discuss probability distributions.</li> <li>3. Explain the skewness, kurtosis, laws of probability, independence and randomness, significance level, type I and type II errors, one tailed and two tailed tests, categorical data and proportion data, chi square test and test for goodness of fit.</li> <li>4. Analyse the parametric and non-parametric tests, multiple regressions, ordination, principal component analysis.</li> <li>5. Evaluate the levels of significance; regression and correlation, curve fitting and choice of models.</li> </ol>
MICRO-4034	Genetic Engineering, Biostatistics & Bioinformatics	<ol style="list-style-type: none"> <li>1. Perform isolation of total DNA, amplification of target sequence with PCR, restriction digestion, and ligation of target sequence with suitable vector, transformation to the host and characterization.</li> <li>2. Analyze the expression level of the recombinant product with SDS-PAGE and perform sequence alignment and homologous sequence search.</li> <li>3. Calculate the mean, median, mode, range, standard deviation, standard error, and covariance of any population data, and apply t-test, F-test and Chi-square test for a given set of data.</li> <li>4. Demonstrate the ability to draw line graphs and histograms from tabulated data and prepare a skeleton of analysis of variance of the designs - Randomized block design, split-plot and Latin square design.</li> </ol>

		5. Apply appropriate software for data analysis, use bioinformatics tools for sequence annotation and gene prediction, and perform protein modelling and structure prediction.
MICRO- 4044	Dissertation	<ol style="list-style-type: none"><li>1. Apply microbiological principles to design and execute original research projects as demonstrated through the dissertation.</li><li>2. Engage proficiently in oral defense and discussion of research findings during the viva-voce examination.</li><li>3. Demonstrate practical skills and theoretical understanding in microbiology through internal assessment tasks.</li><li>4. Analyze and synthesize complex microbiological concepts to address research questions effectively.</li><li>5. Evaluate experimental outcomes and propose innovative solutions based on microbiological principles.</li></ol>

<b>Department:</b>	<b>Department of Geography</b>	
<b>Programme:</b>	<b>MA &amp; MSc in Geography</b>	
<b>PSOs</b>	<p><b>Advanced Geographic Knowledge and Theories:</b> Demonstrate comprehensive knowledge of advanced geographic theories, principles, and methodologies. Understand the spatial dimensions of physical and human environments and their interactions at various scales, from local to global.</p> <p><b>Spatial Analysis and GIS Proficiency:</b> Exhibit proficiency in spatial analysis and Geographic Information Systems (GIS), including the ability to collect, manage, analyze, and visualize spatial data to solve complex geographical problems.</p> <p><b>Research and Fieldwork Expertise:</b> Conduct independent research and fieldwork, applying appropriate geographic research methodologies, techniques, and technologies to investigate and analyze geographical phenomena, patterns, and processes.</p> <p><b>Sustainable Development and Policy Analysis:</b> Apply geographical knowledge and analytical skills to assess, develop, and implement sustainable solutions to environmental challenges. Critically evaluate policies and practices related to land use, natural resource management, urban planning, and climate change adaptation and mitigation.</p> <p><b>Global and Cultural Awareness:</b> Demonstrate a deep understanding of global geographic issues, including cultural diversity, geopolitical dynamics, and socio-economic disparities. Engage with these issues critically and ethically, considering the implications of geographic knowledge and decisions on societies and ecosystems at various scales.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
GGY1026	Geomorphology	<ol style="list-style-type: none"> <li>1. Demonstrate knowledge of fundamental concepts such as uniformitarianism, catastrophism, system concepts, steady state, and dynamic equilibrium.</li> <li>2. Understand the historical development, recent trends and theoretical bases of Geomorphology, with an understanding of concepts like uniformitarianism and catastrophism.</li> <li>3. Understand different concepts of process geomorphology and can relate with real world phenomena.</li> <li>4. Explain and relate the influence of climate, vegetation and soil with geomorphic processes, understanding the concept and genesis of morphogenetic regions.</li> <li>5. Apply concepts and techniques in fluvial, palaeo, and environmental geomorphology.</li> </ol>
GGY1036	Climatology and Biogeography	<ol style="list-style-type: none"> <li>1. Understand and articulate the importance of climatology and biogeography in geographical studies.</li> <li>2. Comprehend the factors influencing climate and differentiate between climate and weather, different factors of climate and components.</li> <li>3. Identify and evaluate different climatic disturbances like cyclones, anticyclones, droughts and their impacts. Indian Monsoon system and its role in global climate</li> <li>4. Can evaluate different factors of Global warming and its impact on climate change</li> </ol>

		<ol style="list-style-type: none"> <li>Recognize and analyze the concept of biodiversity, its significance, and conservation strategies for forest and wildlife.</li> </ol>
GGY1046	Economic Geography	<ol style="list-style-type: none"> <li>Evaluate the relationship between technology and economic development</li> <li>Examine varied methods to Economic Geography, specifically theoretical, institutional and problem-solving approaches</li> <li>Understand the concept, significance, and theoretical development of Economic Geography</li> <li>Analyze various concepts and models in Economic Geography and their real-world application</li> <li>Identify economic patterns in primary activities and discuss regional disparities in agriculture and farming</li> </ol>
GGY 1054	Practical on Geomorphology, Climatology and Economic Geography	<ol style="list-style-type: none"> <li>Develop a solid understanding of geomorphological concepts and techniques for morphometric analysis and basin analysis.</li> <li>Apply principles and methods in climatology to map and interpret weather phenomena, analyze rainfall patterns and water resource constraints.</li> <li>Visualize, interpret and summarize spatial variations in economic factors such as landuse, cropping patterns, and commodity production using graphical data.</li> <li>Construct and interpret climographs, hythergraphs, ergographs, rainfall dispersion graphs and water deficiency/surplus graphs.</li> <li>Exhibit comprehension of economic geography through spatial variation, trend analysis and spatial analysis of cropping, economic indicators and landholding income patterns.</li> </ol>
GGY2066	Geographic Thought	<ol style="list-style-type: none"> <li>Appraise the contributions of German, French, British, and American geographers to modern geography.</li> <li>Evaluate different theories like Determinism, Possibilism, Human Ecology etc., and their impact on geographic development.</li> <li>Analyze the rise of new geography, including quantitative revolution, locational analysis school, and various unique approaches.</li> <li>Critically interpret postmodern geographic ideas, including socio-spatial dialectic, gender perspective, and new environmentalism.</li> <li>Identify and comprehend the historical evolution and key shifts in geographic thought.</li> </ol>
GGY2076	Geography of Environment and Development	<ol style="list-style-type: none"> <li>Understand the components of the environment and interrelationship functionings between the natural human environment.</li> <li>Comprehend the emergence, scope, and importance of environmental geography as an academic discipline</li> <li>Evaluate the functioning of different ecosystems, focusing on energy flow and bio-geochemical cycles.</li> <li>Analyze the effects of man's activities, such as industrialization and urbanization, on the climate.</li> </ol>

		5. Critically assess various development processes and appreciate the importance of sustainable development.
GGY2086	Population and Settlement Geography	<ol style="list-style-type: none"> <li>1. Critically evaluate demographic and socio-economic characteristic disparities within global population.</li> <li>2. Discern factors influencing population-resource relationships, and the theoretical concepts relating to population dimensions.</li> <li>3. Identify and explain settlement geography aspects and characteristics of rural &amp; urban settlements.</li> <li>4. Analyze spatial patterns and theories of settlements, urban-rural relationships, settlement hierarchies.</li> <li>5. Understand the field of Population Geography including demographics, theories and data sources.</li> </ol>
GGY2096	Geography of Regional Development of India with Special Reference to North-East India	<ol style="list-style-type: none"> <li>1. Understand the unity in diversity of India as a geographical entity and its locational significance</li> <li>2. Relate physical region specifics to regional development, including relief, drainage, climate, soil and vegetation</li> <li>3. Evaluate resource potential and development scenarios in the realms of mineral and power resources: iron ore, coal, petroleum and water power</li> <li>4. Recognize north-east India's unique geographical, socio-economic aspects, resource utilization and future development strategies</li> <li>5. Interpret the influence of population growth and urbanization on socio-economic development and inequalities in India</li> </ol>
GGY 2104	Practical on Population and Settlement Geography and Regional Development of India and N.E. India	<ol style="list-style-type: none"> <li>1. Understand and analyze population concentration, growth trends, and projection in India, particularly N.E. India and Assam</li> <li>2. Calculate and interpret spatial mean center of population and urban settlement in selected areas</li> <li>3. Analyze distribution patterns of services, economic activities, settlements, and migration volume in India and N.E. India</li> <li>4. Examine trends in population growth against food production, spatial population density, and distribution in India and Assam</li> <li>5. Measure infrastructural development levels and flow patterns of commodities in India and N.E. India using standard carto-statistical techniques</li> </ol>
GGY3116	Quantitative and Cartographic Methods in Geography	<ol style="list-style-type: none"> <li>1. Interpret methodological developments in geography and understand the significance and limitations of quantitative techniques.</li> <li>2. Understand and analyse different types of geographical data; develop and implement sampling techniques for data collection and analysis.</li> <li>3. Employ inferential statistics for hypothesis testing, differentiating between parametric and nonparametric tests, and choosing the appropriate significance level.</li> <li>4. Understand the foundational principles of mapping and surveying; create base maps; manipulate point, line, and area concepts; select appropriate map projections.</li> <li>5. Implement thematic mapping techniques, understand the representation of physical and socio-economic data using three-dimensional graphic techniques.</li> </ol>

GGY3123	Fundamentals of Remote Sensing, GIS and GPS	<ol style="list-style-type: none"> <li>1. Understand the fundamentals and principles of remote sensing, its significance in geography, and data acquisition tools.</li> <li>2. Demonstrate knowledge of various remote sensing data products and their characteristics.</li> <li>3. Apply GIS principles to effectively store, retrieve, analyze and visualize spatial data.</li> <li>4. Understand the foundational and functional aspects of GPS technology.</li> <li>5. Gain comprehensive knowledge of GPS technology, its accuracy, and application in geographical study</li> </ol>
GGY3133	Research Methodology in Geography	<ol style="list-style-type: none"> <li>1. Formulate a unique and impactful research problem</li> <li>2. Design a comprehensive research plan consisting of objectives, hypotheses, methodology, and literature review</li> <li>3. Understanding of research methodology, geographic research types, and definition of research</li> <li>4. Application of inductive and deductive approaches, model building, and hypothesis testing in geography</li> <li>5. Proficiency in questionnaire design, data collection, processing and analysis; executing a research write-up</li> </ol>
GGY3146	Social, Cultural and Political Geography	<ol style="list-style-type: none"> <li>1. Understand the principles and concepts of Social Geography including social space, group and well-being.</li> <li>2. Demonstrate an understanding of the theoretical frameworks in Cultural Geography such as cultural hearth, region, and landscape.</li> <li>3. Identify and analyse world cultural regions in terms of language, religion, and ethnicity.</li> <li>4. Comprehend the field of Political Geography, including key concepts like lebensraum, core-periphery, geopolitics, and political economy.</li> <li>5. Critically evaluate India's international relations and geopolitical problems in the global context.</li> </ol>
GGY3156 (1)	Agricultural Geography (Elective)	<ol style="list-style-type: none"> <li>1. Identify the determinants of agriculture including physical, economic, social, institutional and Technological factors</li> <li>2. Understanding agricultural geography; its trends, development, and approaches of study.</li> <li>3. Evaluate factors of agricultural production and comprehend key models in agricultural geography.</li> <li>4. Distinguish between different agricultural systems, types, scales, and regionalization methods.</li> <li>5. Interpret land use and capability classifications, and perform regional analysis of agriculture in various global contexts.</li> </ol>
GGY3156(2)	Cartography (elective)	<ol style="list-style-type: none"> <li>1. Understand the fundamentals, history, and trends in cartography, including the shift from analog to digital mapping</li> <li>2. Apply principles of spherical trigonometry and understand its application in cartography</li> <li>3. Demonstrate knowledge of different map projections and the ability to choose and construct appropriate ones</li> </ol>

		<ol style="list-style-type: none"> <li>4. Design maps effectively with accurate symbolization and layout using fundamental principles of cartographic design</li> <li>5. Conduct ground surveys using principles of geodetic and plane surveying and topographic surveying, map preparation using modern technologies</li> </ol>
GGY3156(3)	Fluvial Geomorphology (Elective)	<ol style="list-style-type: none"> <li>1. Understand the meaning, scope, and evolution of fluvial geomorphology along with its relation to hydrology.</li> <li>2. Acquire proficiency in methods and tools for fluvial geomorphological studies, including GIS and computer applications.</li> <li>3. Comprehend the concept of drainage basin as a fluvial system, its inputs, outputs and its role as a fundamental geomorphic unit.</li> <li>4. Interpret the factors controlling runoff, rainfall-runoff relationship, and hydrograph analysis.</li> <li>5. Classify and analyze the plan geometry of channels, understanding channel changes, types, and floodplains.</li> </ol>
GGY3156(4)	Geography of Rural Development (Elective)	<ol style="list-style-type: none"> <li>1. Compare and contrast rural characteristics of developed and developing countries.</li> <li>2. Examine rural-urban relations, and navigate through development diffusion.</li> <li>3. Interpret the evolution of rural settlement, spatial organizations, and central place theory.</li> <li>4. Critically evaluate components of rural development processes, policies, and related issues.</li> <li>5. Understand the concept, significance, and processes of rural development.</li> </ol>
GGY3156(5)	Geoinformatics (Elective)	<ol style="list-style-type: none"> <li>1. Comprehend the fundamental principles and types of Remote Sensing System; acquire knowledge on aerial photography and its characteristics.</li> <li>2. Apply the concepts of GIS; manipulate, and analyze GIS data and understand the integration of remote sensing data with GIS.</li> <li>3. Knowledge of Remote Sensing systems, Earth models, datum, coordinate systems, and satellite data products.</li> <li>4. Understand raster and vector data formats, GIS databases, RDBMS and integration of remote sensing data and GIS.</li> <li>5. Grasp GPS concepts, real world GPS applications and utilization of Drones, UAVs and microsattelites in various fields.</li> </ol>
GGY3156(6)	Population Geography (Elective)	<ol style="list-style-type: none"> <li>1. Understand the nature, development, and approaches of population geography and its relation with demography.</li> <li>2. Analyze and interpret population data, comprehend mapping techniques, and predict population trends.</li> <li>3. Explain vital rates, population growth, and migration through various population theories and models.</li> <li>4. Evaluate the relationship between population and resources, and comprehend population characteristics of developed and developing countries.</li> <li>5. Evaluate contemporary population issues, policies, and programmes in developed and developing countries</li> </ol>
GGY3156(7)	Regional Development Planning (Elective)	<ol style="list-style-type: none"> <li>1. Grasp theories of spatial distribution, correlating with empirical regional development.</li> <li>2. Apply methods of regionalization, decentralization, multi-level planning and town &amp;</li> </ol>



		<p>country planning in practical scenarios.</p> <ol style="list-style-type: none"> <li>3. Understand the concept of region and regional development, deciphering the different types</li> <li>4. Assess and identify different regions based on resources, function, and problems</li> <li>5. Develop skills in managing and conserving resources for regional development</li> </ol>
GGY3156(8)	Social Geography (Elective)	<ol style="list-style-type: none"> <li>1. Comprehend key concepts such as social group, structure, process, organization, plurality and diversity in geographic context.</li> <li>2. Analyze the evolution of societies, cultural influences in social world, and the impact of social policies on cultural change.</li> <li>3. Understand and identify the principles and theories of social geography</li> <li>4. Evaluate the impacts of social stratification, reflected in race, tribe, caste, language, dialect and religion</li> <li>5. Apply methodologies in spatial distribution, relationship and interaction in social geography</li> </ol>
GGY 3164	Practical on Quantitative and Cartographic Methods	<ol style="list-style-type: none"> <li>1. Develop proficiency in application of matrix algebra in multivariate data, probability distributions and hypothesis testing techniques in geographical data analysis.</li> <li>2. Perform correlation and regression analyses, analyze non-linear relationship such as rank-size relationship and distance decay.</li> <li>3. Understand and implement techniques of multivariate analysis in areal classification and regionalization, and effective data grouping techniques for Choropleth mapping.</li> <li>4. Demonstrate proficiency in traversing and topographic surveying, and contouring and profile levelling.</li> <li>5. Develop skills in constructing map projections and representing physical and socio-economic data using various graphical presentations.</li> </ol>
GGY4176	Environment and Climate Change	<ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of ecology, utilizing scientific methods for analysis</li> <li>2. Analyse human-environment interactions, assessing environmental valuation and resource development</li> <li>3. Evaluate climate patterns, predict changes, and assess the efficacy of climate models</li> <li>4. Appraise international environmental policies and organizations in addressing climate change</li> <li>5. Appraise climate dynamics, atmospheric circulations, and their implications</li> </ol>
GGY4186	Geography of Bhutan, Bangladesh and Myanmar	<ol style="list-style-type: none"> <li>1. Comprehend the unique geo-political history, location, and locational significance of Bhutan, Bangladesh, and Myanmar's relation to India.</li> <li>2. Analyze the physiography, climate, vegetation, forest policy and biodiversity of the three countries.</li> <li>3. Assess population, ethno-religious and linguistic composition, literacy and educational pattern, and level of urbanization in Bhutan, Bangladesh, and Myanmar.</li> <li>4. Evaluate the economic geography, resource potential, industry, agriculture, transport system, and nature of tourism development in Bhutan, Bangladesh, and Myanmar.</li> <li>5. Interpret trade relations with India and distinguish patterns, problems, and prospects of economic development for these countries.</li> </ol>
GGY4193	Remote Sensing and GIS (Practical)	<ol style="list-style-type: none"> <li>1. Determine photo scale, object height, slope between two points and relief displacement</li> </ol>

		<p>using photogrammetry principles</p> <ol style="list-style-type: none"> <li>2. Interpret aerial photographs and prepare land use map, settlement map and road map</li> <li>3. Interpret satellite imagery and prepare land use and land cover, fluvial-geomorphic maps</li> <li>4. Digitize different layers of spatial information (Point, line and polygon) and their thematic representation</li> <li>5. Study of changing land use and river course using remote sensing and GIS techniques, including GPS data collection and plotting</li> </ol>
GGY4206(1)	Agricultural Geography (Elective)	<ol style="list-style-type: none"> <li>1. Understand and critically analyze various types, characteristics, growth, distribution, and development of Indian agriculture</li> <li>2. Identify and evaluate agricultural regions of India and their distinct characteristics</li> <li>3. Assess land use and landholding patterns in India in the context of agricultural practices</li> <li>4. Investigate and explain the regional variations in the levels of agricultural development and problems of Indian agriculture</li> <li>5. Analyze the impact of technological factors, including the Green revolution on Indian agriculture</li> </ol>
GGY4214(1)	Agricultural Geography (Elective Practical)	<ol style="list-style-type: none"> <li>1. Apply Nelson's and Weaver's methods in crop combination studies, demonstrating understanding of these geographic methodologies.</li> <li>2. Examine and compute crop diversity using location quotient, Lorenz curve, and diversification index.</li> <li>3. Analyse and evaluate cropping intensity indices, relating it to causative factors, in order to understand agricultural geography better.</li> <li>4. Apply Kendall, Sapre and Deshpande, J. Singh and Bhatia's methods in evaluating agricultural productivity and efficiency.</li> <li>5. Create choropleth and pie graph mapping of general and agricultural land use, providing a clear visual depiction of landholding patterns.</li> </ol>
GGY 4223 (1)	Agricultural Geography (Dissertation)	<ol style="list-style-type: none"> <li>1. Students will be able to identify and formulate a relevant research question in the field of Agricultural Geography.</li> <li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li> <li>3. Students will learn to execute a suitable research methodology for collecting and analyzing data related to Agricultural Geography.</li> <li>4. Train students to critically interpret and discuss the research findings in relation to existing literature and theories.</li> <li>5. Students will be competent in writing and presenting a comprehensive dissertation, following academic standards.</li> </ol>
GGY4206 (2)	Cartography (Elective)	<ol style="list-style-type: none"> <li>1. Understand the significance and evolving trends in thematic cartography, acquainting with both regional and informational approaches.</li> <li>2. Understand and grasp methods of representation for point, line, area/polygon and volume in thematic cartography.</li> <li>3. Develop aptitude in creating Choropleth and Isopleth Maps, and learn about data grouping methodologies.</li> <li>4. Understand the challenges, opportunities and emerging trends in Thematic Cartography.</li> <li>5. Gain a firm foundation in Aerial Photography, Photogrammetry, remote sensing and</li> </ol>

		their role in modern Cartography.
GGY4214 (2)	Cartography (Elective Practical)	<ol style="list-style-type: none"> <li>1. construct and analyze various Map Projections including Zenithal, Albers', Gauss' and Mercator's projections.</li> <li>2. demonstrate the ability to create thematic mappings of physical and socio-economic data using various cartographic techniques.</li> <li>3. develop skills in map reading, analysis and profile drawing including transect chart creation.</li> <li>4. gain practical knowledge in Triangulation, Topographic surveying and mapping using Prismatic Compass, Dumpy's Level and Theodolite.</li> <li>5. acquire skills in interpreting and mapping Air photos and Satellite imagery.</li> </ol>
GGY 4223 (2)	Cartography (Dissertation)	<ol style="list-style-type: none"> <li>1. Identify and formulate a relevant research question in the field of cartography</li> <li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li> <li>3. learn to execute a suitable research methodology for collecting and analyzing data related to Cartography.</li> <li>4. critically interpret and discuss the research findings in relation to existing literature and theories.</li> <li>5. Students will be competent in writing and presenting a comprehensive dissertation, following academic standards.</li> </ol>
GGY4206 (3)	Fluvial Geomorphology (Elective)	<ol style="list-style-type: none"> <li>1. Understand the various channel processes and dominant forces that affect channel velocity and flow types.</li> <li>2. Assess the mechanics of water flow and estimate water discharge, understanding its effects on channel variables.</li> <li>3. Comprehend sediment transport mechanics and processes, and their effects on channel morphology.</li> <li>4. Interpret processes of channel erosion and deposition, and their implications on river morphology.</li> <li>5. Evaluate the environmental effects of human impact on river basins and fluvial systems, comprehending the resultant fluvial-geomorphic hazards.</li> </ol>
GGY4214(3)	Fluvial Geomorphology (Elective Practical)	<ol style="list-style-type: none"> <li>1. Interpret fluvial process through stage, discharge, hydrographs and fluvio-geomorphic interpretations</li> <li>2. Understand and analyze the relationship between basin area, stream discharge, water discharge and sediment load</li> <li>3. Perform flood frequency analysis via various methods like Log Pearson Type III, Gumbel's Extreme value distribution Method</li> <li>4. Perform grain-size analysis of alluvial sediments and understand its interpretation</li> <li>5. Utilize application of computer and specific software in fluvial geomorphology for watershed delineation, sediment output analysis etc.</li> </ol>
GGY4223(3)	Fluvial Geomorphology (Dissertation)	<ol style="list-style-type: none"> <li>1. Identify and formulate a relevant research question in the field of fluvial Geomorphology</li> <li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li> <li>3. learn to execute a suitable research methodology for collecting and analyzing data related to Fluvial geomorphology</li> </ol>

		<ol style="list-style-type: none"> <li>4. critically interpret and discuss the research findings in relation to existing literature and theories.</li> <li>5. Students will be competent in writing and presenting a comprehensive dissertation, following academic standards.</li> </ol>
GGY4206 (4)	Geography of Rural Development (Elective)	<ol style="list-style-type: none"> <li>1. Comprehend concepts, patterns, causes, and implications of inequalities of rural development in India</li> <li>2. Analyze and compare rural development practices in Israel, Indonesia, and Bangladesh</li> <li>3. Evaluate indicators of rural development and determine levels of rural development in India at the state level</li> <li>4. Understand the evolution, successes and failures of rural development in India since 1951.</li> <li>5. Assess the inequality of rural development in the Northeast of India in comparison to other regions.</li> </ol>
GGY4214 (4)	Geography of Rural Development (Elective Practical)	<ol style="list-style-type: none"> <li>1. Analyze and apply the rank-size rule and nearest neighbour statistic to get insights into the size and spacing of rural areas.</li> <li>2. Identify complimentary areas of central places through the application of Gravity Model and Central Place Model.</li> <li>3. Map rural infrastructure like road network and distribution of services, using Nearest Neighbour Statistic.</li> <li>4. Map Rural Development Patterns in agriculture, industry, and commerce using suitable statistical techniques.</li> <li>5. Map rural inequalities in income and social well-being using appropriate statistical techniques including Z-scores.</li> </ol>
GGY 4223(4)	Geography of Rural Development (Dissertation)	<ol style="list-style-type: none"> <li>1. Identify and formulate a relevant research question in the field of Rural Development.</li> <li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li> <li>3. learn to execute a suitable research methodology for collecting and analyzing data related to Rural Development.</li> <li>4. critically interpret and discuss the research findings in relation to existing literature and theories.</li> <li>5. Students will be competent in writing and presenting a comprehensive dissertation, following academic standards.</li> </ol>
GGY4206 (5)	Geoinformatics (Elective)	<ol style="list-style-type: none"> <li>1. Understand spatial data, its management and interpretation using GIS, geoprocessing and spatial analysis tools.</li> <li>2. Demonstrate proficiency in employing image interpretation techniques, rectification and registration processes.</li> <li>3. Implement principles of image classification, classification algorithms and effectively validate the classification results.</li> <li>4. Apply GIS and Remote Sensing techniques for modelling environmental changes and their impact on land, water, and urban areas.</li> <li>5. Utilize GIS for land governance and developing spatial decision support systems, environmental impact analysis and spatial data infrastructures.</li> </ol>

GGY4214 (5)	Geoinformatics (Elective Practical)	<ol style="list-style-type: none"> <li>1. Ability to design geoinformatics components, perform georeferencing and create relational data models using different satellite imageries</li> <li>2. Acquire skills in digitizing maps using GIS packages, feature extraction, manipulating scales and spatial representation</li> <li>3. Competence in attribute data manipulation and its representation through cartographic methods</li> <li>4. Proficiency in decision support mapping, thematic mapping, working with georeferenced imageries and nominal data</li> <li>5. Apply digital image processing, image classification techniques and integration of GPS and remote sensing data in the GIS environment</li> </ol>
GGY 4223(5)	Geoinformatics (Dissertation)	<ol style="list-style-type: none"> <li>1. Identify and formulate a relevant research question in the field of Geoinformatics</li> <li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li> <li>3. learn to execute a suitable research methodology for collecting and analyzing data related to Geoinformatics.</li> <li>4. critically interpret and discuss the research findings in relation to existing literature and theories.</li> <li>5. Students will be competent in writing and presenting a comprehensive dissertation, following academic standards.</li> </ol>
GGY4206 (6)	Population Geography (Elective)	<ol style="list-style-type: none"> <li>1. Understand and evaluate India's population's demographic and socio-economic characteristics including vital rates, age-sex composition, literacy and education, and socio-economic well-being.</li> <li>2. Analyze the differential characteristics of rural-urban population in India, understanding the unique composition and dynamics of each.</li> <li>3. Develop comprehensive knowledge about international and internal migration, its consequences, and specific migration problems in North East India.</li> <li>4. Evaluate the impact of population growth on demographic, social, and economic fronts, focusing on the linkage of population growth with food problems in North East India.</li> <li>5. Examine the impact of population pressure on environment, housing, and unemployment, developing strategic solutions for these growing problems.</li> </ol>
GGY4214 (6)	Population Geography (Elective Practical)	<ol style="list-style-type: none"> <li>1. Understand and apply skills to map population distribution, density and concentration</li> <li>2. Develop ability to analyze population growth trends and project future populations</li> <li>3. Attain proficiency in mapping rural-urban population and potential surfaces</li> <li>4. Evaluate and interpret Population-Resource Regions</li> <li>5. Represent demographic, social and economic characteristics of population effectively.</li> </ol>
GGY 4223 (6)	Population Geography (Dissertation)	<ol style="list-style-type: none"> <li>1. Identify and formulate a relevant research question in the field of Population Geography.</li> <li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li> <li>3. Learn to execute a suitable research methodology for collecting and analyzing data related to Population Geography</li> <li>4. Critically interpret and discuss the research findings in relation to existing literature and theories.</li> <li>5. GGY 4223 (6).5: Students will be competent in writing and presenting a comprehensive</li> </ol>

		dissertation, following academic standards.
GGY4206 (7)	Regional Development Planning (Elective)	<ol style="list-style-type: none"> <li>1. Gain comprehensive knowledge of global perspectives on regional development planning.</li> <li>2. Understand and interpret key development indicators.</li> <li>3. Evaluate world economic development patterns across various sectors.</li> <li>4. Examine the role of regional planning in India within the framework of Five Year Plans.</li> <li>5. Compare and analyze regional development perspectives from Israel, Netherlands, and Indonesia.</li> </ol>
GGY4214 (7)	Regional Development Planning (Elective Practical)	<ol style="list-style-type: none"> <li>1. Effectively employ regionalization methods including overlapping themes and ranking</li> <li>2. Apply network analysis theories to facilitate regional development planning</li> <li>3. Define influence areas of nodal centers applying breaking point and gravity potential methods</li> <li>4. Utilize input-output analysis for predicting short-range changes in regional development</li> <li>5. Apply shift share analysis for studying regional development and changes</li> </ol>
GGY 4223 (7)	Regional Development Planning (Dissertation)	<ol style="list-style-type: none"> <li>1. Identify and formulate a relevant research question in the field of Regional Development Planning</li> <li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li> <li>3. Learn to execute a suitable research methodology for collecting and analyzing data related to Regional Development Planning.</li> <li>4. Critically interpret and discuss the research findings in relation to existing literature and theories.</li> <li>5. Students will be competent in writing and presenting a comprehensive dissertation, following academic standards.</li> </ol>
GGY4206 (8)	Social Geography (Elective)	<ol style="list-style-type: none"> <li>6. Comprehend the concepts and processes of social change like modernization, urbanization, industrialization</li> <li>7. Critically discuss socio-economic inequalities exploring issues like poverty, unemployment, hunger, deprivation, injustice and social discrimination</li> <li>8. Analyze the influence of societal literacy and education levels on the overall social composition</li> <li>9. Assess gender perspectives in social geography, including the status and roles of women and gender discrimination issues.</li> <li>10. Analyze the role of literacy and education in shaping societal characteristics and development</li> </ol>
GGY4214 (8)	Social Geography (Elective Practical)	<ol style="list-style-type: none"> <li>1. Analyze and map the distribution of linguistic and religious groups on a global and national scale</li> <li>2. Evaluate and represent the demographic distribution and concentration of Scheduled Tribe population in India and Assam</li> <li>3. Understand and demonstrate patterns of human development across the world, India, and Assam</li> <li>4. Investigate and depict the occupational diversity amongst the SC and ST populations of India and North East India</li> <li>5. Comprehend patterns of human development at a worldwide level, as well as</li> </ol>

GGY 4223 (8)	Social Geography (Dissertation)	specifically in India and Assam. <ol style="list-style-type: none"><li>1. Identify and formulate a relevant research question in the field of Social Geography</li><li>2. Develop the ability to conduct a comprehensive review of existing literature, synthesizing knowledge to establish the foundation for their study.</li><li>3. Learn to execute a suitable research methodology for collecting and analyzing data related to Social Geography.</li><li>4. Critically interpret and discuss the research findings in relation to existing literature and theories.</li><li>5. Students will be competent in writing and presenting a comprehensive dissertation, following academic standards.</li></ol>
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<b>Department:</b>	<b>Department of Education</b>	
<b>Programme:</b>	<b>M.A. Education</b>	
<b>PSOs</b>	<ul style="list-style-type: none"> <li>• Develop a holistic and multidimensional understanding of the philosophical, psychological, sociological and technological aspects of education</li> <li>• Demonstrate an understanding of the theoretical and practical aspects of Teaching, learning and evaluation</li> <li>• Generate research mastery by paying utmost emphasis on original knowledge contribution to the field of social science with social responsibility</li> <li>• Develop a spirit of self-sustenance and an attitude for life-long education with a readiness for professional development</li> </ul>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
1016	Sociological Foundations of Education	<ol style="list-style-type: none"> <li>1. Describe the Social Context of Education and its operational dimensions as a system.</li> <li>2. Explain the knowledge of Culture, its different aspects and relationship with Social Change</li> <li>3. Analyse the current social problems and issues in Education.</li> <li>4. Classify social Groups and their relevance in Society</li> <li>5. Utilize the knowledge of sociology in conflict resolution and to maintain social order</li> </ol>
1026	Psychological Perspectives of Education	<ol style="list-style-type: none"> <li>1. Define the process of Learning and different Learning theories and their application.</li> <li>2. Discuss the importance of motivation in learning and its theories and their application.</li> <li>3. Explain the concept of intelligence and creativity.</li> <li>4. Analyse the traits and types of personality and some personality disorders.</li> <li>5. Define Learning Disabilities (LD) and demonstrate the techniques of teaching students with Learning Disability (LD)</li> </ol>
1036	Comparative Education	<ol style="list-style-type: none"> <li>1. Describe the need and importance of comparative education.</li> <li>2. Discuss the educational system of India and a few other countries.</li> <li>3. Compare the existing educational system of developed and developing countries.</li> <li>4. Outline the education system of different countries.</li> <li>5. Formulate a good model for quality improvement of education of our country by using the knowledge of comparative education</li> </ol>
1046	Educational Technology	<ol style="list-style-type: none"> <li>1. Describe the theoretical base of Educational Technology</li> <li>2. Apply different instructional media in the classroom teaching</li> <li>3. Infer the effectiveness of the innovations in the educational process</li> </ol>



		<ol style="list-style-type: none"> <li>4. Assess the use of programme learning material for addressing individual differences of students</li> <li>5. Develop an effective teaching model for classroom teaching</li> </ol>
1054	VAC (Group Discussion and Co-curricular Activities)	<ol style="list-style-type: none"> <li>1. Discuss various current issues in education</li> <li>2. Develop team spirit among the students through engagement in different co-curricular activities</li> <li>3. Generate leadership qualities in different fields</li> <li>4. Integrate the knowledge of ecological behaviour in to daily life.</li> <li>5. Organize a program on cleanliness and hygienic practices</li> </ol>
2016	Social Psychology and Group Dynamics	<ol style="list-style-type: none"> <li>1. Describe the concept of Social Psychology and Group Dynamics.</li> <li>2. Classify of Inter-personal and Inter-group Relationships.</li> <li>3. Examine the nature of Social Interaction and Social Conflict and to know their relevance in education.</li> <li>4. Apply the concept of Self-Awareness and Self-Identity in interpersonal Perception</li> <li>5. Integrate the knowledge of Social Psychology in classroom setting.</li> </ol>
2026	Educational Planning and Management	<ol style="list-style-type: none"> <li>1. Illustrate basic concept of Educational Management.</li> <li>2. Sketch an outline of educational resources and their management in education.</li> <li>3. Analyse and evaluate the issues and challenges of educational planning and prepare a road map for mitigation of challenges.</li> <li>4. Assess financial resources and their management in education.</li> <li>5. Judge the influences of contemporary issues in educational management.</li> </ol>
2036	Measurement and Evaluation in Education	<ol style="list-style-type: none"> <li>1. Define the concept of measurement and evaluation in the field of Education.</li> <li>2. Discuss the different tools of mental measurement and their application.</li> <li>3. Apply the principles of test construction and standardization in measuring students achievement</li> <li>4. Rate the use of test of Intelligence, Personality and Aptitude and their importance in different fields</li> <li>6. Integrate the knowledge of mental measurement in educational research</li> </ol>
2046	Psychological Laboratory Practical	<ol style="list-style-type: none"> <li>1) Define the concept of Experimental Psychology.</li> <li>2) Demonstrate the methods of conducting various Psychological Experiment &amp; Tests</li> <li>3) Develop scientific attitude among the students</li> <li>4) Plan for developing psychological tests</li> <li>5) Assess mental ability</li> </ol>
2054	VAC (Educational Entrepreneurship, Soft Skill Development)	<ol style="list-style-type: none"> <li>1. Apply the knowledge and skill of entrepreneurship</li> <li>2. Develop soft skill required in life</li> <li>3. Integrate the knowledge and skill of entrepreneurship to develop a start plan</li> <li>4. Demonstrate confidence to face challenges in life</li> <li>5. Develop capacity for multi-tasking</li> </ol>
3016	Educational Statistics	<ol style="list-style-type: none"> <li>1. Explain the different concepts of educational statistics.</li> <li>2. Distinguish between parametric and non-parametric tests</li> <li>3. Classify various methods of Inferential Statistics.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Justify the use of different statistical methods.</li> <li>5. Design a plan for using various statistical methods in education and research.</li> </ol>
3026	Problems and Issues in Education	<ol style="list-style-type: none"> <li>1. Discuss the constitutional provisions of education and their implementation.</li> <li>2. Summarize various schemes of elementary education including RTE Act 2009</li> <li>3. Examine different policies and programmes of secondary education</li> <li>4. Justify importance of the concept of value, peace and human rights education</li> <li>5. Explain the issues of Indian higher education and find out workable solution</li> </ol>
3036	Elective 1 – Abnormal Psychology	<ol style="list-style-type: none"> <li>1. Describe different concepts related to Abnormal Psychology.</li> <li>2. Classify the causes, symptoms and behavioral problems of the people having abnormal behaviour.</li> <li>3. Apply the knowledge of abnormal psychology in the process of diagnosis, prevention and treatment of the people having abnormal behaviour.</li> <li>4. Utilize the knowledge of abnormal psychology to sensitize people about mental illness and to restore mental health</li> <li>5. Devise a plan to eradicate the misconceptions about abnormal behaviour</li> </ol>
3046	Elective 2 – Continuing Education	<ol style="list-style-type: none"> <li>1. Define the concept of continuing education and its relevance to the changing society.</li> <li>2. Summarize the methodology of continuing education</li> <li>3. Examine the major problems of continuing education in India</li> <li>4. Compare the continuing educational system in U.K., Bangladesh and Thailand.</li> <li>5. Develop a suitable model of continuing education for our country</li> </ol>
3056	Elective 3 – Developmental Psychology	<ol style="list-style-type: none"> <li>1. Discuss the basic concept of Developmental Psychology.</li> <li>2. Illustrate the general principles of Growth and Development.</li> <li>3. Subdivide general characteristics and problems of each stage and their implication.</li> <li>4. Assess the adjustment problems of students and find out solution</li> <li>5. Develop an action for addressing the problems of Adolescents.</li> </ol>
3066	Open Course: Stress Management and Mental Health(For Gauhati University)	<ol style="list-style-type: none"> <li>1. Define the concept of Mental Health and Hygiene</li> <li>2. Explain the characteristics of a well-adjusted person and the problems of adjustment in various life situations.</li> <li>3. Detect the adjustment problems of special children.</li> <li>4. Explain different types of adjustment mechanisms and their role in the preservation of mental health and hygiene.</li> <li>5. Develop a plan for stress management and restoration of mental health.</li> </ol>
3076	Environmental Education (For other Colleges and IDOL)	<ol style="list-style-type: none"> <li>1. Define Environment and its importance in life</li> <li>2. Explain the importance of Environmental Education</li> <li>3. Detect the natural and man induced environmental stressors and to prepare strategies for environmental conservation.</li> <li>4. Outline the demographic scenario in Indian population and impact of population growth on environment</li> <li>5. Prepare a plan of the environmental sustainability by imbibing the environmental values</li> </ol>
4016	Philosophical Foundations of Education	<ol style="list-style-type: none"> <li>1. Discuss the concept of Philosophy of Education</li> <li>2. Classify the Ancient Indian Schools of thought</li> <li>3. Compare the Post Vedic and Medieval schools of thought</li> </ol>

		<ol style="list-style-type: none"> <li>4. Apply the knowledge to critically examine the concepts of education in India and western philosophical thoughts</li> <li>5. Integrate the Platonic Philosophy to Education</li> </ol>
4026	Methodology of Educational Research	<ol style="list-style-type: none"> <li>1. Define the concept and methods of Educational Research.</li> <li>2. Classify different types of Educational Research.</li> <li>3. Develop various tools for data collection in Educational Research.</li> <li>4. Apply the knowledge of qualitative and quantitative data analysis.</li> <li>5. Prepare a Research Report.</li> </ol>
4036	Curriculum Development	<ol style="list-style-type: none"> <li>1. Outline the concept, needs and scope of curriculum development</li> <li>2. Illustrate the philosophical, psychological, sociological, scientific and technological bases of curriculum development.</li> <li>3. Judge the importance of technology integration in transacting curriculum</li> <li>4. Detect the problems of existing curriculum</li> <li>5. Devise some innovative practices in curriculum development</li> </ol>
4046	Economics of Education	<ol style="list-style-type: none"> <li>1. Define economics of education</li> <li>2. Discuss the importance and recent trends in economics of education</li> <li>3. Analyse the concept of education as a consumption and investment</li> <li>4. Assess the concept of cost and benefits of education and their analysis</li> <li>5. Evaluate the impact of globalization on education and educational finance</li> </ol>
4056	Guidance and Counselling	<ol style="list-style-type: none"> <li>1. Discuss the concept, need and importance of guidance and counselling.</li> <li>2. Outline the principles and problems of different types of guidance and Counselling</li> <li>3. Explain the procedure of individual and group counselling</li> <li>4. Restate the aim and principles of guidance programme</li> <li>5. Plan to develop child guidance services at institutional and personal level</li> </ol>
4066	Teacher Education	<ol style="list-style-type: none"> <li>1. Outline the basic concept of Teacher Education and Teacher Training and development of Teacher Education in India.</li> <li>2. Distinguish between pre-service and in service Teacher Education Programme and discuss about some central and state level agencies and institutions of Teacher Education in India.</li> <li>3. Point out the recent trends and innovative practices in Teacher Education.</li> <li>4. Develop the idea of professionalism and accountability of teachers.</li> <li>5. Construct a plan to overcome the barriers/challenges of teacher education in India.</li> </ol>
4074	VAC (Project/Field Trip)	<ol style="list-style-type: none"> <li>1. Apply the knowledge of research methodology in project preparation.</li> <li>2. Develop the capacity to conduct Field Survey</li> <li>3. Analyze and interpret data through appropriate techniques</li> <li>4. Produce new ideas through in depth study of facts and events.</li> <li>5. Develop ICT skills while preparing project reports</li> </ol>

<b>Department:</b>	<b>Department of Business Administration</b>	
<b>Programme:</b>	M.A.	
<b>PSOs</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
<b><u>MBA -1013</u></b>	<b><u>Principles and Practices of Management</u></b>	<p><i>CO1: Explain the fundamental ideas of management.</i></p> <p><i>CO2: Describe the main responsibilities of managers and their roles in the organization.</i></p> <p><i>CO3: Explain the meaning of organizational structure and various modern management theories.</i></p> <p><i>CO4: Comprehend and Practice Management in the Indian context.</i></p> <p><i>CO5: Describe the importance of corporate governance and the benefits of business ethics.</i></p>
<b><u>MBA -1023</u></b>	<b><u>Behavioural Science</u></b>	<p><i>CO1: Developing a conceptual understanding of organizational behaviour.</i></p> <p><i>CO2: Comprehending the nature of motivation, personality, and theories of motivation.</i></p> <p><i>CO3: Describe the meaning of group behaviour and dynamics and how communication networks can make teamwork effective.</i></p> <p><i>CO4: Discuss in detail the concept of power and politics and its dependency on each other.</i></p> <p><i>CO5: Use managerial techniques to resolve internal conflicts within an organisation.</i></p>
<b><u>MBA-1033</u></b>	<b><u>Managerial Economics</u></b>	<p><i>CO1: Explain the concept of demand functions, their determinants, and outline the methods of demand forecasting.</i></p> <p><i>CO2: Interpret the meaning of Equilibrium of firm.</i></p> <p><i>CO3: Explain the concept of production functions as well as economies, and diseconomies of scale.</i></p>

		<p><i>CO4: Comprehend the conditions for market equilibrium and how they are determined in different market structures.</i></p> <p><i>CO5: Recall fundamental economic principles such as supply and demand, opportunity cost, and comparative advantage.</i></p>
<b><u>MBA1043</u></b>	<b><u>Quantitative Techniques in Management</u></b>	<p><i>CO1: Remember key formulas, definitions, and techniques related to quantitative methods in management.</i></p> <p><i>CO2: Comprehend the process of probability distribution and its significance in statistic.</i></p> <p><i>CO3: Assess the different statistical tests and use them wherever appropriate.</i></p> <p><i>CO4: Analyze time series data to identify patterns, trends, and seasonality for strategic planning and forecasting.</i></p> <p><i>CO5: Apply some basic mathematical and statistical techniques for business decision-making.</i></p>
<b><u>MBA-1053</u></b>	<b><u>Financial Accounting</u></b>	<p><i>CO1: Understand and remember basic concepts of financial accounting.</i></p> <p><i>CO2: Applying accounting concepts and principles to prepare subsidiary books and bank reconciliation statements.</i></p> <p><i>CO3: Describe and illustrate the concept of trail balance.</i></p> <p><i>CO4: Explain and Illustrate methods of depreciation.</i></p> <p><i>CO5: Create financial statements using accounting techniques.</i></p>
<b><u>MBA-1063</u></b>	<b><u>Cost &amp; Management Accounting</u></b>	<p><i>CO1: Recall fundamentals of cost and management accounting terms such as cost classification and cost behaviour.</i></p>

		<p><i>CO2: Explain the various methods of costing.</i></p> <p><i>CO3: Comprehend the conceptual framework of marginal costing.</i></p> <p><i>CO4: Explain and Illustrate activity-based costing.</i></p> <p><i>CO5: Describe the concept of value auditing and value engineering.</i></p>
<b><u>MBA-1073</u></b>	<b><u>Legal Aspects of Business</u></b>	<p><i>CO1: Explain the concept of the Indian Contract Act 1872, its type, and various legal terminology related to the Indian contract Act 1872.</i></p> <p><i>CO2: Describe the Sale of Goods Act 1930, the essentials of partnership also the rights and responsibilities of a partner.</i></p> <p><i>CO3: Discuss the concept of the Companies Act, 2013 and its process of registration.</i></p> <p><i>CO4: Explain the various Negotiable instruments and their characteristic.</i></p> <p><i>CO5: Integrate the concept of the Consumer Protection Act, 1986 with day-to-day business dealings.</i></p>
<b><u>MBA-1083</u></b>	<b><u>IT for Managers</u></b>	<p><i>CO1: Identify and explain the components of a computer (hardware and software).</i></p> <p><i>CO2: Describe the various statistical charts available for data representation.</i></p> <p><i>CO3: Prepare an effective presentation using MS PowerPoint.</i></p> <p><i>CO4: Define and discuss what is MIS, its process, and various IT interaction models related to MIS.</i></p> <p><i>CO5: Explain how to measure data and transaction processing systems.</i></p>
<b><u>MBA-1094</u></b>	<b><u>Soft skills for Managers</u></b>	<p><i>CO1: Discuss the key soft skills essential for effective managerial performance, such as communication, leadership, and emotional intelligence.</i></p> <p><i>CO2: Comprehend the nuances and complexities of interpersonal relationships, communication dynamics, and leadership styles.</i></p> <p><i>CO3: Explain and demonstrate group communication.</i></p> <p><i>CO4: Explain the various types of business letter formats.</i></p>

		<i>CO5: Apply a conceptual framework to prepare reports.</i>
<b>MBA 2013</b>	<b>Marketing Management</b>	<p><i>CO1: Remember and comprehend basic marketing concepts.</i></p> <p><i>CO2: Develop skills and ability to Identify &amp; evaluate Market Segments techniques.</i></p> <p><i>CO3: Interpret the process of product life cycle and various decisions related to product development.</i></p> <p><i>CO4: Remember and classify pricing strategies.</i></p> <p><i>CO5: Summarize the concepts of Marketing channels by giving detailed explanations with examples.</i></p>
<b><u>MBA-2023</u></b>	<b><u>Production &amp; Operations Management</u></b>	<p><i>CO1: Define the role of Operations in the overall Business Strategy of an organisation - the application of OM policies and techniques to the service sector as well as the manufacturing organisation.</i></p> <p><i>CO2: Describe and apply the concepts of Productivity Management, Design of Production Planning, Operations Scheduling, and Sequencing.</i></p> <p><i>CO3: Explain and apply the concepts of Inventory Control and various models associated with it.</i></p> <p><i>CO4: Identify and evaluate the various Quality Control techniques and the process involved in it.</i></p> <p><i>CO5: Generate Acceptance Sampling and its usage.</i></p>
<b><u>MBA-2033</u></b>	<b><u>Financial Management</u></b>	<p><i>CO1: Define the finance functions and financial goals of an organisation.</i></p> <p><i>CO2: Illustrate &amp; interpret financial statements.</i></p> <p><i>CO3: Solve using capital budgeting evaluation criterion &amp; estimation of cost of capital.</i></p> <p><i>CO4: Comprehend financial leverage, operating leverage and designing of optimum capital structure.</i></p> <p><i>CO5: Prepare working capital estimation &amp; understanding of the credit policy of an organisation.</i></p>
<b><u>MBA-2043</u></b>	<b><u>Human Resource Management</u></b>	<i>CO1: Define the HRM functions, scope, and policies of an organisation.</i>

		<p><i>CO2: Explain the job description, specifications and examine the Human Resource Planning of an organisation.</i></p> <p><i>CO3: Analyse and outline the various Human Resource Development Training approaches.</i></p> <p><i>CO4: Assess job evaluation and performance appraisal techniques adopted by an organisation.</i></p> <p><i>CO5: Describe HR accounting audit &amp; research.</i></p>
<b><u>MBA- 2053</u></b>	<b><u>Business Research Methodology</u></b>	<p><i>CO1: Define and identify research concepts and its types.</i></p> <p><i>CO2: Formulate research problems, objectives and hypothesis.</i></p> <p><i>CO3: Explain &amp; interpret research design and its techniques.</i></p> <p><i>CO4: Develop a questionnaire using measurement scales.</i></p> <p><i>CO5: Analysis of data, interpretation and report writing.</i></p>
<b><u>MBA 2063</u></b>	<b><u>Business Data Analytics</u></b>	<p><i>CO1: Describe the fundamentals of business analytics.</i></p> <p><i>CO2: Explain &amp; examine data warehousing, and data mining techniques.</i></p> <p><i>CO3: Construct decision trees for decision-making.</i></p> <p><i>CO4: Solve and interpret bivariate &amp; multivariate statistical techniques (ANOVA, Regression, Clustering).</i></p> <p><i>CO5: Discuss Clustering, its methods and application.</i></p>
<b><u>MBA 2073</u></b>	<b><u>Operations Research</u></b>	<p><i>CO1: Discuss and solve Linear programming problems.</i></p> <p><i>CO2: Compute &amp; Illustration of Transportation and Assignment problems and formulation of Goal programming.</i></p> <p><i>CO3: Design game theory.</i></p> <p><i>CO4: Compute Network Theory.</i></p> <p><i>CO5: Analyse and Evaluate Decision making theory.</i></p>



<b><u>MBA-2083</u></b>	<b><u>Global and Indian Economy</u></b>	<p><i>CO1: Explain the meaning, and features of globalisation.</i></p> <p><i>CO2: Define WTO agreements and its implications.</i></p> <p><i>CO3: Explain foreign direct investment, balance of payment and its components.</i></p> <p><i>CO4: Comprehend economic trade blocs.</i></p> <p><i>CO5: State an overview of Indian Economy.</i></p>
<b><u>MBA 2094</u></b>	<b><u>Managerial Effectiveness</u></b>	<p><i>CO1: Identify interactive programs with business &amp; private organisations.</i></p> <p><i>CO2: Identify real-life problems &amp; engaging interactions with business organisations.</i></p> <p><i>CO3: Develop communication skills.</i></p> <p><i>CO4: Organise seminars/ workshops/ events on management themes.</i></p> <p><i>CO5: Produce leadership and decision-making qualities.</i></p>
<b>Department:</b>	<b>Department of Library and Information Science</b>	
<b>Programme:</b>	<b>Master of Library and Information Science (M.Lib.I.Sc.)</b>	
<b>PSOs</b>	<p>PSO 1: Demonstrate a comprehensive understanding of the information landscape, including libraries, information professionals, and their role in facilitating access.</p> <p>PSO 2: Evaluate information sources, services and systems, and effectively apply them to solve problems and achieve academic and societal goals.</p> <p>PSO 3: Analyse research within LIS and conduct independent research projects, demonstrating leadership qualities.</p> <p>PSO 4: Plan, organise and manage any type of Library and Information Centres at the local, national and international levels.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
<b>LIS-1016</b>	<b>Foundations of Library and Information Science</b>	<p>CO 1: Identify and define the different dimensions of library and information science;</p> <p>CO 2: Describe the role played by different organisations in the development of libraries;</p> <p>CO 3: Discuss the role of library associations in the promotion of libraries;</p> <p>CO 4: Apply the five laws of library science as a set of logical principles in libraries; and</p> <p>CO 5: Develop cooperation and collaboration among libraries</p>

<b>LIS 1026</b>	<b>Organization of Knowledge (Theory)</b>	<p><b>CO 1:</b> Define key terms and concepts related to organisation of knowledge;  <b>CO 2:</b> Identify and describe the need, purpose and function of library classification and cataloguing;  <b>CO 3:</b> Describe the structure; identify the main classes in a library classification;  <b>CO 4:</b> Identify the different types of entries in the library catalogue; and  <b>CO 5:</b> Design a comprehensive strategy for organization of knowledge.</p>
<b>LIS 1036</b>	<b>Reference and Information Sources and Services</b>	<p><b>CO 1:</b> Describe the sources for different types of information;  <b>CO 2:</b> Identify the need, use and functions of bibliographies;  <b>CO 3:</b> Explain the process involved in providing reference and information services;  <b>CO 4:</b> Determine the process involved in rendering digital reference services; and  <b>CO 5:</b> Evaluate the different types of information sources and services.</p>
<b>LIS 1046</b>	<b>Organization of Knowledge (Practice)</b>	<p><b>CO 1:</b> Outline the structure of Colon Classification and Dewey Decimal Classification Schemes;  <b>CO 2:</b> Identify the different types of entries in the library catalogue;  <b>CO 3:</b> Recognize the basic, compound and complex subjects;  <b>CO 4:</b> Explain the trends in library catalogue; and  <b>CO 5:</b> Generate class numbers of documents in any type of library using CC and DDC</p>
<b>LIS 1056</b>	<b>Computer Application in LIS</b>	<p><b>CO 1:</b> Describe the computer system, its components and uses;  <b>CO 2:</b> Discuss the importance of ICT in library and information services;  <b>CO 3:</b> Use different computer operating systems;  <b>CO 4:</b> Operate different application software; and  <b>CO 5:</b> Develop automation strategy for any type of libraries</p>
<b>LIS 2016</b>	<b>Management of Library Information Centres</b>	<p><b>CO 1:</b> Explain different theories of management;  <b>CO 2:</b> Define the components of human resources management;  <b>CO 3:</b> Describe the functions of different sections of the libraries; and  <b>CO 4:</b> Determine the quality control measures applicable in libraries;  <b>CO 5:</b> Formulate the budget proposal keeping in view both budgeting aspects and functions of a library;</p>

<b>LIS 2023</b>	<b>Information Communication &amp; Information System</b>	<p><b>CO 1:</b> Distinguish between seemingly synonymous words, such as information, data, knowledge, facts, and wisdom;</p> <p><b>CO 2:</b> Appreciate the role of information systems methodologies;</p> <p><b>CO 3:</b> Describe the different information systems at national and international level;</p> <p><b>CO 4:</b> Explain different information providers; and</p> <p><b>CO 5:</b> Design, implement, and manage information systems.</p>
<b>LIS 2033</b>	<b>System Analysis Design</b>	<p><b>CO 1:</b> Describe the concept of system, system analysis and design;</p> <p><b>CO 2:</b> Explain the need and purpose of automation;</p> <p><b>CO 3:</b> Recognize the different modules of ILMS and its uses;</p> <p><b>CO 4:</b> Explain information analysis in library; and</p> <p><b>CO 5:</b> Use Flow Chart, DFD, SWOT PERT/CPM in system analysis and design</p>
<b>LIS 2043</b>	<b>Preservation &amp; Conservation (C)</b>	<p><b>CO 1:</b> Identify the importance of preservation and conservation of library resources.</p> <p><b>CO 2:</b> Describe the objectives of preservation and conservation of library materials;</p> <p><b>CO 3:</b> Develop skills for digital preservation of library holdings;</p> <p><b>CO 4:</b> Determine the strategy for the preservation and conservation of the various library materials; and</p> <p><b>CO 5:</b> Plan the steps required for preservation of various library materials.</p>
<b>LIS 2053</b>	<b>Academic Library System (EC)</b>	<p><b>CO 1:</b> Explain the role of academic libraries at various levels of formal education;</p> <p><b>CO 2:</b> <b>Grasp</b> the role of UGC, NAAC and INFLIBNET in the promotion of academic libraries;</p> <p><b>CO 3:</b> Relate the need and purpose of building, lighting, interior decoration, furniture and equipment in the academic libraries;</p> <p><b>CO 4:</b> Evaluate services and products of academic library;</p> <p><b>CO 5:</b> Design and develop academic library from scratch</p>
<b>LIS 2063</b>	<b>Public Library System (E)</b>	<p><b>CO 1:</b> Explain the role of public libraries in society;</p> <p><b>CO 2:</b> <b>Grasp</b> the role of RRRLF and UNESCO in the promotion of public libraries;</p> <p><b>CO 3:</b> Comprehend the need and purpose of library legislation for public library services;</p> <p><b>CO 4:</b> Relate the need and purpose of building, lighting, interior decoration, furniture and equipment in the public libraries.</p>

<p><b>LIS 2073</b></p>	<p><b>Special Library System (E)</b></p>	<p><b>CO 5:</b> Design and develop public library from scratch  <b>CO 1:</b> Identify and describe the activities, functions and services of special libraries that are attached to different types of organisations;  <b>CO 2:</b> Distinguish the specific characteristics of special libraries with reference to their specialised products and services;  <b>CO 3:</b> Relate the need and purpose of library standards for special libraries.  <b>CO 4:</b> Evaluate services and products of special library; and  <b>CO 5:</b> Design and develop special library from scratch.</p>
<p><b>LIS 2086</b></p>	<p><b>Organization of Knowledge (Practice)</b></p>	<p><b>CO 1:</b> Outline the structure of Dewey Decimal Classification and Universal Decimal Classification Schemes;  <b>CO 2:</b> Identify the different types of auxiliaries and their use in library classification  <b>CO 3:</b> Recognize the basic, compound and complex subjects;  <b>CO 4:</b> Interpret subjects according to facet analysis and sequencing of facets; and  <b>CO 5:</b> Generate class numbers of documents in any type of library using DDC and UDC.</p>
<p><b>LIS 2096</b></p>	<p><b>ICT Application in Library &amp; Information System</b></p>	<p><b>CO 1:</b> Describe the information and communication technologies and its components and uses;  <b>CO 2:</b> Discuss the importance of information and communication technologies in library and information services;  <b>CO 3:</b> Explain the different types of networks and their topologies;  <b>CO 4:</b> Assess the publishers of different kinds of e-resources and the different access points they provide; and  <b>CO 5:</b> Develop strategies to manage e-resources in a library.</p>
<p><b>LIS 3016</b></p>	<p><b>Research Methodology</b></p>	<p><b>CO 1:</b> Identify and formulate research problems in LIS;  <b>CO 2:</b> Identify and use appropriate research methodology;  <b>CO 3:</b> Apply appropriate tools, techniques and statistical methods in research;  <b>CO 4:</b> Analyse and interpretation of collected data; and  <b>CO 5:</b> Develop ability to apply multi-disciplinary concepts, tools and techniques in research.</p>
<p><b>LIS 3023</b></p>	<p><b>Management Information System</b></p>	<p><b>CO 1:</b> Describe the concept of system, system analysis and design;  <b>CO 2:</b> Explain the need and purpose of management information system;</p>

		<p><b>CO 3:</b> Recognize the scope and areas of consultancy in Library and Information Science;</p> <p><b>CO 4:</b> Explain different components of total quality management; and</p> <p><b>CO 5:</b> Use total quality management in libraries.</p>
<b>LIS 3033</b>	<b>Management of E Resources</b>	<p><b>CO 1:</b> Describe different types of E-Resources and their subscription policies;</p> <p><b>CO 2:</b> Identify the role of E-Resources in developing library network and consortia;</p> <p><b>CO 3:</b> Explain the issues and challenges in acquiring and providing access to E-Resources;</p> <p><b>CO 4:</b> Determine the process involved in rendering digital reference services; and</p> <p><b>CO 5:</b> Evaluate the different types of electronic information sources and services</p>
<b>LIS 3043</b>	<b>Web Resources</b>	<p><b>CO 1:</b> Describe different types of web resources;</p> <p><b>CO 2:</b> Identify the role of web resources in developing library network and consortia;</p> <p><b>CO 3:</b> Explain the issues and challenges in acquiring and providing access to web resources;</p> <p><b>CO 4:</b> Determine the process involved in rendering digital reference services; and</p> <p><b>CO 5:</b> Evaluate the different types of web-based information sources and services.</p>
<b>LIS 3053</b>	<b>Bibliometrics &amp; Webometrics</b>	<p><b>CO 1:</b> Describe informetrics and its use in Library and Information Science;</p> <p><b>CO 2:</b> Interpret informetrics data and metrics to draw conclusions;</p> <p><b>CO 3:</b> Apply informetrics techniques to analyze scholarly communication patterns;</p> <p><b>CO 4:</b> Utilize informetrics tools to evaluate research impact and productivity; and</p> <p><b>CO 5:</b> Analyze trends and patterns in scholarly publications using informetrics data</p>
<b>LIS 3063</b>	<b>Library Software Packages (Theory)</b>	<p><b>CO 1:</b> Describe the history of library software developments in India;</p> <p><b>CO 2:</b> Explain the need and purpose of automation;</p> <p><b>CO 3:</b> Recognize the different modules of ILMS and its uses;</p> <p><b>CO 4:</b> Evaluate CDS/ISIS, WINISIS, SOUL, E-Granthalaya, Libsys, DSpace, GSDL and Koha; and</p> <p><b>CO 5:</b> Use CDS/ISIS, WINISIS, SOUL, E-Granthalaya and Libsys, DSpace, GSDL and Koha.</p>
<b>LIS 3073</b>	<b>Documentation Works</b>	<p><b>CO 1:</b> Describe various bibliographic tools to support information access;</p> <p><b>CO 2:</b> Associate subject descriptors to information content;</p> <p><b>CO 3:</b> Locate and systematically organize the records for bibliographies; and</p> <p><b>CO 4:</b> Appraise the recent developments in Library and Information Centres;</p>

		<b>CO 5:</b> Develop the writing and presentation skill to prepare annotated bibliography
<b>LIS 3086</b>	<b>Software Packages (Practice)</b>	<b>CO 1:</b> Describe the process to install CDS/ISIS, WINISIS and SOUL Software; <b>CO 2:</b> Recognise the feature of CDS/ISIS, WINISIS and SOUL software; <b>CO 3:</b> Use the different modules in CDS/ISIS, WINISIS and SOUL software; <b>CO 4:</b> Design database using CDS/ISIS, WINISIS and SOUL software; and <b>CO 5:</b> Create database records in CDS/ISIS, WINISIS and SOUL
<b>LIS 4016</b>	<b>Information Storage and Retrieval System</b>	<b>CO 1:</b> Identify the special features concerning Library and Information Storage that aid in Retrieval; <b>CO 2:</b> Recognize different indexing languages; <b>CO 3:</b> Explain the need for a database management system (DBMS); <b>CO 4:</b> Categorize different types of vocabulary control devices; and <b>CO 5:</b> Use various search techniques to retrieve relevant information
<b>LIS 4026</b>	<b>Digital Library System</b>	<b>CO 1:</b> Describe the digital library concept, its components, planning and implementation; <b>CO 2:</b> Recognize the various Metadata schema applicable for digital Library; <b>CO 3:</b> Choose appropriate architecture for a digital library; <b>CO 4:</b> Develop a website by using HTML and CSS; and <b>CO 5:</b> Design digital Library and Institutional Repository
<b>LIS 4033</b>	<b>Library &amp; Users</b>	<b>CO 1:</b> Identify users, their information needs, and their behaviour in seeking information; <b>CO 2:</b> Describe information literacy, its types and uses; <b>CO 3:</b> Explain the importance of user education as integral to the learning process; <b>CO 4:</b> Identify users their information needs, and their behaviour in seeking information; and <b>CO 5:</b> Evaluate user studies;
<b>LIS 4043</b>	<b>Internship</b>	<b>CO 1:</b> Describe the organizational structure, services and collection in library <b>CO 2:</b> Explain the principles of information organization and retrieval; <b>CO 3:</b> Implement library policies and procedures for circulation; inter library loan and collection development; <b>CO 4:</b> Analyze user needs, and preferences to improve library services and collections; and

		<b>CO 5:</b> Access the impact of emerging technologies on library operations and information access.
<b>LIS 4056</b>	<b>Open Source Software Packages (Practice)</b>	<b>CO 1:</b> Describe the process to install Koha and DSpace Software; <b>CO 2:</b> Recognise the feature of Koha and DSpace software; <b>CO 3:</b> Use the different modules in Koha and DSpace software; <b>CO 4:</b> Design database using Koha and DSpace software; and <b>CO 5:</b> Create database records in Koha and DSpace.
<b>LIS 4066</b>	<b>Dissertation</b>	<b>CO 1:</b> Identify and formulate a research problem; <b>CO 2:</b> Interpret data and findings to understand their implications; <b>CO 3:</b> Solve problem through proper scientific method of investigation and appropriate research methodology; <b>CO 4:</b> Analyze data to draw meaningful conclusions; and <b>CO 5:</b> Synthesize findings to propose new theoretical frameworks or practical implications for future research

<b>Department:</b>	<b>Department of Chemistry</b>		Supporting Document Criteria 1 Gauhati University
<b>Programme:</b>	<b>M.Sc. (CBCS)</b>		
<b>PSOs</b>	PSO1. Demonstrate the advanced understanding of chemical substances in terms of functionality, reactivity, selectivity, catalysis etc. PSO2. Operate standard analytical and computational equipments to generate and evaluate experimental and computational data PSO3. Apply critical thinking and analytical skills to assess and solve real life problems related to chemistry, chemicals and environment PSO4. Design and develop strategies for creating new methodologies and materials		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>	
CH101	Inorganic Chemistry 1	1. Explain the Structure and bonding of Solid state materials 2. Analyze the structure and bonding of organometallic compounds 3. Assess the chemistry of main group elements 4. Appraise the chemistry of heavy transition metals 5. Summarize the structure bonding and reactivity of main group elements, heavy transition metals and solids.	
CH102	Organic Chemistry 1	1. Explain the kinetics and energetics of organic reactions. 2. Categorize reaction intermediates in organic reactions. 3. Analyze the structure and reactivity of reaction intermediates in organic reactions. 4. Classify the organic molecules on the basis their stereochemistry. 5. Compare the reactivity in organic molecules on the basis of their stereochemistry	
CH103	Physical Chemistry 1	1. Explain the fundamentals of non-equilibrium thermodynamics 2. Apply the concepts of Equilibrium thermodynamics in chemical systems 3. Apply the fundamentals of statistical thermodynamics in model system. 4. Analyze polymers based on molecular weight and average dimensions. 5. Compare analytical data using statistical methods.	
CH104	Quantum Chemistry	1. Explain the theoretical basis of quantum chemistry. 2. Examine the solution of Eigen value equations for model systems 3. Apply Born-Oppenheimer approximation 4. Compare various approximate formalisms and their validity 5. Develop complete many electron wave functions	
CH105	Spectroscopy 1	1. Explain the theoretical basis of different spectroscopic techniques. 2. Explain the use of polarized light spectroscopy 3. Solve problems on rotational and Raman spectroscopy 4. Interpreting experimental data of vibrational spectroscopy 5. Analyze the experimental data of electronic spectroscopy	
CH106	Symmetry and Group Theory in Chemistry	1. Explain the fundamentals of group formation. 2. Classify molecules and solids on the basis of their symmetry. 3. Use matrix notation for geometric transformations. 4. Develop molecular orbitals for complexes. 5. Assess spectroscopic selection rules on symmetry considerations.	
CH107	Practical Organic Chemistry	1. Analyze and apply qualitative analysis techniques 2. Apply synthesis techniques to organic compounds	



		<ol style="list-style-type: none"> <li>3. Perform experiments on natural products</li> <li>4. Conduct quantitative analysis of organic compounds</li> <li>5. Evaluate experimental data and draw conclusions</li> </ol>
CH201	Inorganic Chemistry 2	<ol style="list-style-type: none"> <li>1. Explain Bonding in Coordination compounds</li> <li>2. Interpret electronic spectra of transition metal complexes</li> <li>3. Analyze the mechanism of inorganic reactions</li> <li>4. Illustrate the photochemical reactions of coordination compounds</li> <li>5. Analyze magnetic properties of inorganic compounds</li> </ol>
CH201	Inorganic Chemistry 2	<ol style="list-style-type: none"> <li>1. Explain Bonding in Coordination compounds</li> <li>2. Interpret electronic spectra of transition metal complexes</li> <li>3. Analyze the mechanism of inorganic reactions</li> <li>4. Illustrate the photochemical reactions of coordination compounds</li> <li>5. Analyze magnetic properties of inorganic compounds</li> </ol>
CH202	Organic Chemistry 2	<ol style="list-style-type: none"> <li>1. Apply fundamental concepts of organic photochemistry.</li> <li>2. Evaluate the diverse reactions of carbonyl compounds and olefins in photochemistry</li> <li>3. Analyze complex photochemical rearrangement reactions</li> <li>4. Evaluate oxidation and reduction reactions in organic synthesis</li> <li>5. Apply principles of pericyclic reactions to predict reactivity and stereochemistry</li> </ol>
CH203	Physical Chemistry 2	<ol style="list-style-type: none"> <li>1. Demonstrate understanding and application of chemical kinetics principles</li> <li>2. Analyze molecular reaction dynamics</li> <li>3. Evaluate methods for studying fast reactions</li> <li>4. Critically assess theories of unimolecular reactions</li> <li>5. Apply principles of dynamic electrochemistry</li> </ol>
CH204	Spectroscopy 2	<ol style="list-style-type: none"> <li>1. Demonstrate comprehensive understanding and mastery of NMR Spectroscopy principles</li> <li>2. Apply advanced NMR techniques</li> <li>3. Evaluate dynamic processes using NMR spectroscopy</li> <li>4. Analyze principles and applications of other spectroscopic techniques- ESR Spectroscopy, Mass Spectrometry, and Mössbauer spectroscopy.</li> <li>5. Synthesize knowledge of NMR spectroscopy for diverse nuclei and complex systems</li> </ol>
CH205	Green Chemistry	<ol style="list-style-type: none"> <li>1. Define and comprehend the principles of Green Chemistry</li> <li>2. Apply the principles of Green Chemistry to practical scenarios</li> <li>3. Analyze waste production, problems, and prevention strategies</li> <li>4. Evaluate the role of catalysis in green chemistry and its impact on sustainability</li> <li>5. Synthesize knowledge of green feedstock and biomass conversion</li> </ol>
CH206	Practical Inorganic Chemistry	<ol style="list-style-type: none"> <li>1. Apply qualitative analysis techniques</li> <li>2. Conduct quantitative analysis of inorganic compounds</li> <li>3. Synthesize and characterize coordination compounds and through ligand synthesis</li> <li>4. Perform solid phase synthesis of coordination compounds</li> <li>5. Synthesize and characterize inorganic materials</li> </ol>
CH301	Biochemistry	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of cellular structure and function</li> <li>2. Analyze bioenergetics and thermodynamics in living systems</li> <li>3. Evaluate the chemistry of biomolecules</li> </ol>

		<ol style="list-style-type: none"> <li>4. Analyze the role of metal ions in biological systems</li> <li>5. Synthesize knowledge of biochemical principles and apply to real-world scenarios</li> </ol>
CH302	Modern Methods of Analysis	<ol style="list-style-type: none"> <li>1. Analyze the application of spectroscopic techniques in characterizing inorganic and organic molecules</li> <li>2. Evaluate microscopy and diffraction methods for material analysis</li> <li>3. Analyze thermal methods for material analysis</li> <li>4. Evaluate analytical spectroscopic methods for elemental analysis</li> <li>5. Synthesize knowledge of modern analytical techniques for real-world applications</li> </ol>
CH303	Foundations of Organic Synthesis	<ol style="list-style-type: none"> <li>1. Analyze dynamic stereochemistry in organic synthesis</li> <li>2. Evaluate carbon-carbon bond formation reactions</li> <li>3. Analyze retrosynthetic analysis principles and strategies</li> <li>4. Evaluate the use of protecting groups in organic synthesis</li> <li>5. Analyze the structure and reactivity of heterocycles</li> </ol>
CH304	Seminar Course	<ol style="list-style-type: none"> <li>1. Analyze and evaluate advanced research literature</li> <li>2. Synthesize diverse viewpoints and perspectives</li> <li>3. Develop effective oral communication skills</li> <li>4. Engage in scholarly discourse and debate</li> <li>5. Demonstrate research skills and ethical conduct</li> </ol>
CH305	Practical Physical Chemistry	<ol style="list-style-type: none"> <li>1. Demonstrate the principles of chemical kinetics, conductometric titrations, spectrophotometry, pH metric titrations, and cyclic voltammetry.</li> <li>2. Apply experimental and computational techniques to collect, analyze and interpret data from various experiments</li> <li>3. Analyze adsorption-desorption processes on porous materials, including equilibrium, kinetic, and thermodynamic studies.</li> <li>4. Interpret theoretical chemistry experiments to understand molecular modeling and computational methods.</li> <li>5. Evaluate experimental procedures and results, considering accuracy, precision, limitations, and sources of error.</li> </ol>
CH306	Solid State & Materials Chemistry	<ol style="list-style-type: none"> <li>1. Analyze the classification and characteristics of materials</li> <li>2. Evaluate synthesis methods and theoretical principles of solid-state chemistry</li> <li>3. Analyze the properties and characterization techniques of solid-state materials</li> <li>4. Evaluate organic solid-state chemistry and materials design</li> <li>5. Synthesize knowledge and apply critical thinking to materials chemistry</li> </ol>
CH307	X-ray Crystallography	<ol style="list-style-type: none"> <li>1. Analyze the fundamentals of crystallography and crystal symmetry</li> <li>2. Evaluate the principles of X-ray diffraction and crystal structure determination</li> <li>3. Analyze practical aspects of X-ray diffraction experiments</li> <li>4. Evaluate applications of X-ray crystallography methods</li> <li>5. Synthesize knowledge and apply critical thinking to X-ray crystallography</li> </ol>
CH308	Environmental Chemistry	<ol style="list-style-type: none"> <li>1. Analyze the fundamentals and importance of environmental chemistry</li> <li>2. Evaluate the chemistry of the atmosphere and its impact on the environment</li> <li>3. Analyze the environmental chemistry of soil</li> <li>4. Evaluate the environmental chemistry of water</li> <li>5. Synthesize knowledge and apply critical thinking to environmental issues</li> </ol>

CH309	Surface Chemistry and Catalysis	<ol style="list-style-type: none"> <li>1. Explain the concepts of surface energy, contact angle, and adsorption phenomena at solid-liquid and solid-gas interfaces.</li> <li>2. Apply knowledge of surface area and structure of solid surfaces to analyze adsorption of gases and vapors on solids.</li> <li>3. Analyze the differences between physisorption and chemisorption on heterogeneous surfaces.</li> <li>4. Examine the kinetics and thermodynamics of chemisorption, including catalytic activity and selectivity in heterogeneous catalysis.</li> <li>5. Evaluate surface characterization techniques such as electron diffraction, spectroscopy, and microscopy for studying solid surfaces.</li> </ol>
CH310	Food Chemistry	<ol style="list-style-type: none"> <li>1. Explain basic concepts of food and nutrients, including their functions and sources.</li> <li>2. Apply knowledge of major dietary constituents to assess dietary needs and prevent deficiencies or excesses.</li> <li>3. Analyze the nutritional needs of individuals at different life stages, considering factors such as growth, physical activity, and aging.</li> <li>4. Analyze the causes, symptoms, treatments, and prevention strategies for various nutritional deficiencies and disorders.</li> <li>5. Evaluate the impact of social health issues such as smoking, alcoholism, and drug addiction on nutrition and health.</li> </ol>
CH401	Natural Products Chemistry	<ol style="list-style-type: none"> <li>1. Explain the primary and secondary metabolites involved in natural product chemistry</li> <li>2. Demonstrate an understanding of the structures, reactions, and biogenesis of carbohydrates, terpenoids, steroids, alkaloids, and carotenoids</li> <li>3. Apply the knowledge to predict the structures of natural products based on biosynthetic pathways and chemical reactions</li> <li>4. Analyze scientific literature and research articles to evaluate the role of natural products in drug discovery, medicine, and agriculture</li> <li>5. Evaluate the ethical and environmental implications of using natural products as pharmaceuticals, nutraceuticals, and agrochemicals</li> </ol>
CH402	Advanced Organic Synthesis	<ol style="list-style-type: none"> <li>1. Utilize the principles of carbon-carbon bond formation involving <math>Csp^3</math>, <math>Csp^2</math>, and <math>Csp</math> carbon centers, and apply this knowledge in designing synthetic routes</li> <li>2. Demonstrate asymmetric synthesis techniques, including the use of chiral reagents, catalysts, and auxiliaries, and apply them in the synthesis of enantiomerically pure compounds</li> <li>3. Demonstrate proficiency in constructing different ring systems, including three, four, five, and sixmembered rings, as well as heterocyclic rings, using various synthetic methods.</li> <li>4. Apply new methods for the construction of carbon-heteroatom bonds, including C-N, C-O, C-S, and C-X bonds, and understand the activation of C-H bonds in these processes.</li> <li>5. Explain synthesis and properties of complex natural products, such as terpenes and alkaloids, applying the principles learned throughout the course</li> </ol>
CH403	Quantum and Computational Chemistry	<ol style="list-style-type: none"> <li>1. Apply mathematical concepts, including matrices, determinants, and eigenvalue problems, in the context of quantum mechanics.</li> <li>2. Explain Schrodinger's and Heisenberg's formulations of quantum mechanics, and solve</li> </ol>

		<p>the time-dependent Schrodinger equation using separation of variables.</p> <ol style="list-style-type: none"> <li>3. Apply the knowledge of many-electron wave functions and Born-Oppenheimer approximation to understand the electronic structure of atoms and molecules.</li> <li>4. Apply the Hartree-Fock approximation in solving the electronic structure problem, including interpreting solutions and calculating orbital energies.</li> <li>5. Apply various types of basis sets used in quantum chemistry, such as minimal, double zeta, and polarized basis sets, and apply them in molecular calculations to improve accuracy.</li> </ol>
CH404	Catalysis Science & Technology	<ol style="list-style-type: none"> <li>1. Explain catalyst preparation methods, structure and properties of catalyst supports and their interaction with metal compounds</li> <li>2. Explain the synthesis of zeolites, mesoporous materials, and clays, modification and activation of zeolites and application of these materials in catalysis.</li> <li>3. Explain catalyst deactivation processes, such as poisoning, coke formation, and sintering and utilize various methods for catalyst regeneration to restore activity and selectivity.</li> <li>4. Explain the design of catalytic reactors and strategies for minimizing mass and heat flow</li> <li>5. Utilize suitable catalysts for industrially important processes such as oil refining, steam reforming, hydrogenation reactions, methanol synthesis, catalytic cracking, and pollution control in automobile exhaust</li> </ol>
CH405	Nanoscience and Nanotechnology	<ol style="list-style-type: none"> <li>1. Explain fundamental concepts of nanomaterials, classification of nanomaterials and their occurrence in nature</li> <li>2. Explain crystal symmetries, band structures, and bulk properties of materials and apply solid-state physics concepts to analyze low-dimensional systems.</li> <li>3. Analyze the electronic structure and thermodynamics of nanomaterials using the concepts of quantum confinement, energy considerations, and quantum transport in nanomaterials.</li> <li>4. Apply synthesis techniques to prepare nanomaterials and fabricate nanostructures</li> <li>5. Utilize characterization techniques to analyze nanostructures and evaluate recent advances in nanotechnology and their applications in materials science, biology, medicine, and energy</li> </ol>
CH406:	Advanced Bioinorganic Chemistry	<ol style="list-style-type: none"> <li>1. Explain metal ion storage and transport, including protein roles (e.g., Ferritin, Transferrin), biomineralization of essential elements (Fe, Si, P, Ca), and coordination of O<sub>2</sub>/H<sub>2</sub>O to metal centers in bioinorganic systems.</li> <li>2. Apply principles of electron transport and Marcus theory to analyze respiratory electron transfer chains.</li> <li>3. Analyze the mechanisms of detoxification enzymes involved in converting O<sub>2</sub> into H<sub>2</sub>O, such as Catalases, Peroxidases, and Superoxide dismutases</li> <li>4. Develop strategies for studying metal-nucleic acid interactions, including the design of experiments to investigate various types of interactions.</li> <li>5. Evaluate the mechanisms and therapeutic implications of photocleavage of DNA by transition metal complexes in photodynamic therapy.</li> </ol>
CH407	Supramolecular Chemistry	<ol style="list-style-type: none"> <li>1. Describe non-covalent interactions and the concept of pre-organisation in supramolecular chemistry</li> </ol>

		<ol style="list-style-type: none"> <li>2. Apply knowledge of various supramolecular structures (e.g., crown ethers, cyclodextrins) to understand their applications in molecular recognition.</li> <li>3. Analyze the design, synthesis, and applications of self-assembled structures like metallomacrocycles, MOFs, catenanes, and rotaxanes.</li> <li>4. Evaluate the relevance of supramolecular chemistry in mimicking biological systems, such as using cyclodextrins as enzyme mimics and ion channel mimics.</li> <li>5. Design molecular and supramolecular devices for specific functions, such as photonic devices, electronic devices, and molecular machines</li> </ol>
CH408	Organometallic Chemistry	<ol style="list-style-type: none"> <li>1. Explain key reaction mechanisms in organometallic chemistry, including ligand substitution, oxidative addition, and migratory insertion.</li> <li>2. Apply knowledge of main group organometallic compounds (Li, Mg, B, Al, Si, Sn) to predict their reactivity and synthetic applications.</li> <li>3. Analyze the synthetic applications of d-block organometallic compounds in various coupling reactions (Heck, Stille, Suzuki, etc.) and C-H activation reactions.</li> <li>4. Critically evaluate the applications of organometallic compounds in biomedicine and their potential as therapeutic agents.</li> <li>5. Design synthetic routes using organometallic catalysis, including the use of carbene complexes in cyclopropanation and aziridination reactions</li> </ol>
CH409	Medicinal Chemistry	<ol style="list-style-type: none"> <li>1. Explain basic concepts related to drug action, such as receptors, drug-receptor interactions, and the two-state model of receptor theory</li> <li>2. Apply knowledge of drug discovery and design principles, including the importance of structureactivity relationships (SAR) and molecular modification.</li> <li>3. Analyze the theoretical aspects of drug action, including the factors affecting bioactivity of drugs and the concepts of chemotherapeutic index and therapeutic index.</li> <li>4. Evaluate the importance of various classes of antibiotics, including <math>\beta</math>-lactam antibiotics, aminoglycosides, tetracyclines, and macrolides, in the treatment of bacterial infections.</li> <li>5. Design strategies for drug discovery and development, including the use of combinatorial libraries and molecular modeling</li> </ol>
CH410	NMR methods for structure elucidation	<ol style="list-style-type: none"> <li>1. Explain basic principles of NMR spectroscopy, including isotropic and anisotropic NMR parameters, and the Nuclear Overhauser Effect (NOE)</li> <li>2. Apply knowledge of NMR techniques to analyze and interpret 2D NMR spectra, including COSY, HSQC, and HMBC, for the assignment of <math>^1\text{H}</math> and <math>^{13}\text{C}</math> chemical shifts in simple organic molecules and natural products.</li> <li>3. Analyze the use of NMR spectroscopy in the structure elucidation of inorganic complexes and materials, including the interpretation of contact shifts and pseudo-contact shifts in paramagnetic metal complexes.</li> <li>4. Assess the reliability of NMR data for determining the structures of organic natural products and inorganic complexes, considering factors such as spectral overlap and sensitivity.</li> <li>5. Design NMR experiments for the structural elucidation of complex organic molecules and inorganic materials, considering the appropriate choice of NMR techniques and parameters.</li> </ol>
CH411	Project Dissertation	<ol style="list-style-type: none"> <li>1. Demonstrate principles of planning and strategizing a scientific research problem from</li> </ol>

		<p>the knowledge of literature survey and specific lab techniques learned for the project</p> <ol style="list-style-type: none"> <li>2. Apply planning and strategizing skills to implement a research project within a specified time-frame</li> <li>3. Analyze and interpret data collected from sophisticated instruments used for analysis.</li> <li>4. Evaluate critically the conducted research work by extracting relevant information from research articles to enhance analytical ability, scientific writing and communication skills.</li> <li>5. Create a comprehensive project dissertation that demonstrates the ability to conduct independent research</li> </ol>
<b>Department:</b>	<b>Department of Chemistry</b>	
<b>Programme:</b>	Post Graduate Diploma in Analytical Chemistry	
<b>PSOs</b>	<p>PSO1. Proficiency in Analytical Techniques: Graduates will demonstrate proficiency in a wide range of analytical techniques including conductometric titration, thermo gravimetric analysis, chromatography, and spectroscopic methods, enabling them to accurately analyze various substances and compounds.</p> <p>PSO2. Experimental Design and Execution: Graduates will be able to design, execute, and interpret experiments related to analytical chemistry, applying theoretical knowledge to practical scenarios. They will demonstrate competence in selecting appropriate analytical methods and instruments to solve specific analytical problems.</p> <p>PSO3. Data Analysis and Interpretation: Graduates will possess the skills to analyze experimental data obtained from analytical techniques, critically evaluate results, and draw meaningful conclusions. They will be capable of identifying sources of error and applying statistical methods to ensure the accuracy and reliability of analytical findings.</p> <p>PSO4. Application of Analytical Methods: Graduates will apply their knowledge of analytical chemistry to address real-world challenges in various industries such as pharmaceuticals, environmental monitoring, food safety, and materials science. They will demonstrate the ability to adapt analytical methods to specific contexts and contribute to quality control, research, and development efforts.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
Paper I	Basic Analytical Chemistry (Theory)	<ol style="list-style-type: none"> <li>1. Understand the Fundamentals of Analytical Chemistry</li> <li>2. Evaluate Analytical Data and Perform Statistical Analysis</li> <li>3. Master Sampling Techniques and Understand Chemical Instrumentation</li> <li>4. Comprehend Acid-Base and Redox Concepts in Analytical Chemistry</li> <li>5. Understand Principles of Complexation, Precipitation, and Gravimetric Analysis</li> </ol>
Paper II	Separation Methods (Theory)	<ol style="list-style-type: none"> <li>1. Understand the Principles of Solvent Extraction</li> <li>2. Analyze the Theoretical Foundations and Applications of Chromatographic Methods</li> <li>3. Examine Other Separation Methods such as Membrane Separation, Electrophoresis, and Centrifugation</li> <li>4. Apply Chromatographic and Other Separation Techniques in Practical Scenarios</li> <li>5. Evaluate the Efficiency and Effectiveness of Separation Methods</li> </ol>
Paper III	Analytical Techniques (Practical)	<ol style="list-style-type: none"> <li>1. Demonstrate Proficiency in Glass Blowing Techniques</li> </ol>

		<ol style="list-style-type: none"> <li>2. Apply Calibration and Statistical Treatment to Analytical Data</li> <li>3. Conduct Gravimetric Determinations with Precision</li> <li>4. Perform Various Water Quality Analyses</li> <li>5. Execute Complexometric and Volumetric Determinations</li> </ol>
Paper IV	Separation Techniques (Practical)	<ol style="list-style-type: none"> <li>1. Perform Separation of Organic and Inorganic Compounds Using TLC</li> <li>2. Conduct Separation of Metal Ions and Amino Acid via Paper Chromatography</li> <li>3. Demonstrate Proficiency in Solvent Extraction and HPLC Separation</li> <li>4. Demonstrate Proficiency in Chlorophyll Pigment Separation by Column Chromatography</li> <li>5. Determine Cation Exchange Capacity of Ion Exchange Resin</li> </ol>
Paper – V	Spectroscopic Methods of Analysis (Theory)	<ol style="list-style-type: none"> <li>1. Demonstrate Understanding of Electromagnetic Radiation and its Interaction with Matter</li> <li>2. Apply Principles of UV-VIS Spectroscopy for Quantitative Analysis</li> <li>3. Utilize IR Spectroscopy for Structural Analysis</li> <li>4. Analyze NMR, Mass, and Atomic Absorption Spectroscopy Data</li> <li>5. Evaluate Thermal Analysis Techniques and Atomic Emission Spectroscopy</li> </ol>
Paper – VI	Electro analytical and other methods (Theory)	<ol style="list-style-type: none"> <li>1. Explain fundamental concepts of electroanalytical methods</li> <li>2. Analyze environmental issues and their analytical approaches</li> <li>3. Evaluate analytical techniques for food, petroleum, and drug analysis</li> <li>4. Discuss instrumentation and application of electroanalytical methods</li> <li>5. Critically analyze data and interpret results</li> </ol>
Paper – VII	Instrumental Methods (Practical)	<ol style="list-style-type: none"> <li>1. Apply fundamental principles in spectroscopy</li> <li>2. Perform quantitative analysis using UV-VIS spectrophotometry</li> <li>3. Characterize compounds using FTIR spectroscopy</li> <li>4. Conduct elemental analysis using flame photometry</li> <li>5. Interpret NMR spectra for compound characterization</li> </ol>
Paper – VIII	Spectroscopic Techniques (Practical)	<ol style="list-style-type: none"> <li>1. Apply the knowledge of conductometric titration to accurately determine the concentration of substances in a solution.</li> <li>2. Utilize Thermo gravimetric Method to determine the concentration of minerals in ores.</li> <li>3. Apply analytical techniques to assess the composition of soil samples</li> <li>4. Evaluate the presence of food adulterants using appropriate detection methods and analyze the implications</li> <li>5. Analyze the separated components in human plasma serum using electrophoresis and interpret the outcomes</li> </ol>
<b>Department:</b>	<b>Department of Bioengineering and Technology</b>	

<b>Programme:</b>	<b>B.Tech Biotrechnology</b>	
<b>PSOs</b>	<p><b>PSO1.</b> Acquire knowledge on the fundamentals and basics of biotechnology enabling them to understand the emerging engineering concepts in biotechnology.</p> <p><b>PSO2.</b> Apply critical thinking on technologies and software to hypothesize and formulate solutions in drug resistance, protein production and related aspects</p> <p><b>PSO3.</b> Develop skills in technologies like molecular diagnostics and other biotechnology tools and techniques to put forth probable solutions by a combination of disciplinary and interdisciplinary knowledge in emerging frontiers of biology.</p> <p><b>PSO4.</b> Acquire competency for industry and higher studies to execute new ideas using basic concepts learned through different activities such as workshops, lectures, seminars and field projects in research and entrepreneurship in the field of biotechnology and allied fields.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
<b>BT121</b>	<b>Modern Biology</b>	<ol style="list-style-type: none"> <li>1. Understand the diversity in living organisms: the origin of life and molecular processes that sustain life.</li> <li>2. Understand the importance of microbial world and describe its role as cell factory</li> <li>3. Discuss the role of different biomolecules and understand the fundamental biochemical principles.</li> <li>4. Perform basic biological experiments involving separation and culture techniques and interpret the results</li> <li>5. Understand the data involved in biotechnological applications and analysed sequences. Compare the various biological databases and use it to analyse sequences.</li> </ol>
<b>BT211</b>	<b>Microbiology</b>	<ol style="list-style-type: none"> <li>1. Identify various types of microorganisms and recognize the role of microorganisms in human welfare and in causing diseases.</li> </ol>



		<ol style="list-style-type: none"> <li>2. Examine the given clinical/non-clinical sample by isolation, culture and identification</li> <li>3. Compare the conventional methods of classification of microorganisms and assess the modern techniques used for the process</li> <li>4. Categorize the microorganisms on the basis of types of cells and mode of nutrition</li> <li>5. Delineate elaborately about chemotherapeutic agents, their mode of action and cellular and molecular level.</li> </ol>
<b>BT212</b>	<b>Biochemistry</b>	<ol style="list-style-type: none"> <li>1. Summarise metabolism as a whole and relate it with food habits.</li> <li>2. Identify the flow of energy in the formation of food during photosynthesis and its utilization during metabolism.</li> <li>3. Discover the motive of metabolism as the energy needs of an individual.</li> <li>4. Assess metabolism as a pool of catabolic and anabolic chemical reactions.</li> <li>5. Integrate and hypothesize the various aspects of the biochemistry of metabolism and thereby be ready to design and propose creative ideas out of these</li> </ol>
<b>INT211</b>	<b>Internship</b>	<ol style="list-style-type: none"> <li>1. Gain exposure to a higher order industry/research set up</li> <li>2. Experience working in a commercial/industrial/research set up</li> <li>3. Acquire practical skills and improve their employability</li> <li>4. Formulate and execute future plan for employment or entrepreneurship.</li> <li>5. Experience of preparing comprehensive report on the things learnt and knowledge gained</li> </ol>
<b>BT221</b>	<b>Immunology</b>	<ol style="list-style-type: none"> <li>1. Recognize the main stay of human defensive tools</li> <li>2. Describe the chemistry of antibody structure. Differentiate the different classes of antibodies and illustrate the theory behind antibody diversity.</li> <li>3. Identify the antigen types and determinants and explain the processing and presentation of antigen by body's immune system</li> <li>4. Identify the various immunological disorders and explain their mechanism</li> <li>5. Examine the presence of antibodies/antigens by various immunological technique viz., radial immunodiffusion, dotELISA, Sandwich ELISA; illustrate the procedure and principle of hybridoma technology</li> </ol>

<b>BT222</b>	<b>Cell and Molecular Biology</b>	<ol style="list-style-type: none"> <li>1. Understand the organization and functional aspects of Prokaryotes and Eukaryotes Cell and Cell Organelles</li> <li>2. Explain the molecular events involved in cell division.</li> <li>3. Understand and differentiate between the basic molecular processes and its controlling mechanism in Prokaryotes and eukaryotes</li> <li>4. Foster an understanding of key concepts in cell and molecular biology, thereby relating these concepts in daily lives, through analysis of problems, experiment and tutorial discussion.</li> <li>5. Assess the application of molecular biology in modern world</li> </ol>
<b>BT223</b>	<b>Dept elective A Medical Biotechnology</b>	<ol style="list-style-type: none"> <li>1. Describe the scope and application of medical Biotechnology</li> <li>2. Explain the mode of action of antibiotics and antivirals</li> <li>3. Identify the basics of various cell-based and DNA diagnostics and assess when to use these methods</li> <li>4. Justify and assess the need of quality management in various test procedures</li> <li>5. Perform basic experiments in cell, blood and nucleic acid as clinical sample.</li> </ol>
<b>BT223</b>	<b>Dept elective B: Functional Genomics</b>	<ol style="list-style-type: none"> <li>1. Define and illustrate the various theories of genomics.</li> <li>2. Explain the evolution of genomes.</li> <li>3. Arrange and analyse various features of genomes to understand the functionality of genomic sequences.</li> <li>4. Assess the various types of genomic sequences and judge the utility of sequence data generated</li> <li>5. Compile and organize the genomic data generated and be to reconstruct specific sequences for best possible output with respect to expression of the same</li> </ol>
<b>BT224</b>	<b>Process Engineering</b>	<ol style="list-style-type: none"> <li>1. Explain bioprocess; understand the need, utility and challenges of bioprocesses in product formation.</li> <li>2. Perform basic engineering calculations and recall the concepts of physical variables, dimensions and units.</li> <li>3. Explain the basic mechanisms of involved in process engineering viz., material and energy balances, fluid flow and mixing, heat and mass transfer.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Apply the basic mechanisms in simple bioprocesses and solve problems involved in designing a bioprocess.</li> <li>5. Determine culture development and growth by analysing reaction kinetics in cell growth and death</li> </ol>
<b>BT311</b>	<b>Genetic Engineering</b>	<ol style="list-style-type: none"> <li>1. Describe the tools of genetic engineering including genetic analysing and editing</li> <li>2. Explain the methods of gene transfer</li> <li>3. Explain the preparation of molecular probes and assess their application as genetic engineering tools</li> <li>4. Perform experiments to systematically understand the approach to recombinant cells</li> <li>5. Analysis of the data obtained from various genetic engineering experiments</li> </ol>
<b>BT312</b>	<b>Plant and Animal Biotechnology</b>	<ol style="list-style-type: none"> <li>1. Define plant biotechnology and compare the classical and modern approach towards genetic transformation in plants</li> <li>2. Describe the background, advantage and application of animal tissue culture</li> <li>3. Illustrate the various process of producing transgenic plants and animals.</li> <li>4. Perform experiments to isolate plant genetic material and to analyse it</li> <li>5. Perform experiments for culture, sub culture and maintenance of mammalian cells</li> </ol>
<b>BT313</b>	<b>Enzyme technology</b>	<ol style="list-style-type: none"> <li>1. Define enzyme technology, classify and name them</li> <li>2. Describe the composition, role and application of enzymes</li> <li>3. Understand chemical kinetics and apply it in simple problems involving enzymatic reactions</li> <li>4. Perform experiments to immobilize enzymes and understand its kinetics</li> <li>5. Apply techniques of purification of enzymes, enzymes assays and inhibitors on enzyme activity.</li> </ol>
<b>BT314</b>	<b>Dept elective I A: Nanobiotechnology</b>	<ol style="list-style-type: none"> <li>1. Understand the basic concept of nanoscience and nanotechnology.</li> <li>2. Explain the structure -function relationship of cellular nanostructures.</li> <li>3. Describe the characterization techniques of nanomaterials and apply them for their assessment</li> </ol>

		<ol style="list-style-type: none"> <li>4. Illustrate the structure, function and applications of various form of nanomaterials</li> <li>5. Analyse the data obtained from various characterization techniques.</li> </ol>
<b>BT314</b>	<b>Dept elective I B: Cancer Biology</b>	<ol style="list-style-type: none"> <li>1. Understand the process of cancer development and prevention</li> <li>2. Understand the cancer diagnostic methodologies</li> <li>3. Describe the cancer-causing agents</li> <li>4. Understand the laboratory techniques in cancer biology</li> <li>5. Learn cancer drug development methods</li> </ol>
<b>INT311</b>	<b>Internship</b>	<ol style="list-style-type: none"> <li>1. Gain exposure to a higher order industry/research set up</li> <li>2. Experience working in a commercial/industrial/research set up</li> <li>3. Acquire practical skills and improve their employability</li> <li>4. Formulate and execute future plan for employment or entrepreneurship.</li> <li>5. Prepare a comprehensive report on the things learnt and knowledge gained</li> </ol>
<b>BT321</b>	<b>Fermentation Technology</b>	<ol style="list-style-type: none"> <li>1. Describe the process and applications of fermentation technology</li> <li>2. Compare between batch, continuous and fed batch cultures</li> <li>3. Identify the type of media and conditions to be used for the fermentation process</li> <li>4. Demonstrate the parts of a bioreactor, Design. Sterilization. Instrumentation</li> <li>5. Assess the technique to be used for downstream processing</li> </ol>
<b>BT322</b>	<b>Natural product chemistry</b>	<ol style="list-style-type: none"> <li>1. Identify the different classes of natural products</li> <li>2. Describe the process of biosynthesis of various natural products from plants</li> <li>3. Understand the different approaches of drug designing</li> <li>4. Explore different methods for isolation and characterization of natural products</li> <li>5. Analyse the plant derived natural products by various techniques.</li> </ol>
<b>BT323</b>	<b>Environmental Biotechnology</b>	<ol style="list-style-type: none"> <li>1. Understand the impact of human activities on the environment.</li> <li>2. Identify the different types of wastes and compare the different strategies involved in waste management as per the type of waste.</li> <li>3. Explore the role of biotechnological tools in the improvement of environmental factors.</li> <li>4. Integrate the practices of management of different types of waste with the modern technologies.</li> <li>5. Design innovative ideas for waste management.</li> </ol>

<b>BT 324</b>	<b>Dept elective II A: Metabolomics</b>	<ol style="list-style-type: none"> <li>1. Define metabolomics and distinguish the various aspects associated</li> <li>2. Classify and apply technologies in metabolomics</li> <li>3. Run different software related to the subject and analyze the results.</li> <li>4. Argue on various pathways and processes and assess the use of them in generating productivity and utility.</li> <li>5. Choose from among various resource software and various techniques to combine and rearrange them in combinations to put forth probable solutions in metabolomics.</li> </ol>
<b>BT 324</b>	<b>Dept elective II B: Food Biotechnology</b>	<ol style="list-style-type: none"> <li>1. Develop necessary skills to preserve, process and make value added products from the produce of North eastern region</li> <li>2. Understand the basics and importance of food safety laws and regulation</li> <li>3. Maintain and ensure quality, safety and hygiene level of processed food.</li> <li>4. Develop skills that will be able to support the food processing sector including producers, processors till the end consumers.</li> <li>5. Use the tools of biotechnology in the food production and preservation sector</li> </ol>
<b>BT411</b>	<b>Protein engineering</b>	<ol style="list-style-type: none"> <li>1. Identify the basic properties that can be used for protein manipulations.</li> <li>2. Extrapolate methods to measure protein stability parameters</li> <li>3. Classify and generalize the forces stabilizing proteins for their application and utility.</li> <li>4. Distinguish protein characteristics for their isolation and purification</li> <li>5. Appraise all above understandings to develop models for various protein studies.</li> </ol>
<b>BT 412</b>	<b>Dept elective III A: Bioreactor Design and analysis</b>	<ol style="list-style-type: none"> <li>1. Apply the knowledge of reaction kinetics to understand the basics of reactor design.</li> <li>2. Identify reaction kinetics principles and formulate problems in biochemical reaction engineering and find appropriate solutions</li> <li>3. Design and scaling up of bioreactor</li> <li>4. Explain about metabolite production in large scale bioreactor</li> <li>5. Ability to use modern engineering tools, including prediction and modelling to different bioreactor</li> </ol>

<b>BT 412</b>	<b>Dept elective III B: Biostatistics</b>	<ol style="list-style-type: none"> <li>1. Define data and distribution and their types and present it as graph or table, according to the statistical problem to be addressed.</li> <li>2. Distinguish and compare the different tests of significance and their application in biological research problems.</li> <li>3. Form hypothesis and test the same using the statistical tools available.</li> <li>4. Interpret the results obtained after performing statistical tests</li> <li>5. Use of statistical tools in any problem statement</li> </ol>
<b>BT413</b>	<b>Project part-I</b>	<ol style="list-style-type: none"> <li>1. Identify and formulate a research problem.</li> <li>2. Compile relevant literature and form a hypothesis.</li> <li>3. Plan a design for the research work.</li> <li>4. Examine, analyse and interpret the data from the results obtained.</li> <li>5. Compile the results, and prepare a logically coherent scientific project report.</li> </ol>
<b>BT414</b>	<b>Industry/Institute Visit</b>	<ol style="list-style-type: none"> <li>1. Gain insight into the working culture and ethos of the organisation.</li> <li>2. Comprehend how technical know-how is executed in a cumulative manner to complete a process and obtain the result either in the form of a product or as research finding.</li> <li>3. Associate the different factors that attribute to the successful management of large organisations.</li> <li>4. Use and polish their soft skills as well as their networking skills while interacting with the experts in research/academia/industry.</li> <li>5. Prepare a comprehensive report comprising of all details of the visit including the knowledge gained.</li> </ol>
<b>BT415</b>	<b>Open elective II (Instrumentation)</b>	<ol style="list-style-type: none"> <li>1. Explain the principle of various instruments used in biotechnology.</li> <li>2. Explain the design of various equipment used in biotechnology.</li> <li>3. Understand the functions of components used in designing the equipment.</li> <li>4. Perform experiments using these equipment</li> <li>5. Analyse the data obtained from performed experiment.</li> </ol>
<b>INT411</b>	<b>Internship</b>	<ol style="list-style-type: none"> <li>1. Gain exposure to a higher order industry/research set up.</li> <li>2. Experience working in a commercial/industrial/research set up.</li> <li>3. Acquire practical skills and improve their employability.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Formulate and execute future plan for employment or entrepreneurship.</li> <li>5. Prepare a comprehensive report on the things learnt and knowledge gained.</li> </ol>
<b>BT421</b>	<b>Project part-II</b>	<ol style="list-style-type: none"> <li>1. Identify and formulate a research problem.</li> <li>2. Compile relevant literature and form a hypothesis.</li> <li>3. Plan a design for the research work.</li> <li>4. Examine, analyse and interpret the data from the results obtained.</li> <li>5. Compile the results, and prepare a logically coherent scientific project report.</li> </ol>
<b>BT422</b>	<b>Seminar presentation</b>	<ol style="list-style-type: none"> <li>1. Perform extensive literature survey on the topics given.</li> <li>2. Explain and express the scientific content.</li> <li>3. Point out and critically examine the features.</li> <li>4. Develop soft skill.</li> <li>5. Defend and justify the research problem given as seminar topic</li> </ol>
<b>BT423</b>	<b>Dept elective A: IPR</b>	<ol style="list-style-type: none"> <li>1. Understand the importance of intellectual property right (IPR) and bioethics</li> <li>2. State the national and international regulations formulated for research in different area of Biotechnology</li> <li>3. Differentiate between patentable and nonpatentable inventions.</li> <li>4. Establish the intellectual property right of any material</li> <li>5. Assess the risk of products derived from recombinant DNA technology</li> </ol>
<b>BT423</b>	<b>Dept elective A: Bioethics</b>	<ol style="list-style-type: none"> <li>1. Define the concepts of ethics and law.</li> <li>2. Describe the principle of bioethics.</li> <li>3. Justify practical situation relating to bioethics.</li> <li>4. Explain the biosafety issues to be followed in biotechnology.</li> <li>5. Identify various regulatory authorities governing the biosafety aspects of genetically modified organisms</li> </ol>
<b>BT424</b>	<b>Open elective (Bioinformatics)</b>	<ol style="list-style-type: none"> <li>1. Understand the basic of Computer use through different programme, major bioinformatics resources and biological databases, basic concepts in biological sequence analysis, structural bioinformatics and molecular modelling.</li> <li>2. Devise appropriate Computational/bioinformatics strategies for solving biological problems and interpretation of results.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Understand the analytical tools to construct and interpret phylogenetic trees for different evolutionary processes that shape biodiversity.</li> <li>4. Analyse molecular data and understand the evolutionary diversification of gene/protein families.</li> <li>5. Understand fundamental ideas in computational and systems biology involving genome analysis, mass spectrometry. protein structure prediction, protein-protein docking/interaction.</li> </ol>
<b>BT425</b>	<b>Open elective (Biosensor and Bioelectronics)</b>	<ol style="list-style-type: none"> <li>1. Applications of various sensors and transducers available for physiological and cellular measurements.</li> <li>2. Analyze fundamental biosensing and transduction principles.</li> <li>3. Illustrate various types of transducers.</li> <li>4. Summarize biosensors, commercial uses and market status.</li> <li>5. Evaluate other bioelectronics devices like biofuel cell, especially enzymatic and microbial fuel cell and their basic working principle and application.</li> </ol>
<b>Department:</b>	<b>Department of Bioengineering and Technology</b>	
<b>Programme:</b>	<b>M.Tech Biotechnology</b>	
<b>PSOs</b>	<p><b>PSO1.</b> Acquire indepth understanding of the fundamentals of biotechnology and get equipped to apply the same in their career of research or in industry.</p> <p><b>PSO2.</b> Development of scientific and ethical reasoning while practising the combination and restructuring of genetic modulations, protein interaction, drug efficacy solutions.</p> <p><b>PSO3</b> Conduct research using defined research methodology including design of experiment, analysis and interpretation of data to provide valid conclusion</p> <p><b>PSO4.</b> Development of the ability to practice the high end-technologies as skills to analyse and solve complex real-life problems and meet demands of industry and academia.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
<b>BET 1014</b>	<b>Microbial &amp; Immunotechnology</b>	<p>CO1. Recognize the scopes of microbial biotechnology in fields like agriculture, human therapeutics etc.</p> <p>CO2. Understand the importance of non-culturable bacteria and various approaches involved in assessing such microorganisms.</p>



		<p>CO3. Explain the general principle behind development of chemotherapy.</p> <p>CO4. Explain clinical immunology pertaining to the way body become immune to microbial infection.</p> <p>CO5. Illustrate various advanced immune-techniques.</p>
<b>BET 1024</b>	<b>Genetic Engineering</b>	<p>CO1 Describe, distinguish and explain the basics of the techniques involved in the engineering of genes</p> <p>CO2 Select and judge the various methods of production and maintenance of gene carriers.</p> <p>CO3 Subdivide and separate the systems and techniques of gene expression to infer and point out the best.</p> <p>CO4 Measure and assess the gene manipulation technologies with respect to their use.</p> <p>CO5 Hypothesize and prescribe the various applications of genetic engineering.</p>
<b>BET 1034</b>	<b>Protein Engineering</b>	<p>CO1 Identify the basic properties that can be used for protein manipulations.</p> <p>CO2 Extrapolate methods to measure protein stability parameters.</p> <p>CO3 Classify and generalize the forces stabilizing proteins for their application and utility.</p> <p>CO4 Distinguish protein characteristics for their isolation and purification.</p> <p>CO5 Appraise all above understandings to develop models for various protein studies.</p>
<b>BET 1044</b>	<b>Molecular Diagnostic (Department Elective 1)</b>	<p>CO1 Understand the molecular mechanism of disease</p> <p>CO2 Understand the assays for diagnosis of infectious disease</p> <p>CO3 Learn the techniques of molecular diagnosis</p> <p>CO4 Understand cytogenetics and biochemical diagnostics</p> <p>CO5 Understand molecular biology in forensic applications</p>
<b>BT1044</b>	<b>Virology (Department Elective 1)</b>	<p>CO1 Understand the division of various virus based on their genetic organization, the various aspects taxonomy and diversity of Viruses.</p> <p>CO2 Understand the replication of viruses, bacteriophages, cultivation of viruses,</p> <p>CO3 Analyse the diagnosis of different virus of human, animal, plant and poultry origin.</p>

		<p>CO4 Understand the major diseases causing virus in human and plants and their control by used of anti-viral treatment.</p> <p>CO5 Understand Virus as a cancer-causing organism with special reference to different type of widely prevalent cancer in India and Northeast India in particular.</p>
<b>BET 1055</b>	<b>Biotechnology Lab I</b>	<p>CO1: Demonstrate various skills/tools used in bioinformatics</p> <p>CO2: Perform different types of separation, purification steps in Protein Engineering.</p> <p>CO3: Explain working principle of instrumental techniques.</p> <p>CO4: Separate proteins after recovery.</p> <p>CO5 Analyse and interpolate data starting from PCR primer designing to structure predictions.</p>
<b>BET 1063</b>	<b>Plant molecular farming</b>	<p>CO1 Explain the foreign protein expression using plant cell suspension</p> <p>CO2 Differentiate between foreign protein expression using plant cell suspension and cultures</p> <p>CO3 Identify method that can be used for recombinant protein production using monocot expression systems</p> <p>CO4 Summarize the methods used for production of pharmaceutical proteins in plants</p> <p>CO5 Explain expression strategies for molecular farming</p>
<b>BET 2074</b>	<b>Biochemical engineering &amp; Fermentation Technology</b>	<p>CO1 Describe and compare traditional and modern bioprocess system.</p> <p>CO2 Determine the proportions in which compounds react with each other and thereby understand thermodynamics of microbial growth.</p> <p>CO3 Compare the phases of cell growth in various cultural conditions</p> <p>CO4 Explain kinetics of microbial growth</p> <p>CO5 Formulate fermentation media for lactic acid antibiotic fermentation along with strain improvement techniques.</p>

<b>BET 2084</b>	<b>Food Science and Technology</b>	<p>CO1 Enumerate the constituents of food – contributing to texture, flavour and organoleptic properties of food.</p> <p>CO2 Describe various steps involve in upstream and downstream processing o foods</p> <p>CO3 Categorize the sources and activity of microorganisms associated with food.</p> <p>CO4 Illustrate and design the various food preservation techniques</p> <p>CO5 Perform the manufacturing of various foods and beverages.</p>
<b>BET 2094</b>	<b>Omics and Tissue Engineering</b>	<p>CO1 Understand the key concepts in molecular and cell biology and genetics including evolution, relationship between structure and function, energy and regulation, interrelatedness of life, and the nature of science.</p> <p>CO2 Understand the scope of proteomics, potential applications, using high throughput techniques for different application.</p> <p>CO3 Understand the scope of analytical techniques in metabolomics for the analyses of Metabolome of different products from Plant and animal origin</p> <p>CO4 Describe the concept of cells to form polymeric scaffolds and stem cells biology for use in tissue engineering.</p> <p>CO5 Understand the fundamental concepts of tissue architecture for tissue engineering and ethical concern of tissue engineering.</p>
<b>BET 2104</b>	<b>Bioprospecting (Department Elective 2)</b>	<p>CO1 Differentiate traditional and modern bioprospecting methods</p> <p>CO2 Analyse the characteristics of culture dependent and independent microbes</p> <p>CO3 Map the microbial diversity</p> <p>CO4 Apply the methods for screening the bioactivity</p> <p>CO5 Explain the convention on biological diversity</p>
<b>BET 2104</b>	<b>Molecular Oncology (Department Elective 2)</b>	<p>CO1 Understand the basic concept of cancer</p> <p>CO2 Understand the molecular mechanisms of carcinogenesis</p> <p>CO3 Learn the checkpoints in cell cycle</p>

		<p>CO4 Learn cancer critical genes</p> <p>CO5 Understand genetic alterations and repair mechanisms</p>
<b>BET 2114</b>	<b>Biotechnology Lab II</b>	<p>CO1 Understand the principles of each experiment performed.</p> <p>CO2 Determine the nutritional and chemical components in food.</p> <p>CO3 Acquire the skill to perform various steps involved in downstream processing.</p> <p>CO4 Apply culture techniques to produce various microbial products.</p> <p>CO5 Quantitate cellular biomolecules.</p>
<b>BET2125</b>	<b>Pharmaceutical Biotechnology</b>	<p>CO1 List, compare and examine various biopharmaceutical products</p> <p>CO2 Explain various biopharmaceutical products used in drug industry are produced using biotechnological tools</p> <p>CO3 Examine the possibilities for production of different secondary metabolites using different sources for commercial utility.</p> <p>CO4 Summarize the role of Computer Aided drug design used to produce drugs</p> <p>CO5 Utilize and develop strategies for clinical research</p>
<b>BET 2131</b>	<b>Industry/Research Institute visit</b>	<p>CO1 Gain insight into the working culture and ethos of the organisation.</p> <p>CO2 Comprehend how technical know-how is executed in a cumulative manner to complete a process and obtain the result either in the form of a product or as research finding.</p> <p>CO3 Associate the different factors that attribute to the successful management of large organisations.</p> <p>CO4 Use and polish their soft skills as well as their networking skills while interacting with the experts in research/academia/industry.</p> <p>CO5 Prepare a comprehensive report comprising of all details of the visit including the knowledge gained.</p>
<b>BET 3146</b>	<b>Bioethics and Intellectual Property Rights (Open)</b>	<p>CO1 Define the issues that need addressal when working in the realm of Biotechnology</p> <p>CO2 Describe the principle of bioethics.</p> <p>CO3 Explain the biosafety issues to be followed in biotechnology.</p>

		<p>CO4 Identify various regulatory authorities governing the biosafety aspects of genetically modified organisms.</p> <p>CO5 Understand the importance of intellectual property right (IPR) and bioethics</p> <p>CO6 Learn the process and need of filing patents and establish the intellectual property right of any material</p>
<b>BET 31525</b>	<b>Project work, progress Seminar, Assignment</b>	<p>CO1 Define a research problem and formulate a hypothesis</p> <p>CO2 Perform literature survey and; compare and compile the data</p> <p>CO3 Use the acquired technical and analytical skills in dealing with the research problem</p> <p>CO4 Develop soft skills and art of presentation on a research topic</p> <p>CO5 Compile and organize given data/information in the form a comprehensive report.</p>
<b>BET 4166</b>	<b>Open- Health &amp; Hygiene</b>	<p>CO1 Identify and recognize the importance of general health and hygiene.</p> <p>CO2 Discuss and associate the basic interactions with environment and resultant health issues.</p> <p>CO3 Choose specific diseases and show the need to understand their development pattern</p> <p>CO4 Breakdown the various steps and hygiene practices to better analyse the interdependence of health and hygiene</p> <p>CO5 Measure the application of vaccines, abuse of drugs and alcohol and summarise and justify the various of our social behaviour to evaluate health vis a vis hygiene</p>
<b>BET 41725</b>	<b>Project work, progress Seminar, Assignment</b>	<p>CO1 Refine the research problem</p> <p>CO2 Perform literature survey and; compare and compile the data</p> <p>CO3 Use the acquired technical and analytical skills in dealing with the research problem</p> <p>CO4 Develop soft skills and art of presentation on a research topic</p> <p>CO5 Compile and organize given data/information in the form of a comprehensive report.</p>

<b>Department:</b>	<b>Department of Geology</b>	
<b>Programme:</b>	<b>M.Sc. in Geology</b>	
<b>PSOs</b>	<ul style="list-style-type: none"> <li>• Demonstrate sound knowledge of petrological processes that operates in the lithosphere.</li> <li>• Design a systematic approach for resource (hydrocarbon, minerals) and ground water exploration and the precautions in heavy engineering constructions (dam, tunnel, nuclear power plant, road etc).</li> <li>• Generate an understanding in earth's surface process and the linkages between interdisciplinary components of earth systems sciences; the key environmental issues; identifying and interpreting fossil assemblage; application of the techniques of Geoinformatics.</li> <li>• Develop skills in creative and critical thinking, analytical methods and integration of knowledge in interdisciplinary components and will be able to formulate a scientific problem and strategies to solve it.</li> </ul>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
GLG-1016	Group-A: Structural Geology Group-B: Seismology	<ol style="list-style-type: none"> <li>1. Identify basic structural elements and able to interpret the complex geometry in a repeatedly activated crustal terrain.</li> <li>2. Distinguish the deformation structures within rocks from mesoscopic to microscopic scale.</li> <li>3. Interpret importance of structures and their developments which are directly related with the formation of ore and hydrocarbon deposits within the earth crust.</li> <li>4. Interpret seismic waves and crustal velocity structures.</li> <li>5. Make lithological and structural maps of a terrain and correlate with available deformation sequence obtained from physical and microstructural analyses.</li> </ol>
GLG-1026	Group-A: Mineralogy & Crystal Chemistry Group-B: Thermodynamics in Geology	<ol style="list-style-type: none"> <li>1. Discuss solid solution chemistry, exolution and structural inversion of important rock forming minerals.</li> <li>2. Analyse importance of ionic radii, coordination number and Pauling rule and bonding in crystals.</li> <li>3. Illustrate transformation processes in minerals, viz. exolution, transient phase in exolution and structural transformations (polymorphism).</li> <li>4. Describe role of fundamental thermodynamic equation, laws of thermodynamics in geological processes.</li> <li>5. Explain P-T-X dependence of Gibbs free energy and Clausius-Clapeyron equation in determining slope of a mineral reaction.</li> </ol>
GLG-1036	Group-A: Geoinformatics Group-B: Geomorphology & Quaternary Geology	<ol style="list-style-type: none"> <li>1. Explain the techniques of mapping using GPS and GIS.</li> <li>2. Apply the techniques of digital image processing and GIS in solving processes that operate on the surface of the earth.</li> <li>3. Define the earth's surface process and the form -process relationship.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Outline the linkages between the interdisciplinary components of earth systems science and the Quaternary geological history and associated issues of concern (like climate change, active tectonics. Various tectonic forcing on climate and the consequent changes).</li> <li>5. Develop knowledge on the thick repository of Quaternary sediments and their stratigraphic framework in NE India.</li> </ol>
GLG-1044	Group-A: Structural Geology Group-B: Seismology	<ol style="list-style-type: none"> <li>1. Prepare geological map after extensive field work and interpret structures from an available geological map.</li> <li>2. Utilize planar and linear fabric elements within stereo net to solve complex structural problems in a reactivated geological terrain.</li> <li>3. Identify seismic waves in seismograms during pre-, syn- and post-seismic activities.</li> <li>4. Determine earthquake related parameters and carry out fault plane solution.</li> <li>5. Interpret paleoseismological data.</li> </ol>
GLG-1052	Mineralogy (Practical)	<ol style="list-style-type: none"> <li>1. Identify physical characteristics of minerals in hand specimens.</li> <li>2. Distinguish optical characteristics of minerals in thin section</li> <li>3. Prepare samples for XRD analysis.</li> <li>4. Interpret X-Ray diffractograms.</li> <li>5. Identify unknown minerals in powdered form from their diffractogram</li> </ol>
GLG-1064	Group-A: Geoinformatics Group-B: Geomorphology & Quaternary Geology	<ol style="list-style-type: none"> <li>1. Classify satellite images using various techniques.</li> <li>2. Utilize vector data from various sources for digitization in GIS</li> <li>3. Illustrate spatial analysis in GIS</li> <li>4. Identify landforms, geological and geomorphic features.</li> <li>5. Develop the relation between landform and their controlling factors, drainage behaviour, discharge hydrograph, morphometric parameters, Quaternary chronology and tectonics using topographic analysis</li> </ol>
GLG-1072	Field Mapping (Fieldwork)	<ol style="list-style-type: none"> <li>1. Outline basic ideas for Geological field work.</li> <li>2. Identify rocks and minerals</li> <li>3. Indicate geomorphological and structural correlation.</li> <li>4. Make structural and lithological maps.</li> <li>5. Develop tectonics from structural geology</li> </ol>
GLG-2016	Group-A: Hydrogeology Group-B: Climatology and Oceanography	<ol style="list-style-type: none"> <li>1. Interpret hydrological cycles and occurrence of groundwater in aquifers.</li> <li>2. Explain Darcy's law and its validity and limitations</li> <li>3. Analyze movement of groundwater through various rocks.</li> <li>4. Discuss different types and factors of groundwater fluctuation.</li> <li>5. Describe the energy budget, the latitudinal and altitudinal thermal gradients, the pressure belts and wind system, monsoon phenomena, storms, cloud and precipitation, the mechanism of formation of the surface ocean currents , thermohaline circulation, subtropic gyres, El-Nino phenomena.</li> </ol>
GLG-2026	Group-A: Igneous Petrology Group-B: Metamorphic Petrology	<ol style="list-style-type: none"> <li>1. Discuss the process of generation of magma in the crust and mantle and correlate it with the global tectonic processes.</li> <li>2. Apply the principles of phase equilibria in studying igneous systems.</li> <li>3. Describe metamorphic processes and role of structures and textures in the</li> </ol>

		<p>identification of poly-deformational and poly- metamorphic rocks.</p> <ol style="list-style-type: none"> <li>Identify spatial mineral reactions in reconstructing PTt path of metamorphism.</li> <li>Explain types of mineral reaction and their application in geothermobarometry and petrogenetic grid.</li> </ol>
GLG-2035	Group-A: Geochemistry and Isotope Geology Group-B: Application of Statistics in Geology	<ol style="list-style-type: none"> <li>Interpret abundance of elements in the interior of the earth.</li> <li>Apply appropriate techniques for determining abundance of major, trace and rare earth elements in rocks.</li> <li>Describe the application of radiogenic isotopes in geochronology.</li> <li>Interpret the processes of fractionation of stable isotopes and their application.</li> <li>Use statistical methods in solving geological problems.</li> </ol>
GLG-2042	Engineering Geology (Theory)	<ol style="list-style-type: none"> <li>Determine engineering properties of soil and rocks.</li> <li>Interpret geological structures and their role in stability of large engineering structures.</li> <li>Assess groundwater condition and its effect in stability rock masses.</li> <li>Apply your knowledge in geology to suggest suitable techniques of blasting and improvement of rock mass properties.</li> <li>Organize geotechnical investigation in selecting sites of large engineering structures like tunnel, dam etc.</li> </ol>
GLG-2052	Hydrogeology	<ol style="list-style-type: none"> <li>Analyze rainfall data and well hydrographs.</li> <li>Interpret geological maps and satellite imagery for groundwater prospect evaluation.</li> <li>Estimate groundwater reserves.</li> <li>Compute aquifer and well characteristics from aquifer tests and Step Draw Down tests.</li> <li>Prepare hydrogeological and related maps</li> </ol>
GLG-2064	Group-A: Igneous Petrology Group-B: Metamorphic Petrology	<ol style="list-style-type: none"> <li>Identify igneous rocks in thin sections and hand specimens and interpret textures and structures.</li> <li>Interpret variation diagrams.</li> <li>Identify metamorphic rocks in thin sections and hand specimens</li> <li>Interpret metamorphic mineral assemblages, textures and structures.</li> <li>Estimate geothermo-barometric calculations from mineral chemistry data.</li> </ol>
GLG-2073	Group-A: Geochemistry and Isotope Geology Group-B: Application of Statistics in Geology	<ol style="list-style-type: none"> <li>Calculate mineral formula from EPMA data.</li> <li>Estimate norms from major oxide data and classify metamorphic rocks.</li> <li>Apply tectonic discrimination diagrams based on major, minor and trace elements.</li> <li>Calculate correlation-regression analysis, factor and principal component analysis using computer.</li> <li>Analyze flood frequency using Gumbel and Log-Pearson Type-III distributions.</li> </ol>
GLG-2082	Engineering Geology (Practical)	<ol style="list-style-type: none"> <li>Estimate specific gravity and consistency limits of soil</li> <li>Determine shear strength parameters of rocks and soils.</li> <li>Calculate Poisson ration, modulus of elasticity and Point Load Index and uniaxial compressive strength of rocks.</li> <li>Compute numerical and graphical analysis of stability problems.</li> <li>Determine RQD and RMR</li> </ol>



GLG-3016	Group-A: Economic Geology – Genesis Group-B: Economic Geology – Indian deposits Group-C: Exploration and Mining	<ol style="list-style-type: none"> <li>1. Interpret structural and textural features of ores.</li> <li>2. Analyze critically genesis of hydrothermal, magmatic, volcanogenic, submarine exhalative, metasomatic and pegmatitic ore deposits.</li> <li>3. Describe the techniques of geothermometry and geobarometry and their application in ore geology.</li> <li>4. Explain distribution and genesis of ore deposits in India, major ore and none metallic deposits of Northeast India.</li> <li>5. Assess the applicability of different geophysical, geochemical and radioactive techniques in exploration of mineral deposits and various mining methods in different geological conditions.</li> </ol>
GLG-3024	Group-A: Sedimentology Group-B: Surveying and Mapping	<ol style="list-style-type: none"> <li>1. Interpret textures and structures of sedimentary rocks.</li> <li>2. Analyze and classify the physical and chemical parameters of sedimentary and diagenetic environments and sedimentary rocks genetically.</li> <li>3. Interrelate sedimentation with tectonics and classify sedimentary basins.</li> <li>4. Describe various methods of surveying and their advantages and disadvantages.</li> <li>5. Formulate a method of geological mapping in an unknown terrain.</li> </ol>
GLG-3036	Stratigraphy	<ol style="list-style-type: none"> <li>1. Assess the existing knowledge, concepts, techniques, and methodology appropriate for classification and correlation of stratigraphic units.</li> <li>2. Identify and model sedimentary facies based on available information.</li> <li>3. Describe the stratigraphic horizons from different parts of India- Precambrian to Recent.</li> <li>4. Identify the sedimentary basins of India and analyze basin configurations, sedimentation history and paleoclimate therein.</li> <li>5. Develop an understanding of the tectonosedimentary framework and evolution of the sedimentary basins of the Northeast India and classification and correlation of the sedimentary sequences.</li> </ol>
GLG-3044	Group-A: Economic Geology Group-B: Sedimentology	<ol style="list-style-type: none"> <li>1. Identify the textures and structures of ore minerals in polished blocks under microscope and in hand specimen.</li> <li>2. Identify industrial minerals for different mineral-based industries.</li> <li>3. Study different sedimentary rocks in thin sections and textural analysis in hand specimen.</li> <li>4. Isolate and identify heavy minerals.</li> <li>5. Prepare facies maps and fence diagrams from bore-hole data.</li> </ol>
GLG-3052	Group-A: Stratigraphy Group-B: Surveying and Mapping	<ol style="list-style-type: none"> <li>1. Identify rocks of different stratigraphic horizons of India.</li> <li>2. Prepare and interpret geological maps.</li> <li>3. Use of theodolite and total station for close and open traverse surveying.</li> <li>4. Utilize GPS for topographical survey.</li> <li>5. Create contour from DEM</li> </ol>
GLG-3062	Fieldwork#	<ol style="list-style-type: none"> <li>1. Outline the field work</li> <li>2. Identify required rocks in the field</li> <li>3. Select rock samples from field</li> <li>4. Organize geological mapping in an unknown geological terrain</li> <li>5. Generate geological map.</li> </ol>

GLG-3073	Open Course-1: Geodynamics	<ol style="list-style-type: none"> <li>1. Describe the theories of formation of continents, ocean basins and mountains.</li> <li>2. Analyze the role of plate tectonics in evolution of Himalaya.</li> <li>3. Explain the broad overview of the tectonic divisions of India.</li> <li>4. Discuss the evolution of the Himalayas and Himalayan tectonics</li> <li>5. Express the key aspects of the IMMB.</li> </ol>
GLG-3083	Open Course-2: Planetary Geology	<ol style="list-style-type: none"> <li>1. Infer basic understanding on evolution of the solar system,</li> <li>2. Explain the formation of the sun and the planets</li> <li>3. Classify of meteorites.</li> <li>4. Demonstrate a understanding of primitive and differentiated meteorites</li> <li>5. Demonstrate and understanding of planetary remote sensing.</li> </ol>
GLG-4014	Palaeontology	<ol style="list-style-type: none"> <li>1. Classify foraminifers in sedimentary rocks as per the taxonomy</li> <li>2. Interpret the significance of foraminifers in geological studies and hydrocarbon explorations.</li> <li>3. Explain evolution of some of vertebrates based on fossil records in the context of changing pattern of paleoclimate and paleoecology.</li> <li>4. Demonstrate deep understanding of the separation techniques and taxonomic identification of palynomorphs from sedimentary rocks and significance of palynological studies.</li> <li>5. Analyze application of Gondwana flora in deciphering paleoclimate of the Permian Period.</li> </ol>
GLG-4026	Fuel Geology Group-A: Coal Group- B: Petroleum	<ol style="list-style-type: none"> <li>1. Analyze coal samples for proximate and ultimate analysis and classify them.</li> <li>2. Carry out petrological study of coal samples under microscope and write about origin of macerals and their applications in hydrocarbon exploration.</li> <li>3. Analyze the properties and assess utilization prospects of Indian coal deposits.</li> <li>4. Assess reservoir properties of sedimentary rocks for petroleum deposits.</li> <li>5. Describe the techniques of exploration and geophysical logging and assess their application.</li> </ol>
GLG-4034	Fuel Geology Group-A: Coal Group- B: Petroleum	<ol style="list-style-type: none"> <li>1. Describe proximate analysis in the laboratory.</li> <li>2. Identify macerals in polished pellets of coal.</li> <li>3. Interpret organic geochemical data for characterizing source rocks.</li> <li>4. Explain geophysical logs.</li> <li>5. Prepare structure contour, isopay and isopach maps and create master logs from well data.</li> </ol>
GLG-4042	Palaeontology	<ol style="list-style-type: none"> <li>1. Distinguish different invertebrate fossil forms.</li> <li>2. Identify plant fossils of Gondwana sequence rocks.</li> <li>3. Identify foraminifera under microscope.</li> <li>4. Identify palynofoms under microscope.</li> <li>5. Assess biostratigraphic zonation based on foraminiferal fossil assemblages.</li> </ol>
GLG-4056	Elective*1 (Mandatory)	<ol style="list-style-type: none"> <li>1. Formulate a research problem from a geological terrain</li> <li>2. Prepare a model to address the research problem.</li> <li>3. Generate information from Lab analysis</li> <li>4. Interpret the information to address the problem.</li> </ol>

		5. Prepare the dissertation.
GLG-4056A	Petroleum Exploration [Theory]	<ol style="list-style-type: none"> <li>1. Identify organic matters in source rocks on the basis of organic geochemical and petrographical data.</li> <li>2. Discuss the techniques of hydrocarbon migration and role of cap rocks and traps.</li> <li>3. Explain the importance of geophysical logs in petroleum exploration.</li> <li>4. Design a model of geophysical exploration for hydrocarbon in an unexplored sedimentary basin.</li> <li>5. Classify sedimentary basins on the basis of tectonics and hydrocarbon potential with special reference to Indian sedimentary basins.</li> </ol>
GLG-4056B	Basin Analysis [Theory]	<ol style="list-style-type: none"> <li>1. Formulate and conduct an integrated study of the sedimentary basins as geodynamic entities.</li> <li>2. Describe the surface and subsurface methods employed for characterizing a sedimentary basin.</li> <li>3. Analyze the role of plate tectonics in formation of a sedimentary basin and functioning of sedimentary routing systems.</li> <li>4. Explain a model of establishment of stratigraphy and thermal history of a sedimentary basin.</li> <li>5. Discuss about application of sequence stratigraphy in drawing tectonic and sedimentation history of a sedimentary basin and its petroleum potential.</li> </ol>
GLG-4056C	Coal and Organic Petrology [Theory]	<ol style="list-style-type: none"> <li>1. Explain the geological basis of evolution of peat swamps and coal deposit through geological time.</li> <li>2. Describe the ICCP schemes of classification of coal macerals and their application hydrocarbon exploration</li> <li>3. Discuss the characterization of utilization prospects of coal deposits.</li> <li>4. Describe the dispersed organic matters present in sedimentary rocks and their thermal evolution.</li> <li>5. Explain about different analytical tools of organic geochemistry and their applications.</li> </ol>
GLG-4056D	Advanced Geoinformatics [Theory]	<ol style="list-style-type: none"> <li>1. Define a digital image and explain the theoretical basis and applications of different image restoration and enhancement methods.</li> <li>2. Discuss the technical aspects and application of RADAR remote sensing.</li> <li>3. Explain the techniques of hyperspectral remote sensing and write about spectral libraries.</li> <li>4. Describe digital photogrammetry and techniques of creation of orthophoto and DEM from stereo satellite images.</li> <li>5. Discuss the techniques of surveying using Differential and RTK GNSS receivers.</li> </ol>
GLG-4056E	Geo-Exploration [Theory]	<ol style="list-style-type: none"> <li>1. Develop understanding of working of seismic method.</li> <li>2. Discuss the electrical methods and their interpretation.</li> <li>3. Explain the theoretical bases of electromagnetic methods of exploration.</li> <li>4. Describe the gravity and magnetic methods</li> <li>5. Apply the geophysical techniques for resources (hydrocarbon, mineral), ground water exploration and heavy engineering construction</li> </ol>
GLG-4056F	Advanced Sedimentology [Theory]	<ol style="list-style-type: none"> <li>1. Discuss about genesis and significance of sedimentary structures.</li> <li>2. Explain about tectonic evolution of sedimentary basins.</li> <li>3. Illustrate the petrographic methods that are used in characterizing clastic sediments.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Discuss the textures, structures and diagenesis of carbonate sediments.</li> <li>5. Describe heavy mineral assemblage of sediments and applications of it in provenance analysis.</li> </ol>
GLG-4056G	Advanced Geochemistry and Thermodynamics [Theory]	<ol style="list-style-type: none"> <li>1. Discuss the geochemical characteristics of noble gas and their importance in studying mantle processes and aquifer systems.</li> <li>2. Illustrate the importance of thermodynamic systems in studying magmatic and metamorphic reactions.</li> <li>3. Discuss the thermodynamic properties of ideal and non-ideal solutions and their role in magmatic and metamorphic reactions.</li> <li>4. Discuss the distribution of trace elements in studying genesis of igneous and metamorphic processes.</li> <li>5. Describe the application of stable isotope geochemistry in studying processes of ore formation.</li> </ol>
GLG-4062A	Elective*1 Petroleum Exploration [Practical]	<ol style="list-style-type: none"> <li>1. Prepare structure contour map</li> <li>2. Determine the location of gas-oil and oil-water contacts.</li> <li>3. Prepare isopach maps and postulate depositional model.</li> <li>4. Point out the characteristics of the organic matters of source rocks based on interpretation of organic geochemical data.</li> <li>5. Interpret 2D seismic sections.</li> </ol>
GLG-4062B	Basin Analysis [Practical]	<ol style="list-style-type: none"> <li>1. Prepare facies maps based on borehole data</li> <li>2. Interpret facies maps.</li> <li>3. Interrelate stratigraphical columns based on lithological, heavy mineral assemblage and paleontological data.</li> <li>4. Interpret and correlate geophysical logs.</li> <li>5. Interpret the relationship of tectonics and sedimentation from integrated data</li> </ol>
GLG-4062C	Coal and Organic Petrology [Practical]	<ol style="list-style-type: none"> <li>1. Determine forms of sulphur based on gravimetric analysis.</li> <li>2. Interpret organic geochemical analysis data for typing of organic matters of sedimentary rocks.</li> <li>3. Identify macerals under microscope</li> <li>4. Discuss the genesis of macerals</li> <li>5. Determine the depositional environment coal deposits from organo-geochemistry and petrographic data</li> </ol>
GLG-4062D	Advanced Geoinformatics [Practical]	<ol style="list-style-type: none"> <li>1. Generate georeferenced satellite images by collecting GCPs from already georeferenced images.</li> <li>2. Classify and enhance optical images.</li> <li>3. Analyze and interpret SAR data.</li> <li>4. Utilize GIS for spatial analysis.</li> <li>5. Survey using GPS and integrate data in GIS.</li> </ol>
GLG-4062E	Geo-Exploration [Practical]	<ol style="list-style-type: none"> <li>1. Estimate subsurface layer parameters using seismic data</li> <li>2. Interpret gravity and magnetic data.</li> <li>3. Use of electrical methods to configure mineralize zone</li> <li>4. Analyze petrophysical properties of ore bearing horizon.</li> </ol>

		5. Identify anomalies and delineate discontinuities.
GLG-4062F	Advanced Sedimentology [Practical]	<ol style="list-style-type: none"> <li>1. Prepare thin section of sediments and sedimentary rocks and study them under microscope for analysis of diagenesis and cementation.</li> <li>2. Separate heavy minerals from sediments and identify the heavy mineral assemblage under microscope.</li> <li>3. Prepare lithologs from field data.</li> <li>4. Identify stained minerals from stain thin sections of carbonate and siliciclastic rocks.</li> <li>5. Measure porosity and permeability in sandstones / sediments</li> </ol>
GLG-4062G	Advanced Geochemistry and Thermodynamics [Practical]	<ol style="list-style-type: none"> <li>1. Classify igneous rocks using cations, R1-R2 diagram.</li> <li>2. Classify sedimentary rocks based on geochemical data.</li> <li>3. Use REE and trace element diagrams for igneous rock, sea and river water and sediments.</li> <li>4. Determine mineral stability based on thermodynamic calculations.</li> <li>5. Prepare spider diagram for trace element.</li> </ol>
GLG-4078	Project Work*2 (in lieu of the mandatory Elective Course)	<ol style="list-style-type: none"> <li>1. Formulate a research problem from a geological terrain</li> <li>2. Prepare a model to address the research problem.</li> <li>3. Generate information from Lab analysis</li> <li>4. Interpret the information to address the problem.</li> <li>5. Prepare the dissertation.</li> </ol>
GLG-4083	Open Course-3: Fluvial System	<ol style="list-style-type: none"> <li>1. Develop an understanding on source to sink overview of the fluvial system</li> <li>2. Describe fluvial landforms and their significance</li> <li>3. Explain fluvial sedimentary sequence</li> <li>4. Develop a deep understanding of the fluvial landform features in Northeast India.</li> <li>5. Discuss the economic potential of fluvial depositional systems</li> </ol>
GLG-4093	Open Course-4: Environmental Geology	<ol style="list-style-type: none"> <li>1. Discuss the causal factors of pollution and hazards related to mining.</li> <li>2. Analyze impact of landslides on environment.</li> <li>3. Describe the causal factors of flood in fluvial systems and their management.</li> <li>4. Identify the sources of water pollution and suggest remedial measures.</li> <li>5. Propose remedial measure</li> </ol>

<b>Department:</b>	<b>Department of Hindi</b>	
<b>Programme:</b>	<b>M.A. in Hindi</b>	
<b>PSOs</b>	<ul style="list-style-type: none"> <li>• Demonstrate a chronological, genre-specific, and life-long grounding in Hindī language and literature.</li> <li>• Apply theoretical knowledge to practical grounds by engaging in teaching-learning scenario, creative writing, reflective &amp; reflexive practices and demonstrate effective communication, problem-solving and advanced inter-personal skills.</li> <li>• Utilize the functional and technical knowledge of Official Hindī to seek job-opportunities and train as Hindī Translator, Hindī Officer, Hindī Pradhyapak in Govt. &amp; semi-govt., and other offices as well as in print &amp; electronic media sector.</li> <li>• Produce high-level research, grounded on rigorous scientific reasoning &amp; ethical principles that can significantly contribute original insights to enhance the existing knowledge base of Hindī language &amp; literature in particular, and society in general.</li> </ul>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
HIN-1016	Ādikālīn Evam Bhaktikālīn Kāvya	<p>CO1: Identify the aesthetic and artistic features of Ādikālīn and Bhaktikālīn poetry, particularly in context of the texts of Sarahapād, Gorakhnāth, Chandwardāi, Vidyāpati, Kabīrdās, Surdās and Tulsīdās</p> <p>CO2: Outline the origin of Hindī Language &amp; Literature and develop proper knowledge of the major Hindī dialects like Avadhī, Brajbhāshā, Maithilī etc.</p> <p>CO3: Analyse the sense of life &amp; social consciousness reflected in Ādikālīn and Bhaktikālīn poetry</p> <p>CO4: Critically assess the poetic craftsmanship of Sarahapād, Gorakhnāth, Chandwardāi, Vidyāpati, Kabīrdās, Surdās and Tulsīdās</p> <p>CO5: Justify the relevance of Ādikālīn and Bhaktikālīn poetry in the context of modern times</p>
HIN-1026	Hindī Sāhitya kā Itihās-I (Ādikāl evam Bhaktikāl)	<p>CO1: Outline the theories of writing of the history of Hindī Literature</p> <p>CO2: Classify and discuss the various streams of Ādikālīn Literature</p> <p>CO3: Analyse the emergence and relevance of Bhakti-Āndolan</p> <p>CO4: Compare and contrast the different streams of Bhaktikālīn Literature-- Sant Kāvya, Sufī Kāvya, Rāmbhakti Kāvya and Krishnabhakti Kāvya</p> <p>CO5: Assess the various forms of old and medieval Hindī Language viz. Apabhraṅsh-influenced Hindī, Dingal, Maithilī, Avadhī, Brajbhāshā etc.</p>
HIN- 1036	Hindī kā Upanyās Sāhitya	<ol style="list-style-type: none"> <li>1. Outline the origin and development of Hindī Novel Literature</li> <li>2. Illustrate the prescribed texts viz. Godān, Shekhar: Ek Jīvanī, Mailā Ānchal and Mānas kā Hans based on elements and types of novels</li> <li>3. Interpret the intricacies of the pre-independence and post-independence Indian society in context of the prescribed novels</li> <li>4. Critically assess the varied artistic craftsmanship of the prescribed novelists viz. Premchand, Ajneya, Phanīshwar Nāth ‘Renu’ and Amritlāl Nāgar</li> <li>5. Develop the art of novel-writing and explore creative potentialities</li> </ol>

HIN-1045	Hindī kā Upanyās Sāhitya	<ol style="list-style-type: none"> <li>1. Outline the origin and development of Hindī short-story Literature</li> <li>2. Illustrate the prescribed 18 short-stories based on elements and types of short-stories</li> <li>3. Analyse the social consciousness, sense of life &amp; modernism reflected in the prescribed short-stories</li> <li>4. Critically assess the varied artistic craftsmanship of the prescribed short-story writers</li> <li>5. Develop the art of short-story writing and explore creative potentialities</li> </ol>
HIN-1055	Bhāratīya Kāvyaśāstra	<ol style="list-style-type: none"> <li>1. Discuss the extensive history of Indian poetics</li> <li>2. Classify and analyse the major theories/schools of Indian Poetics- Rasa, Dhvani, Alankār, Vakrokti, Ouchitya</li> <li>3. Compare and contrast the major theories/schools of Indian Poetics</li> <li>4. Determine Rasa, Dhvani, Alankār etc. in literary works as practical test of knowledge</li> <li>5. Develop the art required for classical criticism</li> </ol>
HIN-2016	Rītikālīn Kāvya	<ol style="list-style-type: none"> <li>1. Identify the aesthetic and artistic features of Rītikālīn poetry, particularly in context of the texts of Keshavdās, Biharīlāl, Ghanānand, Matirām and Bhushān</li> <li>2. Analyse the political-social-literary scenario reflected in Rītikālīn poetry</li> <li>3. Critically assess the literary essence of Brajbhāshā as the dominant language of Rītikālīn poetry</li> <li>4. Compare the prescribed Rītikālīn poets viz. Keshavdās, Biharīlāl, Ghanānand, Matirām and Bhushān based on poetic genius and achievements</li> <li>5. Justify the relevance of Rītikālīn poetry in the context of modern times</li> </ol>
HIN-2026	Hindī Sāhitya kā Itihās-II (Rītikāl)	<ol style="list-style-type: none"> <li>1. Outline a brief sketch of Rītikāl: prominent poets and their works</li> <li>2. Discuss the social and literary consciousness preponderant in the Rītikālīn period</li> <li>3. Interpret the different poetic forms other than Rītikāvya viz. Bhaktikāvya, Nītikāvya, Vīrkāvya, Dakkhinī gadya etc.</li> <li>4. Categorize and analyse the major forms of Rītikāvya viz. Rītibaddha kāvya, Rītisiddha kāvya and Rītimukta kāvya</li> <li>5. Assess the linguistic features of Brajbhāshā as the dominant language of Rītikālīn literature</li> </ol>
HIN-2036	Hindī Sāhitya kā Itihās-III (Ādhunik kāl)	<ol style="list-style-type: none"> <li>1. Outline a brief sketch of Ādhunik kāl: prominent litterateurs and their works</li> <li>2. Explain the ever-changing consciousness of modern era reflected in the literature of Ādhunik kāl</li> <li>3. Categorise and analyse the various forms of Modern Hindi poetry viz. Bhāratenduyugīn kāvyadhārā, Dwivedīyugīn kāvyadhārā, Chhāyāvādyugīn kāvyadhārā, Pragativādī-Prayogvādī-Naī Kavītā-Sāthottarī Kavītā etc.</li> <li>4. Classify and assess the various forms of Hindi prose literature viz. drama, novel, short-story, biography, memoir, travelogue, interview etc.</li> <li>5. Critique the linguistic features</li> </ol>
HIN-2045	Hindī kā Nātak Sāhitya	<ol style="list-style-type: none"> <li>1. Outline the origin and development of Hindī Drama Literature</li> <li>2. Illustrate the prescribed texts viz. Andher Nagrī, Chandragupt, Ādhe Adhure and Ek aur Dronāchārya based on elements and types of dramas</li> </ol>

		<ol style="list-style-type: none"> <li>Analyse the socio-cultural consciousness, sense of life and modernism reflected in the prescribed dramas</li> <li>Critically assess the artistic craftsmanship of the prescribed dramatists viz. Bhāratendu Harishchandra, Jayshankar Prasād, Mohan Rākesh and Shankarshesh</li> <li>Develop the art of drama-writing and explore creative potentialities</li> </ol>
HIN-2055	Pāshchatya Kāvyaśāstra evam Samakālīn Avadhārāyen	<ol style="list-style-type: none"> <li>Outline the extensive history of Western Poetics</li> <li>Discuss some contemporary literary trends viz. Russian formalism, New Criticism, myth, fantasy, imagination, symbol, image</li> <li>Analyse the major theories propounded by some prominent Western philosophers viz. Plato, Aristotle, Longinus, Croche, T.S. Eliot</li> <li>Compare and contrast some major western literary ideologies viz. Romanticism, Idealism, Realism, Symbolism and Existentialism</li> <li>Develop the art required for criticism of literature after in-depth theoretical knowledge of Western Poetics</li> </ol>
HIN-3016	Ādhunik Kāvya-I (Dwivedīyugīn evam Chhāyāvādyugīn Kāvyaśāstrāyen)	<ol style="list-style-type: none"> <li>Identify the aesthetic and artistic features of Dwivedīyugīn and Chhāyāvādyugīn poetry, particularly through discussion on Sāket, Kāmāyanī, Rām kī Shakti-Puja, Saroj-Smriti, poems of Sumitrānandan Pant, Mahādevī Vermā and Harivansh Rāy Bachchan</li> <li>Analyse the socio-cultural consciousness and spirit of the modern era reflected in the Dwivedīyugīn and Chhāyāvādyugīn poetry</li> <li>Critically assess the poetic craftsmanship of the prescribed poets viz. Maithilīsharan Gupt, Jayshankar Prasād, Suryakānt Tripāthī 'Nirālā,' Sumitrānandan Pant, Mahādevī Vermā and Harivansh Rāy Bachchan</li> <li>Justify the relevance of Dwivedīyugīn and Chhāyāvādyugīn poetry in the context of modern times</li> <li>Develop the art of poetry-writing and explore creative potentialities</li> </ol>
HIN-3026	Bhāshāvijnān ke Siddhānt evam Shailīvijnān	<ol style="list-style-type: none"> <li>Discuss the basic principles of language and linguistics</li> <li>Categorize and analyse in depth the various branches of linguistics viz. Syntax, Morphology, Phonetics, Semantics</li> <li>Assess style and interpret the various structural forms of Stylistics</li> <li>Justify the importance of the study of Linguistics and Stylistics for correct usage of language</li> <li>Develop a comparative research attitude for linguistic study in Syntax, Phonetics, Morphology, Wordology, Semantics, Stylistics of Hindi and other languages</li> </ol>
HIN-3036	Hindī Bhāshā evam Nāgrī Lipi	<ol style="list-style-type: none"> <li>Outline the origin and development of Hindī Language</li> <li>Classify and discuss the various sub-languages &amp; dialects; different forms like Urdu, Dakkhinī, Hindustānī; vowels &amp; consonants of Hindī</li> <li>Analyse Hindī sentence-structure and Hindī nouns (in regard of gender, number, case) pronouns, adjectives, &amp; verbs and strengthen grammatical knowledge &amp; correct usage</li> <li>Assess the scientific nature of Nāgrī Lipi by measuring its qualities and shortcomings</li> <li>Develop a comparative research attitude for linguistic study of Hindī and other modern Indian languages in future</li> </ol>
HIN-3045	Hindī kā Nibandh Sāhitya	<ol style="list-style-type: none"> <li>Outline the origin and development of Hindī Essay Literature</li> </ol>



		<ol style="list-style-type: none"> <li>2. Illustrate the prescribed texts viz. Chintāmani (Part-I), Ashok ke Phool etc. based on elements and types of essays</li> <li>3. Analyse the conceptual and socio-cultural thoughts &amp; ideologies reflected in the prescribed essays</li> <li>4. Critically assess the varied artistic craft of the prescribed essayists viz. Āchārya Rāmchandra Shukla, Āchārya Hazārī Prasād Dwivedī, Bhāratendu Harishchandra, Vidyāniwās Mishra, Kubernāth Rāy, Vivekī Rāy and Nāmvar Singh</li> <li>5. Develop the art of essay-writing and explore creative potentialities</li> </ol>
HIN-3055	Prayojanmulak Hindī	<ol style="list-style-type: none"> <li>1. Distinguish the different forms of functional Hindī viz. national language, official language, link language, international language etc.</li> <li>2. Interpret the provisions related to Hindī mentioned in the Constitution of India</li> <li>3. Analyse the functional aspect of the Hindī implemented in government &amp; semi-government offices and have in-depth knowledge of official and semi-official letters</li> <li>4. Assess the promotion of functional Hindī as an important tool of employment generation</li> <li>5. Test the practical ability in the official Hindī arena with the acquired knowledge of Hindī terminological words, noting &amp; drafting, Hindī typing, usage of Hindī in media, precis-writing etc.</li> </ol>
HIN-4016	Ādhunik Kāvya-II (Chhāyāvādotar Kāvyaadhārāyen)	<ol style="list-style-type: none"> <li>1. Identify the aesthetic and artistic features of Chhāyāvādotar poetry, particularly through discussion on Urvashī, Andhāyug and prescribed poems of Ajneya, Muktibodh, Nāgarjun, Bhawānī Prasād Mishra, Dhumil, Lilādhār Jagudī, Rajesh Joshī, and Arun Kamal</li> <li>2. Analyse the socio-cultural consciousness and spirit of modern era reflected in the various developmental stages of Chhāyāvādotar poetry like Pragativādī, Prayogvādī, Nayī Kavita, Sāthottarī Kavita, Samakālīn Kavita</li> <li>3. Critically assess the poetic craftsmanship of the prescribed poets viz. Rāmdhārī Singh ‘Dinkar,’ Dr. Dharmvīr Bhārtī, Ajneya, Muktibodh, Nāgarjun, Bhawānī Prasād Mishra, Dhumil, Lilādhār Jagudī, Rajesh Joshī, and Arun Kamal</li> <li>4. Justify the importance of Chhāyāvādotar poetry in the context of modern times</li> <li>5. Develop the art of poetry-writing and explore creative potentialities</li> </ol>
HIN-4026	Hindī Ālochanā, Pramukh Ālochak evam Ādhunik Vimarsh	<ol style="list-style-type: none"> <li>1. Identify the origin and development of Hindī Criticism</li> <li>2. Discuss the various emerging modern discourses viz. Dalit discourse, Feminist discourse, Tribal discourse etc.</li> <li>3. Assess the principles of criticism of some prominent critic scholars viz. Ācharya Rāmchandra Shukla, Dr. Rāmvilās Sharmā, Dr. Nāmvar Singh</li> <li>4. Compare the critical thinking of some significant critic scholars viz. Shyāmsundar Das, Āchārya Hazārī Prasād Dwivedī, Āchārya Nanddulāre Vājpayī, Dr. Nagendra</li> <li>5. Develop critical ability and nurture it for further research advancements</li> </ol>

HIN-4036	Hindī Gadya kī vividh vidhāyen	<ol style="list-style-type: none"> <li>1. Identify the origin and development of the varied genres of Hindī Prose Literature viz. memoir, sketch, biography, travelogue etc.</li> <li>2. Explain the prescribed texts under Hindī ke shrestha rekhāchitra (ed.) &amp; Sansmaran aur rekhāchitra (ed.), along with Premchand: Ghar mein and Are Yayāvar rahegā yād based on the elements of sketches, memoirs, biography, and travelogue respectively</li> <li>3. Analyse the socio-cultural consciousness, sense of life and modernism reflected in the prescribed sketches, memoirs, biography, and travelogue</li> <li>4. Critically assess the varied artistic craft of the prescribed litterateurs viz. Ajneya, Shivrānī Devī, Banārasīdas Chaturvedī, Krishnadev Prasād Goud, Dr. Rāmvilās Sharmā, Harishankar Parsāī, Ray Krishna Das, Shivpujan Sahāy, Rāmdharī Singh ‘Dinkar,’ Amritlāl Nāgar</li> <li>5. Develop the art of sketch-writing, memoir-writing, biography-writing, travelogue-writing and explore creative potentialities</li> </ol>
HIN-4045	Tulnātmak Bhāratīya Sāhitya: Asamiyā	<ol style="list-style-type: none"> <li>1. Identify the history of Assamese literature as an integral part of greater Indian literature</li> <li>2. Discuss the devotional &amp; moral ideologies and sense of life &amp; society reflected particularly in the literature of Vaishnav yug and Adhunik yug</li> <li>3. Analyse the aesthetic and artistic features of the prescribed texts viz. Rukminīharan Nāt, Bargīts of Mādhavdeva and poems of Raghunāth Choudhāry &amp; Nalinībālā Devī</li> <li>4. Critically assess the poetic craftsmanship &amp; literary contributions of Shrī manta Shankardeva, Shrī Shrī Mādhavdeva, Raghunāth Choudhary and Nalinībālā Devī</li> <li>5. Develop a comparative research attitude in regard of comparative study of Hindī - Assamese language and literature in future</li> </ol>
HIN-4055	Hindī Krishna Kāvya	<ol style="list-style-type: none"> <li>1. Discuss the concept, need and importance of guidance and counselling.</li> <li>2. Outline the principles and problems of different types of guidance and Counselling</li> <li>3. Explain the procedure of individual and group counselling</li> <li>4. Restate the aim and principles of guidance programme</li> <li>5. Plan to develop child guidance services at institutional and personal level</li> </ol>

<b>Department:</b>	<b>Department of Information Technology</b>	
<b>Programme:</b>	<b>B.Tech [IT]</b>	
<b>PSOs</b>	<p>PSO1. Students will have adequate skills and competency to work as a professional to deliver quality results in industries, academia, research organizations, and in the professional world.</p> <p>PSO2. Students will be capable of developing software solutions for different relevant problems in the world of Information and Communication Technology, by applying knowledge of various domains such as Database Technologies, Information Systems, Internet and Network Technologies, Cloud Technologies, Algorithms, Artificial Intelligence, Machine Learning, Image Processing, and associated interdisciplinary subjects.</p> <p>PSO3. Students will be able to handle software and network security issues.</p> <p>PSO4. Students will be able to take up research works in specific areas such as natural language processing, speech processing, image processing, IoT etc.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
IT211	Data Structure and Algorithm (IT/BET)	<ol style="list-style-type: none"> <li>1. Remember: Define fundamental data structures like arrays, stacks, queues, linked lists, trees, and graphs. (Level 1)</li> <li>2. Comprehend: Explain the operations (insertion, deletion, searching) associated with different data structures and their time and space complexities. (Level 2)</li> <li>3. Apply: Use data structures effectively to solve algorithmic problems. Explain the underlying data structure concepts used in popular libraries and frameworks. (Level 3)</li> <li>4. Analyze: Analyze a given problem and choose the most appropriate data structure to represent and manipulate the data efficiently. (Level 4)</li> <li>5. Evaluate: Critically assess the trade-offs between different data structures in terms of memory usage, access time, and maintainability when designing complex software systems. (Level 5)</li> </ol>
IT221	Computer Organization and Architecture	<ol style="list-style-type: none"> <li>1. Analyze the instruction cycle of a computer, explaining the role of each component. (Control Unit, ALU, Memory) and their interactions.</li> <li>2. Evaluate the trade-offs between different memory hierarchy levels (cache, main memory, secondary storage) based on access time and capacity.</li> <li>3. Explain the concept of pipelining and its impact on instruction execution performance.</li> <li>4. Compare and contrast different instruction set architectures (RISC vs. CISC) based on their design principles and instruction complexity.</li> <li>5. Write a simple assembly language program to demonstrate understanding of basic instructions and addressing modes.</li> </ol>
IT222	Object Oriented Programming	<ol style="list-style-type: none"> <li>1. Describe the fundamental concepts of OOP such as objects, classes, inheritance, encapsulation, abstraction, and polymorphism.</li> <li>2. Discuss OOP languages like C++ and use them to solve various problems.</li> <li>3. Apply OOP concepts and C++ language to design and implement software using OOP principles.</li> <li>4. Develop the ability to create modular, flexible, and reusable code.</li> </ol>

		5. Applying data structures and algorithms within an OOP context to manage large amounts of data efficiently.
IT223	Discrete Mathematics	<ol style="list-style-type: none"> <li>1. Understanding the fundamental concepts such as logic, sets, functions, and relations.</li> <li>2. Developing proficiency in mathematical reasoning and the ability to construct proofs, including direct, indirect, and proof by contradiction.</li> <li>3. Describing combinatorics, graph theory, and their applications in computer science.</li> <li>4. Preparing students to solve problems involving algebraic structures and elementary number theory, such as divisibility, congruences, and prime numbers.</li> <li>5. Applying principles of mathematical induction to prove statements involving natural numbers.</li> </ol>
IT311	Database Management Systems	<ol style="list-style-type: none"> <li>1. Describe the fundamental elements of relational database management system.</li> <li>2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.</li> <li>3. Design ER-models to represent simple database application scenarios.</li> <li>4. Extend the ER-model to relational tables, populate relational database and formulate SQL queries on data.</li> <li>5. Transform the database design by normalization.</li> </ol>
IT312	Formal Language and Automata Theory	<ol style="list-style-type: none"> <li>1. Define foundational concepts: formal languages, alphabets, strings, grammars (Chomsky hierarchy), automata models (FA, PDA, TM), and their components (states, transitions, symbols). (Level 1)</li> <li>2. Explain the relationships between formal languages and their generating grammars. Differentiate between different automata models based on their capabilities and limitations. (Level 2)</li> <li>3. Given a formal description (regular expression, grammar) or a language, identify the appropriate automata model (FA, PDA, TM) to recognize it. (Level 3)</li> <li>4. Analyse the time and space complexity of computations performed by different automata models. (Level 4)</li> <li>5. Critically evaluate the suitability of different automata models for specific applications based on their efficiency and expressive power.(Level 5)</li> </ol>
IT313	Operating Systems	<ol style="list-style-type: none"> <li>1. Describe process control, threads, concurrency, memory, Scheduling, virtual memory management.</li> <li>2. Use system calls to directly communicate with operating system.</li> <li>3. Apply different process synchronization algorithms to a few real-life examples.</li> <li>4. Create page tables for memory management.</li> <li>5. Construct knowledge about protection and security of different operating system like Unix.</li> </ol>
IT314	Software Engineering	<ol style="list-style-type: none"> <li>1. Describe basics of software development lifecycle models</li> <li>2. Summarize various design principles used in software development.</li> <li>3. Apply software engineering principles in programming for development of different software.</li> <li>4. Summarize various approaches and methodologies used for software testing.</li> <li>5. Develop software which adheres to various standards of software engineering</li> </ol>
IT321	Compiler Design	<ol style="list-style-type: none"> <li>1. Identify the various phases of a compiler and their functionalities (lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization, code generation).</li> </ol>

		<p>(Level 1)</p> <ol style="list-style-type: none"> <li>2. Explain the concepts of regular expressions and finite state automata (FSA) for pattern matching and tokenization in lexical analysis. Additionally, understand context-free grammar (CFG) and their role in syntax analysis. (Level 2)</li> <li>3. Design and implement a lexical analyzer using tools like LEX or regular expression libraries to recognize tokens from a simple programming language. (Level 3)</li> <li>4. Compare and contrast different parsing techniques (top-down vs bottom-up) and identify suitable parsing algorithms (LL(1), LR(0) etc.) based on the characteristics of a given grammar. Analyze the efficiency of these parsing algorithms. (Level 4)</li> <li>5. Critique the effectiveness of various optimization techniques (e.g., constant folding, dead code elimination) applied to intermediate code. Evaluate the trade-off between code size and execution speed after optimization. (Level 5)</li> </ol>
IT322	Computer Network	<ol style="list-style-type: none"> <li>1. Explain basic concepts of networking, different layers of OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, and network topology.</li> <li>2. Apply framing, error control, flow control and multiple access control techniques.</li> <li>3. Describe the various functions of Network Layer i.e. Logical addressing, sub netting &amp; Routing Mechanism and also use of IP addresses.</li> <li>4. Explain the different Transport Layer functions i.e. Port addressing, Connection Management, Error control and Flow control mechanism.</li> <li>5. Explain the functions offered by session and presentation layer and the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, SSH etc.</li> </ol>
IT902	Speech Processing	<ol style="list-style-type: none"> <li>1. Explain a speech signal with its different acoustic representation and phonemic behavior.</li> <li>2. Discuss various types of signals and systems.</li> <li>3. Measure speech signal in terms of Fourier coefficient.</li> <li>4. Determine different acoustic parameters using MFCC, LPC and ZCR.</li> <li>5. Build a software interface which can recognize a speech signal with its different phonemic and acoustic attributes.</li> </ol>
IT903	Neural Network and Machine Learning	<ol style="list-style-type: none"> <li>1. Understanding the foundational concepts of neural networks, including their architecture and how they learn from data.</li> <li>2. Integrating multiple facets of practical machine learning in a single system: data preprocessing, learning, regularization, and model selection.</li> <li>3. Analyzing and implementing existing learning algorithms for classification, regression, clustering, and reinforcement learning.</li> <li>4. Building, training, and applying fully connected deep neural networks.</li> <li>5. Designing experiments to evaluate and compare different machine learning techniques on real-world problems.</li> </ol>
IT904	Natural Language Processing	<ol style="list-style-type: none"> <li>1. Define Natural Language Processing in the context of contemporary intelligent computing.</li> <li>2. Explain various aspects of natural language in the context of computational paradigm.</li> <li>3. Classify language phenomenon into rules and patterns and use them for machine learning ecosystem.</li> <li>4. Illustrate the syntax and semantics of natural languages considering understanding the</li> </ol>

		<p>language by a computational framework.</p> <p>5. Construct Computational Models for processing and understanding Natural Language</p>
IT905	Artificial Intelligence	<ol style="list-style-type: none"> <li>1. Describe the fundamentals of Artificial Intelligence, including the structure of knowledge representation and knowledge searching.</li> <li>2. Illustrate the building blocks of AI system and formalize the problem solving as a state space searching.</li> <li>3. Explain intelligent algorithms for constraint satisfaction problems and designing intelligent systems.</li> <li>4. Analyse different heuristic search techniques in light of creating intelligent system.</li> <li>5. Construct general understanding of knowledge representation techniques including logic, symbolic reasoning, and statistical reasoning</li> </ol>
IT906	Advance Computer Organization and Architecture	<ol style="list-style-type: none"> <li>1. Compute simple calculations of power, cost and performance on computer design.</li> <li>2. Classify to demonstrate pipeline, pipeline hazards and implementation of pipeline.</li> <li>3. Demonstrate instruction level parallelism various architectures.</li> <li>4. Measure the performance of the architecture in terms of the right parameters.</li> <li>5. Analyse advanced optimization of cache performance, protection of virtual memory &amp; amp; virtual machines</li> </ol>
IT912	Wireless Network	<ol style="list-style-type: none"> <li>1. Understand the basics of propagation of radio signals, basic concepts of Cellular System and the design requirements.</li> <li>2. Explain the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs.</li> <li>3. Describe various mobile radio propagation models and how diversity can be exploited to improve performance.</li> <li>4. Explain the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.</li> <li>5. Understanding of the emerging trends in Wireless communication like WiFi, WiMAX, Software Defined Radio (SDR) and related issues and challenges</li> </ol>
IT913	Adhoc and Sensor Network	<ol style="list-style-type: none"> <li>1. Describe Ad hoc and Sensor network.</li> <li>2. Explain the protocols, network architectures and applications of Ad hoc and wireless Sensor networks.</li> <li>3. Analyze the protocol design issues of Ad hoc and Sensor networks.</li> <li>4. Design routing protocols for Ad hoc and wireless Sensor networks with respect to some protocol design issues.</li> <li>5. Evaluate the QoS related performance measurements of Ad hoc and Sensor Networks.</li> </ol>
IT915	Cryptography and Network Security	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities.</li> <li>2. Apply the different cryptographic operations of symmetric cryptographic algorithms.</li> <li>3. Apply the different cryptographic operations of public key cryptography.</li> <li>4. Apply the various Authentication schemes to simulate different applications.</li> <li>5. Understand various Security practices and System security standards.</li> </ol>
IT918	Web Technology	<ol style="list-style-type: none"> <li>1. Identify the basic concepts and services associated with the WWW and internet.</li> <li>2. Explain the functions and working principles of web browsers, including the roles of plug-ins and helper applications.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Differentiate between client-server computing models and apply them to real-world scenarios.</li> <li>4. Compare and contrast the advantages and disadvantages of Fat Client and Fat Server architectures.</li> <li>5. Evaluate the various web development based on their suitability for specific application purposes.</li> </ol>
<b>Department:</b>	<b>Department of Information Technology</b>	
<b>Programme:</b>	<b>B.Tech [CSE]</b>	
<b>PSOs</b>	<p>PSO1. Students will have sound knowledge and skill about software, and hardware of computer systems along with computer networks and security aspects of it to compete and sustain as a professional.</p> <p>PSO2. Students will be able to apply fundamental knowledge of theoretical computer science and critically analyze problems to provide computer-based solutions for engineering applications.</p> <p>PSO3. Students will be able to use the core concepts of computing and optimization techniques to develop more efficient and effective computer algorithms.</p> <p>PSO4. Students will be able to take up research works in specific areas such as theoretical computer science, natural language processing, speech processing, image processing, and IoT.</p>	
IT211	Data Structure and Algorithm (IT/BET)	<ol style="list-style-type: none"> <li>1. Remember: Define fundamental data structures like arrays, stacks, queues, linked lists, trees, and graphs. (Level 1)</li> <li>2. Comprehend: Explain the operations (insertion, deletion, searching) associated with different data structures and their time and space complexities. (Level 2)</li> <li>3. Apply: Use data structures effectively to solve algorithmic problems. Explain the underlying data structure concepts used in popular libraries and frameworks. (Level 3)</li> <li>4. Analyze: Analyze a given problem and choose the most appropriate data structure to represent and manipulate the data efficiently. (Level 4)</li> <li>5. Evaluate: Critically assess the trade-offs between different data structures in terms of memory usage, access time, and maintainability when designing complex software systems. (Level 5)</li> </ol>
IT221	Computer Organization and Architecture	<ol style="list-style-type: none"> <li>1. Analyze the instruction cycle of a computer, explaining the role of each component. (Control Unit, ALU, Memory) and their interactions.</li> <li>2. Evaluate the trade-offs between different memory hierarchy levels (cache, main memory, secondary storage) based on access time and capacity.</li> <li>3. Explain the concept of pipelining and its impact on instruction execution performance.</li> <li>4. Compare and contrast different instruction set architectures (RISC vs. CISC) based on their design principles and instruction complexity.</li> <li>5. Write a simple assembly language program to demonstrate understanding of basic instructions and addressing modes.</li> </ol>
IT222	Object Oriented Programming	<ol style="list-style-type: none"> <li>1. Describe the fundamental concepts of OOP such as objects, classes, inheritance, encapsulation, abstraction, and polymorphism.</li> <li>2. Discuss OOP languages like C++ and use them to solve various problems.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Apply OOP concepts and C++ language to design and implement software using OOP principles.</li> <li>4. Develop the ability to create modular, flexible, and reusable code.</li> <li>5. Applying data structures and algorithms within an OOP context to manage large amounts of data efficiently.</li> </ol>
IT223	Discrete Mathematics	<ol style="list-style-type: none"> <li>1. Understanding the fundamental concepts such as logic, sets, functions, and relations.</li> <li>2. Developing proficiency in mathematical reasoning and the ability to construct proofs, including direct, indirect, and proof by contradiction.</li> <li>3. Describing combinatorics, graph theory, and their applications in computer science.</li> <li>4. Preparing students to solve problems involving algebraic structures and elementary number theory, such as divisibility, congruences, and prime numbers.</li> <li>5. Applying principles of mathematical induction to prove statements involving natural numbers.</li> </ol>
IT311	Database Management Systems	<ol style="list-style-type: none"> <li>1. Describe the fundamental elements of relational database management system.</li> <li>2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.</li> <li>3. Design ER-models to represent simple database application scenarios.</li> <li>4. Extend the ER-model to relational tables, populate relational database and formulate SQL queries on data.</li> <li>5. Transform the database design by normalization.</li> </ol>
IT312	Formal Language and Automata Theory	<ol style="list-style-type: none"> <li>1. Define foundational concepts: formal languages, alphabets, strings, grammars (Chomsky hierarchy), automata models (FA, PDA, TM), and their components (states, transitions, symbols). (Level 1)</li> <li>2. Explain the relationships between formal languages and their generating grammars. Differentiate between different automata models based on their capabilities and limitations. (Level 2)</li> <li>3. Given a formal description (regular expression, grammar) or a language, identify the appropriate automata model (FA, PDA, TM) to recognize it. (Level 3)</li> <li>4. Analyse the time and space complexity of computations performed by different automata models. (Level 4)</li> <li>5. Critically evaluate the suitability of different automata models for specific applications based on their efficiency and expressive power.(Level 5)</li> </ol>
IT313	Operating Systems	<ol style="list-style-type: none"> <li>1. Describe process control, threads, concurrency, memory, Scheduling, virtual memory management.</li> <li>2. Use system calls to directly communicate with operating system.</li> <li>3. Apply different process synchronization algorithms to a few real-life examples.</li> <li>4. Create page tables for memory management.</li> <li>5. Construct knowledge about protection and security of different operating system like Unix.</li> </ol>
IT314	Software Engineering	<ol style="list-style-type: none"> <li>1. Describe basics of software development lifecycle models</li> <li>2. Summarize various design principles used in software development.</li> <li>3. Apply software engineering principles in programming for development of different software.</li> <li>4. Summarize various approaches and methodologies used for software testing.</li> </ol>



IT321	Compiler Design	<p>5. Develop software which adheres to various standards of software engineering</p> <ol style="list-style-type: none"> <li>1. Identify the various phases of a compiler and their functionalities (lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization, code generation). (Level 1)</li> <li>2. Explain the concepts of regular expressions and finite state automata (FSA) for pattern matching and tokenization in lexical analysis. Additionally, understand context-free grammar (CFG) and their role in syntax analysis. (Level 2)</li> <li>3. Design and implement a lexical analyzer using tools like LEX or regular expression libraries to recognize tokens from a simple programming language. (Level 3)</li> <li>4. Compare and contrast different parsing techniques (top-down vs bottom-up) and identify suitable parsing algorithms (LL(1), LR(0) etc.) based on the characteristics of a given grammar. Analyze the efficiency of these parsing algorithms. (Level 4)</li> <li>5. Critique the effectiveness of various optimization techniques (e.g., constant folding, dead code elimination) applied to intermediate code. Evaluate the trade-off between code size and execution speed after optimization. (Level 5)</li> </ol>
IT322	Computer Network	<ol style="list-style-type: none"> <li>1. Explain basic concepts of networking, different layers of OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, and network topology.</li> <li>2. Apply framing, error control, flow control and multiple access control techniques.</li> <li>3. Describe the various functions of Network Layer i.e. Logical addressing, sub netting &amp; Routing Mechanism and also use of IP addresses.</li> <li>4. Explain the different Transport Layer functions i.e. Port addressing, Connection Management, Error control and Flow control mechanism.</li> <li>5. Explain the functions offered by session and presentation layer and the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, SSH etc.</li> </ol>
IT902	Speech Processing	<ol style="list-style-type: none"> <li>1. Explain a speech signal with its different acoustic representation and phonemic behavior.</li> <li>2. Discuss various types of signals and systems.</li> <li>3. Measure speech signal in terms of Fourier coefficient.</li> <li>4. Determine different acoustic parameters using MFCC, LPC and ZCR.</li> <li>5. Build a software interface which can recognize a speech signal with its different phonemic and acoustic attributes.</li> </ol>
IT903	Neural Network and Machine Learning	<ol style="list-style-type: none"> <li>1. Understanding the foundational concepts of neural networks, including their architecture and how they learn from data.</li> <li>2. Integrating multiple facets of practical machine learning in a single system: data preprocessing, learning, regularization, and model selection.</li> <li>3. Analyzing and implementing existing learning algorithms for classification, regression, clustering, and reinforcement learning.</li> <li>4. Building, training, and applying fully connected deep neural networks.</li> <li>5. Designing experiments to evaluate and compare different machine learning techniques on real-world problems.</li> </ol>
IT904	Natural Language Processing	<ol style="list-style-type: none"> <li>1. Define Natural Language Processing in the context of contemporary intelligent computing.</li> <li>2. Explain various aspects of natural language in the context of computational paradigm.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Classify language phenomenon into rules and patterns and use them for machine learning ecosystem.</li> <li>4. Illustrate the syntax and semantics of natural languages considering understanding the language by a computational framework.</li> <li>5. Construct Computational Models for processing and understanding Natural Language</li> </ol>
IT905	Artificial Intelligence	<ol style="list-style-type: none"> <li>1. Describe the fundamentals of Artificial Intelligence, including the structure of knowledge representation and knowledge searching.</li> <li>2. Illustrate the building blocks of AI system and formalize the problem solving as a state space searching.</li> <li>3. Explain intelligent algorithms for constraint satisfaction problems and designing intelligent systems.</li> <li>4. Analyse different heuristic search techniques in light of creating intelligent system.</li> <li>5. Construct general understanding of knowledge representation techniques including logic, symbolic reasoning, and statistical reasoning</li> </ol>
IT906	Advance Computer Organization and Architecture	<ol style="list-style-type: none"> <li>1. Compute simple calculations of power, cost and performance on computer design.</li> <li>2. Classify to demonstrate pipeline, pipeline hazards and implementation of pipeline.</li> <li>3. Demonstrate instruction level parallelism various architectures.</li> <li>4. Measure the performance of the architecture in terms of the right parameters.</li> <li>5. Analyse advanced optimization of cache performance, protection of virtual memory &amp; amp; virtual machines</li> </ol>
IT912	Wireless Network	<ol style="list-style-type: none"> <li>1. Understand the basics of propagation of radio signals, basic concepts of Cellular System and the design requirements.</li> <li>2. Explain the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs.</li> <li>3. Describe various mobile radio propagation models and how diversity can be exploited to improve performance.</li> <li>4. Explain the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.</li> <li>5. Understanding of the emerging trends in Wireless communication like WiFi, WiMAX, Software Defined Radio (SDR) and related issues and challenges</li> </ol>
IT913	Adhoc and Sensor Network	<ol style="list-style-type: none"> <li>1. Describe Ad hoc and Sensor network.</li> <li>2. Explain the protocols, network architectures and applications of Ad hoc and wireless Sensor networks.</li> <li>3. Analyze the protocol design issues of Ad hoc and Sensor networks.</li> <li>4. Design routing protocols for Ad hoc and wireless Sensor networks with respect to some protocol design issues.</li> <li>5. Evaluate the QoS related performance measurements of Ad hoc and Sensor Networks.</li> </ol>
IT915	Cryptography and Network Security	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities.</li> <li>2. Apply the different cryptographic operations of symmetric cryptographic algorithms.</li> <li>3. Apply the different cryptographic operations of public key cryptography.</li> <li>4. Apply the various Authentication schemes to simulate different applications.</li> <li>5. Understand various Security practices and System security standards.</li> </ol>

IT918	Web Technology	<ol style="list-style-type: none"> <li>1. Identify the basic concepts and services associated with the WWW and internet.</li> <li>2. Explain the functions and working principles of web browsers, including the roles of plug-ins and helper applications.</li> <li>3. Differentiate between client-server computing models and apply them to real-world scenarios.</li> <li>4. Compare and contrast the advantages and disadvantages of Fat Client and Fat Server architectures.</li> <li>5. Evaluate the various web development based on their suitability for specific application purposes.</li> </ol>
<b>Department:</b>	<b>Department of Information Technology</b>	
<b>Programme:</b>	<b>M.Tech [IT]</b>	
<b>PSOs</b>	<p>PSO1. Students will have adequate skills and competency to work as a professional to deliver quality results in industries, academia, research organizations, and in the professional world.</p> <p>PSO2. Students will be capable of developing software solutions for different relevant problems in the world of Information and Communication Technology, by applying knowledge of various domains such as Database Technologies, Information Systems, Internet and Network Technologies, Cloud Technologies, Algorithms, Artificial Intelligence, Machine Learning, Image Processing, and associated interdisciplinary subjects.</p> <p>PSO3. Students will be able to handle software and network security issues.</p> <p>PSO4. Students will be able to take up research works in specific areas such as natural language processing, speech processing, image processing, IoT etc.</p>	
ITC1024	Design and Analysis of Algorithms	<ol style="list-style-type: none"> <li>1. Analyse the efficiency of algorithms using asymptotic notation and complexity analysis.</li> <li>2. Apply algorithmic design paradigms such as greedy algorithms, divide and conquer, dynamic programming, and backtracking to solve problems.</li> <li>3. Use advanced data structures such as heaps, hash tables, and balanced trees for algorithm design.</li> <li>4. Utilize algorithmic techniques for graph traversal, shortest paths, and minimum spanning trees.</li> <li>5. Develop algorithms for optimization problems, network flow, and string matching.</li> </ol>
ITC2014	Web Technologies	<ol style="list-style-type: none"> <li>1. Compare and contrast the structure and functionalities of XML with HTML.</li> <li>2. Develop an interactive web application using AJAX to retrieve and manipulate data a Document Object Model (DOM) concept.</li> <li>3. Assess the advantages and disadvantages of JSP compared to other server-side scripting languages.</li> <li>4. Design and implement a web application using JSP and JDBC, connecting to a MySQL database to perform CRUD operations (Create, Read, Update, Delete) and display data dynamically.</li> <li>5. Compare and contrast different HTML5 elements and APIs with their traditional counterparts, evaluating their impact on web development practices.</li> </ol>
ITC1214	Natural Language Processing	<ol style="list-style-type: none"> <li>1. Define Natural Language Processing in the context of contemporary intelligent computing.</li> <li>2. Explain various aspects of natural language in the context of computational paradigm.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Classify language phenomenon into rules and patterns and use them for machine learning ecosystem.</li> <li>4. Illustrate the syntax and semantics of natural languages in light of understanding the language by a computational framework.</li> <li>5. Construct Computational Models for processing and understanding Natural Language.</li> </ol>
ITC1234	Speech Processing	<ol style="list-style-type: none"> <li>1. Identify a speech signals, its acoustic representation and phonemic behavior.</li> <li>2. Interpreting different types of signals.</li> <li>3. Generate Fourier series, Fourier transform and Filters for a speech signal</li> <li>4. Integrate different speech analysis tool with for speech data.</li> <li>5. Design algorithms for speech synthesis and recognition.</li> </ol>
ITC1354	Fuzzy Logic and Neural Networks	<ol style="list-style-type: none"> <li>1. Describe and explain the fundamental theory and concepts of neural networks, neuro-modelling, several neural network paradigms and its applications.</li> <li>2. Illustrate and design the feed forward and backward neural networks (NN)</li> <li>3. Explain and interpret the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.</li> <li>4. Interpret the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.</li> <li>5. Analyse the various NN's and apply the same to inductive and/or deductive problems.</li> </ol>
ITC 2424	Cloud Computing	<ol style="list-style-type: none"> <li>1. Describe the basic concepts of cloud computing.</li> <li>2. Distinguish between fog, cloud, and edge computing.</li> <li>3. Apply optimization techniques in designing task scheduling algorithms for cloud environment.</li> <li>4. Design security solutions for cloud-based applications.</li> <li>5. Compare different <i>cloud resource management</i> techniques.</li> </ol>
ITC2234	Digital Image Processing	<ol style="list-style-type: none"> <li>1. Demonstrate the fundamentals of digital image and its mathematical transforms.</li> <li>2. Apply various image enhancement algorithm.</li> <li>3. Categorize different image compression method.</li> <li>4. Explain color image processing segmentation and image restoration.</li> <li>5. Design and develop image recognition tool.</li> </ol>
ITC2304	Artificial Intelligence and Intelligent Systems	<ol style="list-style-type: none"> <li>1. Describe the fundamentals of Artificial Intelligence, including the structure of knowledge representation and knowledge searching.</li> <li>2. Illustrate the building blocks of AI system and formalizing the problem solving as a state space searching.</li> </ol>

		<ol style="list-style-type: none"><li>3. Explain intelligent algorithms for constraint satisfaction problems and designing intelligent systems.</li><li>4. Analyse different heuristic search techniques in light of creating intelligent system.</li><li>5. Construct general understanding of knowledge representation techniques including logic, symbolic reasoning, and statistical reasoning.</li></ol>

<b>Department:</b>	<b>Department of Persian</b>	
<b>Programme:</b>	<b>MA in Persian</b>	
<b>PSOs</b>	<p>PSO 1: Demonstrate a comprehensive understanding of the historical development of the Persian language from its pre-Islamic roots to its modern form. PSO 2: Formulate ideas clearly, concisely, and persuasively in written and spoken Persian by applying grammatical structures and vocabulary effectively.</p> <p>PSO 3: Distinguish the influence of Persian literature and other cultures and literary traditions in India</p> <p>PSO 4: Produce and develop original research projects on topics related to Persian language and literature</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
PER-1016	History of Persian Literature	<ol style="list-style-type: none"> <li>1. Draw an outline on the development of Persian literature</li> <li>2. Prepare students to have a deep and thorough knowledge of Persian literature.</li> <li>3. Summarize the major themes and styles of poetry during the mentioned period.</li> <li>4. Interpret the significance of specific poems in the context of Persian literature and its development.</li> <li>5. Create a timeline illustrating the chronological development of Persian poetry up to the Safavid period.</li> </ol>
PER-1026	Classical Persian Poetry	<ol style="list-style-type: none"> <li>1. Identify key historical periods and influential figures in classical Persian poetry.</li> <li>2. Interpret old values and tradition through modern vocabularies and techniques.</li> <li>3. Examine the meanings of specific verses within the Ghazal in relation to broader Persian cultural contexts.</li> <li>4. Assess the significance of classical Persian poetry in the broader context of world literature.</li> <li>5. Create original interpretations of classical Persian poems based on historical understanding.</li> </ol>
PER-1036	Classical Prose	<ol style="list-style-type: none"> <li>1. Recall major developments and influences that shaped classical Persian prose.</li> <li>2. Explain the cultural, social, and political contexts that impacted the development of classical Persian prose.</li> <li>3. Demonstrate an understanding of how the themes and messages of the texts reflect broader cultural values and beliefs.</li> <li>4. Analyze the stylistic elements, character development, and plot dynamics in the selected texts.</li> <li>5. Evaluate the literary merit and artistic quality of the selected texts within the canon of classical Persian prose.</li> </ol>
PER-1046	Philology and Pre-Islamic languages of Iran	<ol style="list-style-type: none"> <li>1. List the characteristics that define Indo-European languages and differentiate them from other language families.</li> <li>2. Illustrate the general principles of philology, including its methodologies and objectives.</li> <li>3. Utilize philological methods to investigate language relationships within the Indo-European family.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Assess critically the methodologies and theories used in the study of Persian philology and its impact on neighboring languages.</li> <li>5. Create connections between linguistic developments and religious practices in pre-Islamic Iran.</li> </ol>
PER-1056	Translation & Communication Skill in Persian	<ol style="list-style-type: none"> <li>1. Recognize the components of sentence structure and techniques for oral expression and elocution in Persian.</li> <li>2. Illustrate how sentences are formed including word order and syntax in Persian.</li> <li>3. Apply oral expression and elocution techniques to improve speaking skills in Persian.</li> <li>4. Outline the effectiveness of different sentence structures and compositions in conveying meaning.</li> <li>5. Summarize the quality and coherence of written compositions in Persian based on established criteria.</li> </ol>
PER-1066	Persian Language Learning-I	<ol style="list-style-type: none"> <li>1. Identify the key characteristics and historical significance of the Persian language.</li> <li>2. Interpret the pronunciation of Persian alphabets and understand phonetic principles.</li> <li>3. Apply knowledge of the Persian alphabet and phonetics to accurately pronounce Persian words.</li> <li>4. Point out grammar structures in Persian sentences to identify parts of speech and sentence patterns.</li> <li>5. Formulate the effectiveness of vocabulary-building techniques in expanding Persian language skills.</li> </ol>
PER-2016	History of Persian literature in India	<ol style="list-style-type: none"> <li>1. Identify the major Persian poets and their contributions to Persian literature in India.</li> <li>2. Demonstrate the basic knowledge and skills and high level of expertise in Indo-Persian studies.</li> <li>3. Sketch the history of Persian language and literature in India.</li> <li>4. Analyzed historical and cultural understanding to contextualize the themes and motifs in their works.</li> <li>5. Interpret the significance of each poet and their works in the development of Persian literature in India.</li> </ol>
PER-2026	Indo-Persian Prose	<ol style="list-style-type: none"> <li>1. Recognize the socio-cultural contexts that influenced the growth of Persian prose in the Indian subcontinent.</li> <li>2. Show the contributions of prominent Indo-Persian prose writers to the literary landscape of India.</li> <li>3. Prepare a comprehensive history of medieval India based on Persian chronicles.</li> <li>4. Assess the cultural and historical importance of the texts within the context of Indo-Persian literature.</li> <li>5. Create connections between Indo-Persian prose literature and other literary traditions, both Persian and Indian.</li> </ol>
PER-2036	Indo-Persian Poetry	<ol style="list-style-type: none"> <li>1. Identify contributions of great Indian origin Persian poets in globalizing Indian culture and tradition.</li> <li>2. Indicate comprehensive list of poets and their contributions in safeguarding composite culture of our country.</li> <li>3. Apply critical thinking skills to identify the underlying messages conveyed through the poetries of Faizi, Amir Khusrau, Ghalib and Iqbal.</li> <li>4. Dissect the philosophical underpinnings embedded within the poetic verses.</li> </ol>

		<ol style="list-style-type: none"> <li>5. Develop critical essays examining the evolution of Indo-Persian poetry through the lens of their contributions.</li> </ol>
PER-2046	History of Sufism	<ol style="list-style-type: none"> <li>1. Describe the origin, meaning and development of Sufism.</li> <li>2. Illustrate contributions of Sufis in safeguarding human values and International understanding of humanism.</li> <li>3. Categorize the Sufi orders and the impact on society.</li> <li>4. Interpret Sufi terminologies and concepts</li> <li>5. Reconstruct relation between Sufism, spiritualism, mysticism and Bhaktism.</li> </ol>
PER-2056	Translation & Communication Skill in Persian	<ol style="list-style-type: none"> <li>1. Recognize the components of sentence structure and techniques for oral expression and elocution in Persian.</li> <li>2. Apply oral expression and elocution techniques to improve speaking skills in Persian.</li> <li>3. Outline the effectiveness of different sentence structures and compositions in conveying meaning.</li> <li>4. Summarize the quality and coherence of written compositions in Persian based on established criteria.</li> <li>5. Create an expert translator and high level of interpreter.</li> </ol>
PER-2066	Persian Language Learning-II	<ol style="list-style-type: none"> <li>1. Memorize essential phrases and expressions for everyday communication in Persian.</li> <li>2. Demonstrate comprehension of basic Persian grammar structures, including sentence construction and word order.</li> <li>3. Apply appropriate linguistic strategies to engage in basic conversations and written exchanges in Persian.</li> <li>4. Evaluate the effectiveness of different language learning techniques and strategies for improving Persian language proficiency.</li> <li>5. Generate original content in Persian, such as short stories, dialogues, or personal narratives.</li> </ol>
PER-3016	Sufi Literature (Prose & Poetry)	<ol style="list-style-type: none"> <li>1. Interpret the views of Sufi poets on humanism and universal brotherhood.</li> <li>2. Use ethics to recognize different value systems and understand the moral dimensions of decision making.</li> <li>3. Point out the parallel line between philosophy of Farid ud Din Attar and Vedantic philosophy.</li> <li>4. Compare and contrast Sufi ideas with those from other religious or philosophical traditions.</li> <li>5. Develop an original research paper or presentation on a topic related to Sufi prose literature.</li> </ol>
PER-3026	History of Modern Persian Literature	<ol style="list-style-type: none"> <li>1. Identify key figures and their major works in modern Persian literature</li> <li>2. explain the social, political, and cultural contexts that influenced modern Persian literature.</li> <li>3. compare and contrast different interpretations of major works of modern Persian literature.</li> <li>4. Evaluate the aesthetic merit of different works of modern Persian literature.</li> <li>5. Provide a critical and analytical study of modern Persian literature including different literary movements took place in Europe and Asia</li> </ol>
PER-3036	Modern Persian Poetry	<ol style="list-style-type: none"> <li>1. Recall the chronological order of major historical periods in modern Persian</li> <li>2. Differentiate between the characteristics of poetry from different historical periods in modern Persian poetry.</li> <li>3. Identify the relationship between social and political changes and the development of new poetic movements in modern Persian poetry.</li> <li>4. Interpret different issues related to nationalism, emancipation of women, children issues in the light of Islamic revolution.</li> </ol>



		5. Write a poem inspired by the style and themes of a particular historical period in modern Persian poetry.
PER-3046	Modern Persian Prose	<ol style="list-style-type: none"> <li>1. Outline the major characteristics of Short Story and Drama genres in Modern Persian Prose.</li> <li>2. List prominent works of Modern Persian Prose in the categories of Short Story and Drama.</li> <li>3. Interpret the themes and messages conveyed in Modern Persian Prose Short Stories and Dramas. Students learn to identify and understand modern history, culture and economic scenario of Iran through literature.</li> <li>4. Deconstruct the underlying social and cultural messages in Modern Persian Prose.</li> <li>5. Evaluate critically different literary movements and their impact on modern Persian prose</li> </ol>
PER-3056	Geography of Rural Development (Elective)	<ol style="list-style-type: none"> <li>1. Recognize the components of sentence structure and techniques for oral expression and elocution in Persian.</li> <li>2. Apply oral expression and elocution techniques to improve speaking skills in Persian.</li> <li>3. Outline the effectiveness of different sentence structures and compositions in conveying meaning.</li> <li>4. Summarize the quality and coherence of written compositions in Persian based on established criteria.</li> <li>5. Create an expert translator and high level of interpreter.</li> </ol>
PER-3066	Persian Language & Culture in India	<ol style="list-style-type: none"> <li>1. Describe the contributions of Indian origin writers to Persian literature.</li> <li>2. Sketch the impact of Indian culture on the works of Indian origin Persian writers.</li> <li>3. Develop their knowledge on Persian in research and comparative studies.</li> <li>4. Examine the role of Persian journalism in shaping public discourse in India.</li> <li>5. Propose solutions to address challenges faced by the preservation of Persian language and culture in India.</li> </ol>
PER-4016	Rhetoric & Comprehension	<ol style="list-style-type: none"> <li>1. Recognize the fundamental concepts of rhetoric and comprehension.</li> <li>2. Demonstrate comprehension of complex rhetorical structures and their impact on communication.</li> <li>3. Utilize comprehension skills to extract deeper meanings from texts and speeches.</li> <li>4. Assess the effectiveness of comprehension strategies in extracting meaning from texts.</li> <li>5. Combine comprehension skills with rhetorical techniques to produce insightful interpretations.</li> </ol>
PER-4026	Advance Grammar and Composition	<ol style="list-style-type: none"> <li>1. Recognize different parts of speech, sentence structures, and punctuation rules.</li> <li>2. Explain the significance of proper grammar usage in written and spoken communication to improve creativity.</li> <li>3. Create well-structured and persuasive letters, applications, and essays tailored to specific audiences and contexts.</li> <li>4. Assess the effectiveness of letters, applications, and essays in achieving their intended purposes.</li> <li>5. Combine different writing techniques to craft persuasive arguments and narratives.</li> </ol>
PER-4036	Contemporary Persian World	<ol style="list-style-type: none"> <li>1. Gather information on the political, economic and geographical overview of Persian speaking countries</li> <li>2. Summarize the main themes and trends in the political, social, and cultural histories of Iran, Afghanistan, and Tajikistan.</li> <li>3. Examine the interconnectedness of internal and external factors in influencing the trajectories of these nations.</li> <li>4. Evaluate the impact of historical events and developments on the political stability, social</li> </ol>

		<p>cohesion, and economic development of Iran, Afghanistan, and Tajikistan.</p> <ol style="list-style-type: none"> <li>Integrate diverse perspectives and sources to construct nuanced understandings of complex historical processes. Apply methodologies in spatial distribution, relationship and interaction in social geography</li> </ol>
PER-4046	Advance Translation & Communication Skill in Persian	<ol style="list-style-type: none"> <li>Recognize the components of sentence structure and techniques for oral expression and elocution in Persian.</li> <li>Apply oral expression and elocution techniques to improve speaking skills in Persian.</li> <li>Outline the effectiveness of different sentence structures and compositions in conveying meaning.</li> <li>Summarize the quality and coherence of written compositions in Persian based on established criteria.</li> <li>Create an expert translator and high level of interpreter.</li> </ol>
PER-4056	Dissertation Project	<ol style="list-style-type: none"> <li>Identify basic knowledge on research in different areas of Persian language, literature and culture.</li> <li>List and explain the methodologies and research techniques applicable to the dissertation project.</li> <li>Apply appropriate research methodologies and techniques to gather and analyze data for the dissertation project.</li> <li>Analyze and interpret research data to draw meaningful conclusions and insights related to the research topic.</li> <li>Develop a well-structured and coherent Research Project in future.</li> </ol>
PER-4066	Introduction of Sufism and its impact in India	<ol style="list-style-type: none"> <li>Describe the origin, meaning and development of Sufism in India</li> <li>Illustrate contributions of Sufis in safeguarding human values and International understanding of humanism.</li> <li>Categorize the Sufi orders and the impact on Indian society.</li> <li>Criticize the involvement of Sufism with Power</li> <li>Reconstruct relation between Sufism, spiritualism, mysticism and Bhaktism.</li> </ol>

<b>Department:</b>	<b>Department of Commerce</b>	
<b>Programme:</b>	<b>M.Com</b>	
<b>PSOs</b>	PSO1: Demonstrate an understanding of the advanced concepts in business decision making PSO2: Design strategic thinking to address issues in human resource, marketing, finance, accounting & taxation PSO3: Develop an entrepreneurial mindset, including the ability to identify market opportunities, develop innovative business models, and create new ventures or initiatives within existing organizations. PSO4: Produce high level research output that can significantly contribute to new knowledge in Commerce and Management	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
COM 1016	Business Policy Analysis	CO1: Demonstrate the role of State Intervention in business CO2: Explain the laws relating to economic practices CO3: Evaluate the effectiveness of Public Sector Enterprises CO4: Assess the role of MSME and foreign capital for economic development CO5: Recognize and interpret the special economic package for NE Region
COM 1026	Financial Reporting and Analysis	CO1: Finalize with the idea of Indian and International Accounting Standard and identify its convergence. CO2: Interpret the Conceptual framework for the preparation and presentation of financial statements CO3: Prepare financial statements in accordance with the regulatory framework CO4: Apply the Accounting Ratios for performance evaluation of corporate entities. CO5: Using the Accounting tools (ratio) for diagnosing financial health of corporate entities.
COM 1036	Marketing Policy Analysis	CO1: Identify various marketing concepts and principles CO2: Develop marketing strategies that align with organizational policies and market dynamics. CO3: Utilize marketing tools and techniques to assess the effectiveness of marketing policies and strategies. CO4: Evaluate marketing campaigns to effectively target and engage customers in diverse market environment. CO5: Implement online marketing to manage marketing operations.
COM 1046	Business Statistics	CO1: Describe the utility of sampling dist for estimation CO2: Apply statistical method to solve business problem CO3: Outline the differences between correlation & regression CO4: Estimate variability, Inequality and Uncertainty CO5: Use the knowledge of Uncertainty in decision making.
COM 1056	Financial Markets and Institutions	CO1: Demonstrate the diverse components and structure of Indian Financial System CO2: Analyze the role of financial market and its instruments CO3: Analyze the role of capital market and its instruments CO4: Appraise the importance of banking and its operations in financial system.

		CO5: Compare and contracts between banking and non banking financial institutions.
COM 2016	Economic Legislations	CO1: Analyze business practices in the light of Competition Act CO2: Demonstrate the role of FEMA in facilitating external trade CO3: Infer the role of Legal Metrology Act for standardization and regulation of weights and measures CO4: Identify how SEBI protects investors and promotes the development and regulation of Securities Market CO5: Analyze the impact of Environmental Laws on business practices and the role of RTI Act 2005
COM 2026	Organisational Behaviour	CO1: Define how employees interact within an organization and how these affects the organization functioning CO2: Identify and predict how individuals are likely to behave in various work situations CO3: Outline the insights into the dynamics of working in groups and teams , including the processes of group formation , conflict and decision making CO4: Explain how culture influences employees behavior and organizational effectiveness CO5: Develop leadership skill
COM 2036	Measurement and Evaluation in Education	CO1: Identify the origin and role of Operations Research in decision making CO2: Identify and implement linear programming as a solution to operational challenge CO3: Critically analyze operational system within organization using queuing theory and game theory CO4: Analyze the concept of a computer system and design CO5: Outline the importance of E Commerce
COM 2046	ADVANCED FINANCIAL MANAGEMENT	CO1: Demonstrate the concept of financial management and the risk associated with finance function CO2: Compute the optimal mix of debt and equity to minimize the cost of capital CO3: Identify the Capital Budgeting techniques to evaluate investment projects CO4: Explore the theories and practical considerations behind dividend decision CO5: Identify various business strategies for mergers and acquisitions
COM 2066	Strategic Human Resource Management	CO1: Analyze the HR practices prevalent in the internal and external environment CO2: Identify key management practices and strategies to evaluate employee performance CO3: Design compensation package that align with organizational strategic objectives CO4: Identify various retirement planning options and benefits CO5: Illustrate cultural differences , managing the expatriate and complying labour laws across different countries
COM 2056	Security Analysis & Portfolio Management	CO1: Demonstrate the practical aspect of investment and measure the risk associated with it CO2: Discuss the securities market in India and analyze the purpose and methods of constructing market indices CO3: Examine market efficiency and tools of security analysis CO4: Interpret analysis and revision of portfolios CO5: Classify and evaluate the derivatives market in India

COM 2076	Marketing Research & Consumer Behaviour	<p>CO1: Develop detailed understanding of marketing research including its role and importance</p> <p>CO2: Examine the role and significance of marketing research management</p> <p>CO3: Apply the scientific method to market research including sampling, hypothesis testing etc</p> <p>CO4: Analyze data using statistical tools and enabling them to prepare and present research report</p> <p>CO5: Apply theories of consumer behaviour to real world marketing problems</p>
COM 3016	Research Methodology	<p>CO1: Identify the conceptual framework in research methodology and understand the research design</p> <p>CO2: Select an appropriate sampling technique for a given study</p> <p>CO3: Classify from one to other methods of collecting primary and secondary data for given study</p> <p>CO4: Select appropriate tool for hypothesis testing</p> <p>CO5: Develop a report for research article and Project report</p>
COM 3026	Project Management	<p>CO1: Outline the meaning and need of project management and comprehending the life cycle of a project from conception to termination.</p> <p>CO2: Investigate into each project idea in the context of feasibility study</p> <p>CO3: Explain the viability of the project by using Technical Analysis, Demand Forecasting and Financial Projections</p> <p>CO4: Illustrate the project planning and control by using PERT and CPM</p> <p>CO5: Outline the technique of project implementation and control</p>
COM 3036	International Financial Management	<p>CO1: Identify the concept of international finance and international trade</p> <p>CO2: Examine the International Monetary System and various international finance markets</p> <p>CO3: Analyse the various aspects of Foreign Exchange Market</p> <p>CO4: Examine the various Exchange Rate Theories</p> <p>CO5: Identify foreign exchange exposure and hedging strategies</p>
COM 3046	Advanced Cost and Management Accounting	<p>CO1: Identify various cost concepts used for decision making</p> <p>CO2: Analyze the management control system and responsibility accounting</p> <p>CO3: Demonstrate the use of budgetary control and management information system in decision making</p> <p>CO4: Discuss the concept of value analysis, cost control, cost reduction and cost compliance reports</p> <p>CO5: Examine the various contemporary techniques of cost and management accounting like activity based costing, target costing etc.</p>
COM 3056	Environmental Education (For other Colleges and IDOL)	<p>CO1: Identify the various labour issues in India</p> <p>CO2: Examine the role of Trade Unions in changed economic scenario</p> <p>CO3: Explain the Industrial Relations and Labour Policy since independence</p> <p>CO4: Outline the importance of conflict resolution</p> <p>CO5 Demonstrate the issue of peace and healthy working environment in industrial work life</p>
COM 3066	International Marketing	<p>CO1: Apply the key terms, definitions, and concepts used in marketing with an international</p>

		<p>perspective and Anticipate changes in the operating environment of a business on a global level</p> <p>CO2: Evaluate different cultural, political, and legal environments influencing international trade</p> <p>CO3: Apply basic internationally oriented marketing strategies</p> <p>CO4: Evaluate the impact of global trade organizations and agreements, such as the World Trade Organization (WTO)</p> <p>CO5: Examine the role of various international marketing institutions</p>
COM 3076	Dissertation	<p>CO1: Conduct original research that contributes to the existing body of knowledge in their field of study.</p> <p>CO2: Select and evaluate ideas and information.</p> <p>CO3: Employ appropriate research methodologies and data analysis techniques to address research questions.</p> <p>CO4: Prepare a comprehensive dissertation that adheres to academic standards of structure, style, and citation.</p> <p>CO5: Defend the dissertation's findings and methodology effectively in an academic setting.</p>
COM 4016	Strategic Management	<p>CO1: Assess and formulate organizational missions, objectives, and strategies using analytical frameworks.</p> <p>CO2: Insights into the governance structure of corporations, focusing on the roles, responsibilities, and effectiveness of the Board of Directors and top management.</p> <p>CO3: Perform SWOT Analysis including the application of Porter's Framework</p> <p>CO4: Develop analytical skills for strategic analysis using tools like the Boston Consulting Group's Growth Share Matrix and others.</p> <p>CO5: Identify strategic choices and implementation processes, focusing on diversification strategies, mergers and acquisitions, and the evaluation of synergies.</p>
COM 4026	Entrepreneurship Management	<p>CO1: Examine the importance and evolution of entrepreneurship, its role in economic development, and delve into case studies of successful entrepreneurs both in India and globally.</p> <p>CO2 : Engage with the entrepreneurial process, identifying and evaluating business opportunities, Emphasize the significance of the MSME sector in India, adopt financing strategies, plan capital structures, prepare business plans, and embrace creativity and innovation during startup and growth phases.</p> <p>CO3: Explore start-up financing options, including government schemes, angel investment, venture capital for new ventures.</p> <p>CO4: Develop skills in opportunity identification, business plan formulation, grasp financing strategies, and tackle entrepreneurial challenges, focusing on practical application and critical thinking</p>
COM 4036	Tax Planning	<p>CO1: Identify the principles of tax planning and management</p> <p>CO2: Develop tax planning strategies based on the Income Tax Act</p> <p>CO3: Identify strategies for managing taxation on capital assets and gains, leveraging exemptions to optimize tax liabilities for both long-term and short-term capital gains.</p> <p>CO4: Examine tax planning techniques for various income sources and understand the taxability of government securities and dividends</p>

		CO5: Assess tax planning for partnership firms and companies and other forms of business ventures.
COM 4046	MANAGEMENT OF FINANCIAL SERVICES	CO1: Examine the structure and essential components of the Indian Financial System, identifying the roles and functions of diverse financial institutions and services. CO2: Identify the management of banking services emphasizing on customer relationships, asset and liability management, and integrating risk management principles, including Basel Norms. CO3: Analyze the insurance sector, uncovering the fundamentals of insurance, actuarial practices, risk management techniques, and the regulatory frameworks established by IRDA. CO4: Examine the operations and management of capital markets, focusing on the mechanisms of new capital issues (IPOs, FPOs), along with understanding the roles and duties of market participants in the stock exchange environment. CO5: Analyze credit rating services, learning about the rating process, the variety of ratings available, and the impact of credit rating agencies on financial decision-making and market behaviors.
COM 4056	Strategic Services Marketing	CO1: Identify the nature and classifications of services, analyze consumer behaviours in service encounters, and apply concepts of the service triangle and various service models CO2: Measure service quality, and implement Total Quality Management (TQM) and SERVQUAL systems to enhance service excellence. CO3: Analyze effective marketing mixes for services, design service packages, brand services innovatively, set appropriate pricing, and strategize on service promotions to excel in external marketing efforts. CO4: Outline service location and promotion, evaluate the functioning of service distribution systems, recognize the critical role of employees in marketing services, and incorporate the concept of customers as co-producers in service quality enhancement. CO5: Design engaging physical evidence and service scapes, execute service recovery and empowerment strategies, and build strong customer relationships, emphasizing the pivotal role of frontline staff in fostering relationship growth within the service industry.
COM 4066	Microfinance	CO1: Distinguish microfinance concepts, scope, and benefits, focusing on its evolution in India, to grasp its role in economic empowerment. CO2: Examine structures and operations of MFIs, identify funding sources, and implement effective credit delivery mechanisms. CO3: Analyze the impact of microfinance in India, explore financial inclusion, assess NABARD's contributions, and strategize to overcome sector challenges. CO4: Analyse MFIs by mastering fund management, mitigating risks, and evaluating performance to ensure sustainability and responsibility. CO5: Outline the legal and regulatory frameworks relevant to microfinance in India, complying with essential acts and regulations to uphold standards.
COM 4076	International Business	CO1: Analyze the impact of foreign direct investment and the role of multinational corporations. CO2: Evaluate the effects of regional economic integration initiatives like SAARC, ASEAN, EEC, EEU, NAFTA, SAFTA, and SAPTA on international business operations CO3: Examine India's relationship with the WTO and intellectual property rights to foster

		<p>global trade compliance and advocacy.</p> <p>CO4: Apply knowledge of export-import policy, utilize financial instruments and export-import operations. Master documentation, customs duty, foreign exchange management, and risk management techniques for efficient international payment transfers.</p> <p>CO5: Assess the implications of rupee convertibility on current and capital account transactions, employing hedging techniques, derivatives, and futures to manage financial risks, alongside understanding the roles of IMF and World Bank in global financial stability.</p> <p>CO6: Explore the significance of foreign investment institutions and instruments such as GDRs, ADRs, and FIIs in the Indian capital market, understanding their impact on international investing</p>
COM 4084	E-COMMERCE	<p>Co1: Identify the emergence and evolution of E-commerce, exploring various business models, to comprehend the scope, current trends, and future prospects of E-commerce.</p> <p>CO2: Explore the technological foundations of E-commerce, including internet environments, network types, data communication, and key internet technologies like OSI models, protocols, and cookies, to enable effective E-commerce solutions.</p> <p>CO3: Identify security and privacy measures in E-commerce by understanding encryption, authentication methods, digital signatures, cryptographic algorithms, and biometrics technology, ensuring secure online transactions.</p> <p>CO4; Apply E-marketing concepts, recognizing the advantages of online marketing, E-advertising, E-branding strategies, and the significance of E-CRM, to leverage internet marketing trends for business growth.</p> <p>CO5: Design E-payment systems by analyzing online payment methods, understanding the mechanisms of micro-payments, E-cash, digital currencies, and E-cheques, addressing their properties and legal challenges.</p> <p>CO6: Assess the impact of information technology on banking, exploring E-banking functions like ATM, Mobile Banking, Internet Banking, and the techniques of Electronic Funds Transfer and Automated Clearing Systems, to understand their advantages and limitations.</p>
<b>Programme</b>	Five Year Integrated M.Com	
<b>Programme Specific Outcomes (PSOs)</b>	<p>PSO1: Develop a deep understanding of both foundational and advanced concepts in commerce, finance, accounting, taxation, marketing, and human resources, building a comprehensive skill set that spans the entire spectrum of commerce education from the undergraduate to the graduate level.</p> <p>PSO2: Ability to design, execute, and evaluate research projects that span both basic and advanced levels of Commerce and Management</p> <p>PSO3: Demonstrate an entrepreneurial and strategic mindset that integrates undergraduate curiosity with postgraduate analytical skills.</p> <p>PSO4: Apply a cross-disciplinary approach integrating knowledge from commerce, economics, law, and management studies.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
7.33	Business & Public Policy Analysis	<p>CO1: Demonstrate the role of State Intervention in business</p> <p>CO2: Explain the laws relating to economic practices</p>



		<p>CO3: Evaluate the effectiveness of Public Sector Enterprises          CO4: Assess the role of MSME and foreign capital for economic development          CO5: Recognize and interpret the special economic package for NE Region</p>
7.34	Financial Reporting and Analysis	<p>CO1: Finalize with the idea of Indian and International Accounting Standard and identify its convergence.          CO2: Interpret the Conceptual framework for the preparation and presentation of financial statements          CO3: Prepare financial statements in accordance with the regulatory framework          CO4: Apply the Accounting Ratios for performance evaluation of corporate entities.          CO5: Using the Accounting tools (ratio) for diagnosing financial health of corporate entities.</p>
7.35	Law for Managers	<p>CO1: Interpret the Micro, Small, Medium Enterprise Development Act, 2006, highlighting its key aspects like classification, registration, and promotion of MSMEs.          CO2: Examine the Foreign Exchange Management Act, 1999, focusing on the regulatory framework for foreign exchange, including transactions and compliance requirements.          CO3: Analyze the Competition Act, 2002, with an emphasis on understanding prohibitions against certain agreements, abuse of dominant positions, and the role of the Competition Commission of India.          CO4: Evaluate the Industries (Development &amp; Regulation) Act, 1951, including the process for industrial registration and licensing, and the scope of government interventions.          CO5: Assess laws related to pollution control and environmental protection, notably the Air Act and the Environmental Protection Act, concentrating on compliance standards, pollution control measures, and environmental clearance processes.</p>
7.36	Operations Research and Business Data Analysis	<p>CO1: Identify the origin and role of Operations Research in decision making          CO2: Identify and implement linear programming as a solution to operational challenge          CO3: Critically analyze operational system within organization using queuing theory and game theory          CO4: Analyze the concept of ANOVA          CO5: Analyze the non parametric test</p>
7.37	Marketing Policy Analysis	<p>CO1: Identify various marketing concepts and principles          CO2: Develop marketing strategies that align with organizational policies and market dynamics.          CO3: Utilize marketing tools and techniques to assess the effectiveness of marketing policies and strategies.          CO4: Evaluate marketing campaigns to effectively target and engage customers in diverse market environment.          CO5: Implement online marketing to manage marketing operations.</p>

8.38	Organisational Behaviour	<p>CO1: Define how employees interact within an organization and how these affects the organization functioning</p> <p>CO2: Identify and predict how individuals are likely to behave in various work situations</p> <p>CO3: Outline the insights into the dynamics of working in groups and teams , including the processes of group formation , conflict and decision making</p> <p>CO4: Explain how culture influences employees behavior and organizational effectiveness</p> <p>CO5: Develop leadership skill</p>
8.39	International Business	<p>CO1: Analyze the impact of foreign direct investment and the role of multinational corporations,.</p> <p>CO2: Evaluate the effects of regional economic integration initiatives like SAARC, ASEAN, EEC, EEU, NAFTA, SAFTA, and SAPTA on international business operations</p> <p>CO3: Examine India’s relationship with the WTO and intellectual property rights to foster global trade compliance and advocacy.</p> <p>CO4: Apply knowledge of export-import policy, utilize financial instruments and export-import operations. Master documentation, customs duty, foreign exchange management, and risk management techniques for efficient international payment transfers.</p> <p>CO5: Assess the implications of rupee convertibility on current and capital account transactions, employing hedging techniques, derivatives, and futures to manage financial risks, alongside understanding the roles of IMF and World Bank in global financial stability.</p> <p>CO6: Explore the significance of foreign investment institutions and instruments such as GDRs, ADRs, and FIIs in the Indian capital market, understanding their impact on international investing</p>
8.40	Human Resource Planning and Development	<p>CO1: Understand the core concepts, scope, and evolution of Human Resource Management (HRM), distinguishing it from Personnel Management and exploring the roles and qualities required of HR managers.</p> <p>CO2: Examine strategic HRM, focusing on aligning HR strategies with corporate objectives, environmental analysis, and the HR manager's role as a strategic partner.</p> <p>CO3: Analyze HR processes including job design, HR planning, recruitment, selection, and retention strategies, highlighting their importance in effective manpower management.</p> <p>CO4: Evaluate training and development, employee mobility, absenteeism, and retention strategies, emphasizing their impact on employee development and organizational effectiveness.</p>

		CO5: Assess Performance and Compensation Management, understanding methods of performance appraisal, compensation components, and their influence on employee satisfaction and productivity.
8.41	Entrepreneurship and Project Management	CO1: Examine the importance and evolution of entrepreneurship, its role in economic development, and delve into case studies of successful entrepreneurs both in India and globally. CO2 : Engage with the entrepreneurial process, identifying and evaluating business opportunities, Emphasize the significance of the MSME sector in India, adopt financing strategies, plan capital structures, prepare business plans, and embrace creativity and innovation during startup and growth phases. CO3: Explore start-up financing options, including government schemes, angel investment, venture capital for new ventures. CO4: Illustrate the project planning and control by using PERT and CPM CO5: Outline the technique of project implementation and control
8.42	Financial Markets and Institutions	CO1: Demonstrate the diverse components and structure of Indian Financial System CO2: Analyze the role of financial market and its instruments CO3: Analyze the role of capital market and its instruments CO4: Appraise the importance of banking and its operations in financial system. CO5: Compare and contracts between banking and non banking financial institutions.
9.43	CORPORATE GOVERNANCE AND BUSINESS ETHICS	CO1: Analyze the evolution and application of corporate governance principles, including stakeholder identification, across different countries. CO2: Evaluate corporate governance structures and processes, including issues in mergers and acquisitions, the role of whistleblowers, and instances of corporate misgovernance. CO3: Assess the impact of regulations and guidelines on corporate governance, including those from SEBI and CII, and the importance of audit committees and independent directors. CO4: Identify key findings from renowned corporate governance committees like Cadbury, Greenbury, Hampel, and others to understand their contributions to corporate governance practices. CO5: Demonstrate the role of ethics, values, and corporate social responsibility in business decisions, focusing on ethical decision-making processes, Gandhian ethics, and the management's role in environmental protection.
9.44	ADVANCED FINANCIAL MANAGEMENT	CO1: Demonstrate the concept of financial management and the risk associated with finance function CO2: Compute the optimal mix of debt and equity to minimize the cost of capital CO3: Identify the Capital Budgeting techniques to evaluate investment projects CO4: Explore the theories and practical considerations behind dividend decision CO5: Identify various business strategies for mergers and acquisitions

9.45	Research Methodology	CO1: Identify the conceptual framework in research methodology and understand the research design CO2: Select an appropriate sampling technique for a given study CO3: Classify from one to other methods of collecting primary and secondary data for given study CO4: Select appropriate tool for hypothesis testing CO5: Develop a report for research article and Project report
9.46	Investment Analysis & Portfolio Management	CO1: Demonstrate the practical aspect of investment and measure the risk associated with it CO2: Discuss the securities market in India and analyze the purpose and methods of constructing market indices CO3: Examine market efficiency and tools of security analysis CO4: Interpret analysis and revision of portfolios CO5: Classify and evaluate the derivatives market in India
9.46 B	Industrial Relations & Labour Laws	CO1: Identify the various labour issues in India CO2: Examine the role of Trade Unions in changed economic scenario CO3: Explain the Industrial Relations and Labour Policy since independence CO4: Outline the importance of conflict resolution CO5 Demonstrate the issue of peace and healthy working environment in industrial work life
9.47 A	Advanced Cost and Management Accounting	CO1: Identify various cost concepts used for decision making CO2: Analyze the management control system and responsibility accounting CO3: Demonstrate the use of budgetary control and management information system in decision making CO4: Discuss the concept of value analysis, cost control, cost reduction and cost compliance reports CO5: Examine the various contemporary techniques of cost and management accounting like activity based costing, target costing etc.
9.47 B	Marketing Research & Consumer Behaviour	CO1: Develop detailed understanding of marketing research including its role and importance CO2: Examine the role and significance of marketing research management CO3: Apply the scientific method to market research including sampling, hypothesis testing etc CO4: Analyze data using statistical tools and enabling them to prepare and present research report CO5: Apply theories of consumer behaviour to real world marketing problems
10.48	Strategic Management	CO1: Assess and formulate organizational missions, objectives, and strategies using analytical frameworks. CO2: Insights into the governance structure of corporations, focusing on the roles, responsibilities, and effectiveness of the Board of Directors and top management. CO3: Perform SWOT Analysis including the application of Porter's Framework CO4: Develop analytical skills for strategic analysis using tools like the Boston Consulting Group's Growth Share Matrix and others. CO5: Identify strategic choices and implementation processes, focusing on diversification

		strategies, mergers and acquisitions, and the evaluation of synergies.
10.49	Strategic Services Marketing	<p>CO1: Identify the nature and classifications of services, analyze consumer behaviours in service encounters, and apply concepts of the service triangle and various service models</p> <p>CO2: Measure service quality, and implement Total Quality Management (TQM) and SERVQUAL systems to enhance service excellence.</p> <p>CO3: Analyze effective marketing mixes for services, design service packages, brand services innovatively, set appropriate pricing, and strategize on service promotions to excel in external marketing efforts.</p> <p>CO4: Outline service location and promotion, evaluate the functioning of service distribution systems, recognize the critical role of employees in marketing services, and incorporate the concept of customers as co-producers in service quality enhancement.</p> <p>CO5: Design engaging physical evidence and service scapes, execute service recovery and empowerment strategies, and build strong customer relationships, emphasizing the pivotal role of frontline staff in fostering relationship growth within the service industry.</p>
10.50	Dissertation	<p>CO1: Conduct original research that contributes to the existing body of knowledge in their field of study.</p> <p>CO2: Select and evaluate ideas and information.</p> <p>CO3: Employ appropriate research methodologies and data analysis techniques to address research questions.</p> <p>CO4: Prepare a comprehensive dissertation that adheres to academic standards of structure, style, and citation.</p> <p>CO5: Defend the dissertation's findings and methodology effectively in an academic setting.</p>
10.51 A	International Financial Management	<p>CO1: Identify the concept of international finance and international trade</p> <p>CO2: Examine the International Monetary System and various international finance markets</p> <p>CO3: Analyse the various aspects of Foreign Exchange Market</p> <p>CO4: Examine the various Exchange Rate Theories</p> <p>CO5: Identify foreign exchange exposure and hedging strategies</p>
10.51 B	Strategic Human Resource Management and Practices	<p>CO1: Analyze the HR practices prevalent in the internal and external environment</p> <p>CO2: Identify key management practices and strategies to evaluate employee performance</p> <p>CO3: Design compensation package that align with organizational strategic objectives</p> <p>CO4: Identify various retirement planning options and benefits</p> <p>CO5: Illustrate cultural differences, managing the expatriate and complying labour laws across different countries</p>
10.52B	International Marketing	<p>CO1: Apply the key terms, definitions, and concepts used in marketing with an international perspective and Anticipate changes in the operating environment of a business on a global level</p> <p>CO2: Evaluate different cultural, political, and legal environments influencing international trade</p> <p>CO3: Apply basic internationally oriented marketing strategies</p> <p>CO4:</p> <p>CO5: Examine the role of various international marketing institutions</p>

10.52 A	Tax Planning & Practice	CO1: Identify the principles of tax planning and management CO2: Develop tax planning strategies based on the Income Tax Act CO3: Identify strategies for managing taxation on capital assets and gains, leveraging exemptions to optimize tax liabilities for both long-term and short-term capital gains. CO4: Examine tax planning techniques for various income sources and understand the taxability of government securities and dividends CO5: Assess tax planning for partnership firms and companies and other forms of business ventures.
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<b>Department:</b>	<b>Department of Computer Science</b>	
<b>Programme:</b>	<b>B.Sc. in Computer Science (Major-Minor)</b>	
<b>PSOs</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
COM010104	COMPUTER FUNDAMENTALS AND PROGRAMMING	CO 1: Identify different I/O devices, memory, number systems and data representations. CO 2: Associate with data types, operators, inbuilt functions, principle of control structures, arrays and string in C programming. CO 3: Explain functions, file processing techniques in C programming. CO 4: Distinguish user defined data structures from primitive data structures. CO 5: Solve programming problems that are related to functions, pointers and dynamic memory allocation.
COM020104	COMPUTER ORGANIZATION	CO 1: Describe the basic functional block of a computer. CO 2: Discuss different ways to represent data in memory and arithmetic operations performed on the data. CO 3: Explain the basic instruction set architectures of computer. CO 4: Analyze the hierarchy of memory organization and Input-Output systems used in computer. CO 5: Develop different assembly language programs for 8085 microprocessors
COM030104	OBJECT ORIENTED PROGRAMMING USING C++	CO 1: Define OOP and describe basic data types, different operators, control structures, Function prototyping and call by reference method used in C++. CO 2: Discuss about the concept of class, object, memory allocation for objects, concepts of constructors and destructors used in C++. CO 3: Explain the concept of function overloading and operator overloading. CO 4: Illustrate the concept of inheritance, polymorphism and exception handling mechanism. CO 5: Design C++ program to illustrate different concepts like class, object, constructor, inheritance, virtual functions used in OOP.
COM040104	DATA STRUCTURE	CO 1: Distinguish between linear and non linear data structures. CO 2: Explain different operations performed on array, link list, stack, queue and binary tree. CO 3: Discuss different operations performed on binary tree, representation of binary tree using array and link list.. CO 4: Explain about different sorting and searching algorithms applied on data. CO 5: Analyze the time complexity and space complexity of algorithm. CO 6: Design C++ program to show the operations performed on different data structure..
COM040204	DATABASE MANAGEMENT SYSTEM	CO 1: Describe database management system architectures, its types, advantages and disadvantages. CO 2: Apply Entity Relationship modeling to real world problems and mapping ER to relational model. CO 3: Interpret functional dependencies and categorize a table to specific normalization. CO 4: Analyze various concurrency problems that may happen in database design process. CO 5: Construct complex SQL queries to fetch, delete, update, and create data in DBMS software.

COM040304	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	CO 1: Define and describe sets, relations, functions, its properties and operations. CO 2: Associate with the principles of counting, inclusion, induction and its applications. CO 3: Analyze the growth of functions and discuss asymptotic notations. CO 4: Distinguish and create different graphs, discuss its properties and applications. CO 5: Solve problems that are revolving around mathematical logic e.g. connectives, truth tables, tautologies and contradictions
COM040404	OPERATING SYSTEM	CO 1: Identify different operating systems and its types, functions, applications. CO 2: Explain process, threads and solve process scheduling problems. CO 3: Compare solutions of process synchronizations methods. CO 4: Discuss process deadlock handling techniques. CO 5: Solve memory management issues and discuss memory management solutions.
COM050104	COMPUTER NETWORKS	CO1: Define internet and describe different network topologies and types of networks. CO2: Discuss about different transmission mediums, encoding methods, transmissions modes and switching techniques. CO3: Explain the concept of framing, error control, stop and wait protocols sliding window protocols, protocols of MAC sublayer. CO4: Illustrate the concept of IP address, three way handshaking and DNS. CO5: Compare different routing algorithms used by network layer
COM050204	JAVA PROGRAMMING	CO 1: Describe java programming constructs and operate different java IDEs. CO 2: Explain working principle of various building blocks of java platform. CO 3: Apply object oriented approach using java language to solve required programming problems. CO 4: Differentiate different java string, array methods and its usage. CO 5: Design and develop GUI applications using advanced java packages.
COM05304:	PYTHON PROGRAMMING	CO1: Identify different keywords, operators and input/output formatting in Python. CO2: Explain control statements and functions in Python CO3: Apply object-oriented programming principles in Python. CO4: Analyze the use cases of Python libraries and their significance in various applications. CO5: Assess the robustness of Python code by applying exception handling and understanding the implications of database operations..
COM050404	SOFTWARE ENGINEERING	CO1: Identify different software development processes and their challenges. CO2: Explain software requires specification and translate it into an implementable design, following a structured and organized process. CO3: Apply different software estimation metrics such as cost, effort size, staffing etc. CO4: Design effective use of UML, along with design strategies such as defining software architecture, separation of concerns and design patterns. CO5: Develop a system using OOP concepts
COM050504	WEB TECHNOLOGIES	CO1: Define and describe the working principle of the internet and World Wide Web. CO2: Analyze a web page and identify its elements and attributes. CO3: Apply HTML and CSS in designing a website and web application.



		<p>CO4: Implement server-side functionality using PHP and JavaScript to create interactive web applications.</p> <p>CO5: Develop a web project and identify its elements and attributes and build customized web sites and web applications.</p>
COM060404	ARTIFICIAL INTELLIGENCE	<p>CO1: Describe important historical and current trends addressing artificial intelligence.</p> <p>CO2: Identify and distinguish heuristics searching techniques.</p> <p>CO3: Apply logic programming concepts in AI.</p> <p>CO4: Assess the performance and reliability associated with uncertainty and inconsistencies within AI systems.</p> <p>CO5: Analyze the structure and interpretation of natural languages</p>
COM060104	AUTOMATA THEORY AND LANGUAGES	<p>CO1: Define the concept of finite automata and language accepted by it.</p> <p>CO2: Discuss regular grammar and the properties of regular languages.</p> <p>CO3: Explain the concept of PDA and language accepted by it.</p> <p>CO4: Analyze the simplification of context free language and Normal forms of context free language.</p> <p>CO5: Formulate the concept of pumping lemma for regular language and context free language</p>
COM060204	CLOUD COMPUTING	<p>CO1: Describe client server architecture.</p> <p>CO2: Illustrate the cloud computing architecture.</p> <p>CO3: Explain about different Service Level Agreements (SLAs).</p> <p>CO4: Illustrate data management techniques and security methods used in cloud computing.</p> <p>CO5: Formulate different case studies on open source and commercial clouds</p>
COM060304	COMPLIER DESIGN	<p>CO1: Describe about compilers, its phases and working of compilers.</p> <p>CO2: Computer Regular Expressions, NFA, DFA to recognized tokens.</p> <p>CO3: Design different parsers such as Top down parser, Bottom up parsers like LR, SLR and LALR</p> <p>CO4: Explain intermediate representation i.e. generation of three address codes, representation of it using DAG and devise code optimization solution for a given problem.</p> <p>CO5: Develop Lexical analyzer using Lex and parser generator using Yacc.</p>
COM060504	COMPUTER GRAPHICS	<p>CO1: Describe basic knowledge of core concepts of computer graphics input/output systems.</p> <p>CO2: Explain different techniques for designing computer graphics software.</p> <p>CO3: Design and construct complex geometric models using advanced modeling techniques.</p> <p>CO4: Utilize visible surface detection algorithms to render realistic scenes.</p> <p>CO5: Apply basic illumination models to simulate lighting effects and enhance the visual realism of rendered scenes.</p>
COM060604	DATA MINING AND WAREHOUSING	<p>CO1: Describe the components and architecture of data warehouse architecture</p> <p>CO2: Illustrate different data mining techniques such as association rule mining, clustering and classification.</p>

		<p>CO3: Develop various algorithms like A priori, Pincer Search and DIC used in association rule mining</p> <p>CO4: Explain the working principle of various clustering and classification algorithms like K-means, K-Medoids, PAM, DBSCAN, K-Nearest Neighbor Classifiers etc.</p> <p>CO5: Analyze the uses of web mining, text mining, big data mining, neural networks etc.</p>
COM060704	DESIGN AND ANALYSIS OF ALGORITHMS	<p>CO1: Recognize different algorithm analyzing techniques.</p> <p>CO2: Identify basic algorithm design techniques.</p> <p>CO3: Explain various sorting and searching techniques.</p> <p>CO4: Implement balanced trees and graph algorithms.</p> <p>CO5: Analyze the complexity of string matching algorithms</p>
COM060804	GRAPH THEORY	<p>CO1: Discuss different types of graph and graph traversing methods.</p> <p>CO2: Explain graph connectivity and solve various shortest path problems.</p> <p>CO3: Distinguish between tree graph algorithms.</p> <p>CO4: Discuss classical problems in graph theory and digraphs.</p> <p>CO5: Apply graph coloring algorithms in real world problems.</p>
<b>Department:</b>	<b>Computer Science</b>	
<b>Programme:</b>	<b>Bachelor of Science in Information Technology</b>	
<b>PSOs</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
CIT010104	COMPUTER FUNDAMENTALS	<p>CO1: Identify different number systems and data representations.</p> <p>CO2: Describe various I/O devices, memory and storage solutions.</p> <p>CO3: Apply programming languages to solve simple problems.</p> <p>CO4: Distinguish various computer networking working principles.</p> <p>CO5: Design simple web pages.</p>
CIT010204	INTRODUCTION TO C-PROGRAMMING	<p>CO1: Recognize different C programming language data types, operators, inbuilt functions.</p> <p>CO2: Associate with principle of control structures, arrays and string in C programming.</p> <p>CO3: Explain functions, file processing techniques in C programming.</p> <p>CO4: Distinguish user defined data structures from primitive data structures.</p> <p>CO5: Solve programming problems that are related to functions, pointers and dynamic memory allocation.</p>
CIT010404	MATHEMATICAL FOUNDATION IN INFORMATION TECHNOLOGY	<p>CO 1: Define and describe sets, relations, functions, its properties and operations.</p> <p>CO 2: Associate with the principles of counting, inclusion, induction and its applications.</p> <p>CO 3: Analyse the growth of functions and discuss asymptotic notations.</p> <p>CO 4: Distinguish and create different graphs, discuss its properties and applications.</p> <p>CO 5: Solve problems that are revolving around mathematical logic eg. connectives, truth tables, tautologies and contradictions.</p>
CIT020104	DATA STRUCTURES & ALGORITHMS USING C	<p>CO1: Distinguish between linear and non-linear data structures.</p> <p>CO2: Explain different operations performed on array, link list, stack, queue and binary</p>

		<p>tree.</p> <p>CO2: Discuss about different sorting and searching algorithms applied on data.</p> <p>CO3: Explain the concept of function overloading and operator overloading.</p> <p>CO4: Analyze the time complexity and space complexity of algorithm.</p> <p>CO5: Design C++ program to show the operations performed on different data structure.</p>
CIT020204	DIGITAL LOGIC FUNDAMENTALS	<p>CO1: Identify, discuss number systems used in computer science and mathematical operations.</p> <p>CO2: Apply and solve problems concerning to digital logic, boolean algebra.</p> <p>CO3: Define sequential and combinational circuits.</p> <p>CO4: Design various circuits to solve complex logical problems.</p> <p>CO5: Construct sequential circuits like ripple counter, shift register, RAM etc.</p>
CIT020404	COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS	<p>CO1: Identify different number representations in computer arithmetic.</p> <p>CO2: Design and compute algebraic and transcendental equations.</p> <p>CO3: Apply interpolation and differential equation.</p> <p>CO4: Extrapolation of descriptive statistics.</p> <p>CO5: Measure and rank central tendencies in descriptive statistics</p>
CIT030104	COMPUTER ORGANIZATION AND ARCHITECTURE	<p>CO1: Describe the basic functional block of a computer.</p> <p>CO2: Discuss different ways to represent data in memory and arithmetic operations performed on the data.</p> <p>CO3: Explain the basic instruction set architectures of computer.</p> <p>CO4: Analyze the hierarchy of memory organization and Input-Output systems used in computer.</p> <p>CO5: Develop different assembly language programs for 8085 microprocessor.</p>
CIT030404	OPERATING SYSTEM	<p>CO1: Identify different operating systems and its types, functions, applications.</p> <p>CO2: Explain process, threads and solve process scheduling problems.</p> <p>CO3: Compare solutions of process synchronizations methods.</p> <p>CO4: Discuss process deadlock handling techniques.</p> <p>CO5: Solve memory management issues and discuss memory management solutions.</p>
CIT030304	OBJECT ORIENTED PROGRAMMING THROUGH C++	<p>CO1: Define OOP and describe basic data types, different operators, control structures, Function prototyping and call by reference method used in C++.</p> <p>CO2: Discuss about the concept of class, object, memory allocation for objects, concepts of constructors and destructors used in C++.</p> <p>CO3: Explain the concept of function overloading and operator overloading.</p> <p>CO4: Illustrate the concept of inheritance, polymorphism and exception handling mechanism.</p> <p>CO5: Design C++ program to illustrate different concepts like class, object, constructor, inheritance, virtual functions used in OOP.</p>
CIT040104	DATABASE MANAGEMENT SYSTEM	<p>CO1: Describe database management system architectures, its types, advantages and disadvantages.</p> <p>CO2: Apply Entity Relationship modelling to real world problems and mapping ER to relational model.</p> <p>CO3: Interpret functional dependencies and categorize a table to specific normalization.</p>

		CO4: Analyze various concurrency problems that may happen in database designing process. CO5: Construct complex SQL queries to fetch, delete, update, and create data in DBMS software.
CIT040304	AUTOMATA THEORY AND LANGUAGES	CO1: Define the concept of finite automata and language accepted by it. CO2: Discuss regular grammar and the properties of regular languages. CO3: Explain the concept of PDA and language accepted by it. CO4: Analyse the simplification of context free language and Normal forms of context free language. CO5: Formulate the concept of pumping lemma for regular language and context free language.
CIT040404	PYTHON PROGRAMMING	CO1: Identify different keywords, operators and input/output formatting in Python. CO2: Explain control statements and functions in Python CO3: Apply object-oriented programming principles in Python. CO4: Analyze the use cases of Python libraries and their significance in various applications. CO5: Assess the robustness of Python code by applying exception handling and understanding the implications of database operations.
CIT040504	DESIGN AND ANALYSIS OF ALGORITHMS	CO1: Recognize different algorithm analyzing techniques. CO2: Identify basic algorithm design techniques. CO3: Explain various sorting and searching techniques. CO4: Implement balanced trees and graph algorithms. CO5: Analyze the complexity of string-matching algorithms.
CIT050104	SOFTWARE ENGINEERING	CO1: Identify different software development processes and their challenges. CO2: Explain software requires specification and translate it into an implementable design, following a structured and organized process. CO3: Apply different software estimation metrics such as cost, effort size, staffing etc. CO4: Design effective use of UML, along with design strategies such as defining software architecture, separation of concerns and design patterns. CO5: Develop a system using OOP concepts
CIT050204	WEB TECHNOLOGIES	CO1: Define and describe the working principle of the internet and world wide web. CO2: Analyze a web page and identify its elements and attributes. CO3: Apply HTML and CSS in designing a website and web application. CO4: Implement server-side functionality using PHP and Javascript to create interactive web applications. CO5: Develop a web project and identify its elements and attributes and build customized web sites and web applications.
CIT050304	JAVA PROGRAMMING	CO 1: Describe java programming constructs and operate different java IDEs. CO 2: Explain working principle of various building blocks of java platform. CO 3: Apply object oriented approach using java language to solve required programming problems. CO 4: Differentiate different java string, array methods and its usage. CO 5: Design and develop GUI applications using advanced java packages
CIT050404	COMPUTER NETWORKS	CO1: Define internet and describe different network topologies and types of networks. CO2: Discuss about different transmission mediums, encoding methods,

		<p>transmissions modes and switching techniques.</p> <p>CO3: Explain the concept of framing, error control, stop and wait protocols sliding window protocols, protocols of MAC sublayer.</p> <p>CO4: Illustrate the concept of IP address, three way handshaking and DNS.</p> <p>CO5: Compare different routing algorithms used by network layer.</p>
CIT060104	COMPUTER GRAPHICS	<p>CO1: Describe basic knowledge of core concepts of computer graphics input/output systems.</p> <p>CO2: Explain different techniques for designing computer graphics software.</p> <p>CO3: Design and construct complex geometric models using advanced modeling techniques.</p> <p>CO4: Utilize visible surface detection algorithms to render realistic scenes.</p> <p>CO5: Apply basic illumination models to simulate lighting effects and enhance the visual realism of rendered scenes.</p>
CIT060204	INFORMATION SECURITY AND CYBER LAWS	<p>CO1: Explain fundamental concepts of CIA triad, Cryptography, Encryption.</p> <p>CO2: Identify different program security attacks and its protection methods.</p> <p>CO3: Discuss cybersecurity laws under Information technology Act 2000, India.</p> <p>CO4: Compare network security threat and attack strategies.</p> <p>CO5: Plan to detect loophole in a system for cyber attack.</p>
CIT060404	ARTIFICIAL INTELLIGENCE	<p>CO1: Describe important historical and current trends addressing artificial intelligence.</p> <p>CO2: Identify and distinguish heuristics searching techniques.</p> <p>CO3: Apply logic programming concepts in AI.</p> <p>CO4: Assess the performance and reliability associated with uncertainty and inconsistencies within AI systems.</p> <p>CO5: Analyze the structure and interpretation of natural languages.</p>
CIT060504	ADVANCED WEB PROGRAMMING	<p>CO1: Describe different HTML and CSS components.</p> <p>CO2: Apply languages like HTML, CSS and XML to design websites.</p> <p>CO3: Extend static websites using DHTML and JavaScript.</p> <p>CO4: Design and develop web applications using JavaScript and PHP.</p> <p>CO5: Propose and demonstrate live web applications.</p>
CIT060604	DATA MINING AND WAREHOUSING	<p>CO1: Describe the components and architecture of data warehouse architecture</p> <p>CO2: Illustrate different data mining techniques such as association rule mining, clustering and classification.</p> <p>CO3: Develop various algorithms like A priori, Pincer Search and DIC used in association rule mining</p> <p>CO4: Explain the working principle of various clustering and classification algorithms like K-means, K-Medoids, PAM, DBSCAN, K-Nearest Neighbor Classifiers etc.</p> <p>CO5: Analyze the uses of web mining, text mining, big data mining, neural networks etc.</p>
CIT060704	OPTIMIZATION TECHNIQUES	<p>CO1: Point out different optimization techniques.</p> <p>CO2: Interrelate different optimization techniques.</p> <p>CO3: Analyze queuing theory.</p> <p>CO4: Rank constrained and unconstrained optimization techniques.</p>

		CO5: Illustrate and interpolate data using optimization.
CIT060804	MOBILE APPLICATION DEVELOPMENT	CO1: Describe the basics of mobile application development and the components of a mobile application. CO2: Develop proficiency in native Android application development using XML and Java/Kotlin. CO3: Apply different system components in advance android application development. CO4: Demonstrate cross-platform mobile application development using Flutter and Dart CO5: Create android applications, such as reader application and chat application for end users.
CIT060904	GRAPH THEORY	CO1: Discuss different types of graph and graph traversing methods. CO2: Explain graph connectivity and solve various shortest path problems. CO3: Distinguish between tree graph algorithms. CO4: Discuss classical problems in graph theory and digraphs. CO5: Apply graph coloring algorithms in real world problems.
CIT061104	SYSTEM SOFTWARE	CO1: Identify different types of software and their applications. CO2: Explain the working of an assembler. CO3: Differentiate between different loader types. CO4: Analyze the process of conditional macro expansion and its implications in software development. CO5: Describe the key components and phases involved in the compilation process
CIT061004	PROJECT	CO1: Outline different research and development problems on their interested domain. CO2: Demonstrate their technical writing skill. CO3: Compare and distinguish different technologies on their domain. CO4: Prepare and summarize their findings on a report on a given topic. CO5: Develop their ideas on selected topics on recent technologies
<b>Department:</b>	<b>Department of Computer Science</b>	
<b>Programme:</b>	<b>Master of Science in Computer Science</b>	
<b>PSOs</b>	PSO-1: Illustrate the hardware and software technologies that provide computing solutions to address the needs of an organization. PSO-2: Develop socially acceptable technical solutions to computer science problems with application of modern and appropriate techniques for sustainable development relevant to professional engineering practices. PSO-3: Apply the knowledge of ethical and management principles inherent in the discipline of computing to work in a team as well as to lead a team. PSO-4: Demonstrate advanced computational skills, utilizing cutting edge technology and methodologies for research and data analysis..	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
CSC1016	ADVANCED CONCEPTS IN OOP	CO1: Define the concept of Object Oriented Programming CO2: Distinguish between structured programming and Object Oriented Programming methodologies. CO3: Develop programs using different object oriented programming features such as data abstraction polymorphism, inheritance, exception handling etc. CO4: Analyze different object Oriented Design Approaches and implement it to real life problems. CO5: Transform the different Object Modeling Techniques (OMT) techniques into application.

CSC1026	ADVANCED COMPUTER ORGANIZATION AND ARCHITECTURE	CO1: Explain the basic instruction set architectures of computer. CO2: Analyze different Input-Output systems and memory organization used in computer architecture. CO3: Classify various control unit operations. CO4: Illustrate different parallel architectures. CO5: Compare the performance of various scheduling algorithms such as pipeline scheduling, dynamic scheduling and static scheduling algorithms
CSC1036	OPERATING SYSTEM	CO1: Recognize the design approaches of advanced operating systems such as memory architectures, scheduling, deadlock handling etc. CO2: Analyze the design issues of distributed operating systems. CO3: Compare various design issues of multi processor operating systems. CO4: Distinguish the concept of various Scheduling algorithms used in distributed system CO5: Explain the concept of security measures used in distributed operating system
CSC1046	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	CO1: Define the various terms and proofs of theorems used in basic discrete mathematics CO2: Apply Predicate and Propositional Calculus to express logical statements and derive conclusions. CO3: Solve problems in formal languages, automata and grammars. CO4: Explain the concept of Graphs, Hamiltonian Graph, Euler graphs and graph representation techniques. CO5: Convert real life applications to graph theoretic problems
CSC1056	ADVANCED DATABASE MANAGEMENT SYSTEM	CO1: Define Relational models, schemas and formation of queries in Relational Algebra and Calculus. CO2: Analyze the concepts of Functional dependencies and normalization techniques. CO3: Develop Entity Relationship (ER) and Extended ER diagrams for real life database problems. CO4: Compare different transactions, concurrency control and database recovery techniques. CO5: Explain the concepts of Object-oriented, Distributed, Image, Multimedia and Spatial databases and various content-based indexing and retrieval techniques
CSC2016	DATA COMMUNICATION AND COMPUTER NETWORKS	CO1: Describe different synchronous and asynchronous transmission technologies. CO2: Identify the different types of network topologies and protocols. CO3: Explain data communication system and its components. CO4: Apply the skill of sub-netting and routing mechanism. CO5: Compare different network structures.
CSC2026	ALGORITHMS AND COMPLEXITY THEORY	CO1: Describe the best, average, worst case time complexity of algorithms. CO2: Explain the big O, omega and theta notations and their usage to give asymptotic upper, lower and tight bounds on time and space complexity of algorithms. CO3: Compare sorting and order statistics algorithms and solve problems using fundamental graph algorithms. CO4: Define the classes P and NP and explain the significance of NP completeness. CO5: Design and explain a simple neural network.

CSC2036	SOFTWARE ENGINEERING	<p>CO1: Identify different software development processes and their challenges.</p> <p>CO2: Explain software require specification and translate it into an implementable design, following a structured and organize process.</p> <p>CO3: Apply different software estimation metrics such as cost, effort size, staffing etc.</p> <p>CO4: Design effective use of UML, along with design strategies such as defining software architecture, separation of concerns and design patterns.</p> <p>CO5: Develop a system using OOP concepts</p>
CSC2046	COMPUTER GRAPHICS AND MULTIMEDIA	<p>CO1: Describe basic knowledge of core concepts of computer graphics' input/output systems.</p> <p>CO2: Explain different algorithms such as line drawing algorithms, area filling algorithms, clipping algorithms etc that are essential for designing computer graphics software.</p> <p>CO3: Explain 2D/3D geometric transformations and viewing techniques.</p> <p>CO4: Compare different colour models, visible surface rendering method, methods</p> <p>CO5: Design an animation system for mobile or desktop application.</p>
CSC2056	ADVANCED DATA STRUCTURE	<p>CO1: Define linear and non-linear data structures like stacks, queues, linked list etc.</p> <p>CO2: Explain problems related to data dictionary data structures such as search tree, AVL tree, Red Black trees, Splay trees and Hashing.</p> <p>CO3: Compare different Sorting and Searching techniques such as Quick sort, Heap Sort, Radix Sort, Counting Sort, BST, Median and Order Statistics and Heap data structures.</p> <p>CO4: Analyze partition ADT using Union-find algorithms through weighted merge and path compression</p> <p>CO5: Implement B tree, B+ tree used for external storage operation</p>
CSC3016	THEORY OF COMPUTATIONS	<p>CO1: Define the concept of PDA and language accepted by it.</p> <p>CO2: Associate the relation of Pushdown Automaton with Finite State Automata and CFL.</p> <p>CO3: Explain the concept of Turing machines as language accepters function evaluators and various TM models</p> <p>CO4: Formulate the proves of basic results of Decidable and Un-decidable problems</p> <p>CO5: Compare the relations between classes of languages, the Chomsky Hierarchy.</p>
CSC3026	DISTRIBUTED SYSTEMS	<p>CO1: Describe the architecture and different system models of distributed systems.</p> <p>CO2: Analyze different process synchronization, Global state recording and termination detection algorithms in distributed systems.</p> <p>CO3: Compare different Mutual Exclusion, leader election algorithms, different distributed file structures</p> <p>CO4: Distinguish the Inter-process communication techniques in distributed systems.</p> <p>CO5: Implement the idea of failure handling, concurrency management and Security handling issues</p>
CSC3036	COMPILER DESIGN	<p>CO1: Describe about compilers, its phases and working of compilers.</p> <p>CO2: Develop Lexical analyzer using finite automata</p> <p>CO3: Describe and recognize different parsing methods like top down parsing, bottom up parsing and parser generator</p>



		like YACC CO4: Generation of intermediate code and DAG representation of three address codes. CO5: Explain code optimization.
CSC3046	SEMINAR	CO1: Outline different research and development problems on various domains of interest. CO2: Demonstrate how to improve communication and presentation skills. CO3: Compare and distinguish different technologies on their domain. CO4: Prepare and summarize findings on a report on a given topic. CO5: Develop ideas on selected topics on recent technologies.
CSC3056	IMAGE PROCESSING	CO1: Define and identify different steps of digital image processing. CO2: Apply principles and techniques of digital image processing in applications related to digital imaging system design and analysis. CO3: Differentiate different image compression techniques. CO4: Compare different binary image processing techniques. CO5: Analyze and implement different image transformation and enhancement technique such as DFT, FFT, Filtering, Histogram processing.
CSC3066	DATA MINING AND WAREHOUSING	CO1: Describe the components and architecture of data warehouse architecture CO2: Illustrate different data mining techniques such as association rule mining, clustering and classification. CO3: Implement various association mining algorithms like FR-tree growth, A priori and border algorithm CO4: Explain the working principle of various clustering and classification algorithms like K-means, DBSCAN, CURE, BIRC, ROCK, CART, C4.5 etc. CO5: Analyze the uses of web mining, text mining and sequential data mining
CSC3076	WEB PROGRAMMING AND TECHNOLOGIES	CO1: Define and describe working principle of internet and world wide web. CO2: Analyze a web page and identify its elements and attributes. CO3: Create interactive web applications using AJAX. Differentiate between client side web technologies and server side web technologies. CO4: Apply languages like HTML, DHTML, CSS, XML, JavaScript, VBScript, ASP, PHP, JSP, Servlet and protocols in the workings of the web and web applications CO5: Develop a web project and identify its elements and attributes and build customized web sites and web applications
CSC4016	PROGRAMMING LANGUAGES	CO1: Define the concept of syntax and semantics used in different types of programming paradigms. CO2: Illustrate the data types, syntax and semantics used in imperative programming paradigms CO3: Distinguish between Imperative programming and OOP paradigms (C++/Java). CO4: Develop functional programming using LISP CO5: Design logical programming using PROLOG
CSC4026	PROJECT	CO1: Identify, search, study and work on real-life applications of CS/IT independently. CO2: Devise their thoughts and ideas to develop new innovative solutions.

		<p>CO3: Compose their findings and analysis in the form of a dissertation.          CO4: Compare and distinguish already solved problems and try to improve them.          CO5: Develop new systems within a time bound.</p>
CSC4036	EMBEDDED SYSTEM	<p>CO1: Define and describe the basic principles of embedded processors.          CO2: Explain different I/O programming.          CO3: Analyze different embedded processor architecture such as 8085, 8051, 8086.          CO4: Distinguish different Concurrency control and Scheduling methodologies used in embedded technology.          CO5: Design of systems on RTOS based embedded software in developing a complex embedded system product.</p>
CSC4046	ARTIFICIAL INTELLEGENCE	<p>CO1: Describe important historical and current trends addressing Artificial Intelligence.          CO2: Identify and distinguish heuristics searching techniques.          CO3: Apply logic programming concepts in AI.          CO4: Explain the components of expert system.          CO5: Analyze different knowledge representation methods</p>
CSC4056	SPEECH PROCESSING	<p>CO1: Define basic properties of speech signal in relation to production and perception.          CO2: Explain different algorithms for speech features analysis common to many applications.          CO3: Compare different speech features.          CO4: Design a speech recognition model.          CO5: Develop a speech recognition model using any tool.</p>
CSC4066	APPLIED GRAPH THEORY AND ALGORITHMS	<p>CO1: Discuss various shortest path problems.          CO2: Explain different graph matching problems.          CO3: Discuss flows in network and algorithms associated with it.          CO4: Implement graph coloring algorithms.          CO5: Design modeling of various physical networks.</p>
CSC4076	SYSTEM ADMINISTRATION AND NETWORKING	<p>CO1: Define the basic concepts of Linux OS such as file system, file hierarchy, processes, distributions, disk partitions          CO2: Compute various basic commands in Linux for setting user and group ownerships of files and directories, access permissions; commands related to process, system monitoring and logging, file system handling and network configurations.          CO3: Explain network systems, the resolver library to arrange TCP/IP services, set up IP-address, network masks etc.          CO4: Illustrate the use and configuration of DNS, NFS, NIS, telnet, send mail etc          CO5: Explain Linux installation, backup, recovery etc.</p>
CSC4086	WIRELESS COMMUNICATION AND NETWORKS	<p>CO1: Define different modulation techniques such AM, FM, BPSK, QPSK, QAM OFDM, FHSS, DSSS          CO2: Explain the IEEE 802 protocol Architecture</p>

		CO3: Analyze the concept of Mobility Management - handoff and location management CO4: Illustrate different multiple access techniques for wireless communication such as FDMA, TDMA etc. CO5: Explain WAP architecture and services
CSC4096	QUEUING THEORY AND OPERATIONS RESEARCH	CO1: Describe linear programming techniques using simplex method and the two-phase algorithm CO2: Compare simplex method and the dual simplex method CO3: Illustrate the problem of reduction of the game problem into a linear programming problem CO4: Explain dynamic programming and integer programming CO5: Identify NP hard optimization problem
<b>Department:</b>	<b>Department of Computer Science</b>	
<b>Programme:</b>	<b>Master of Science in Information Technology</b>	
<b>PSOs</b>	PSO-1: Illustrate the hardware and software technologies that provide information technology solutions to address the needs of an organization. PSO-2: To train the student on various IT tools and techniques and facilitate them to comprehend, analyze, design and create feasible IT solutions for real life problems PSO-3: Apply the knowledge of modern programming languages, environments and platforms to develop good interpersonal skills and develop a zest for pursuing higher studies in core areas of IT PSO-4: Demonstrate advanced computational skills, utilizing cutting edge technology and methodologies for research and data analysis.	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
INF1016	ADVANCED CONCEPTS IN OOP	CO1: Define the concept of Object-Oriented Programming CO2: Distinguish between structured programming and Object Oriented Programming methodologies. CO3: Develop programs using different object oriented programming features such as data abstraction polymorphism, inheritance, exception handling etc. CO4: Analyze different object Oriented Design Approaches and implement it to real life problems. CO5: Transform the different Object Modeling Techniques (OMT) techniques into application.
INF1026	ADVANCED COMPUTER ORGANIZATION AND ARCHITECTURE	CO1: Explain the basic instruction set architectures of computer. CO2: Analyze different Input-Output systems and memory organization used in computer architecture. CO3: Classify various control unit operations. CO4: Illustrate different parallel architectures. CO5: Compare the performance of various scheduling algorithms such as pipeline scheduling, dynamic scheduling and static scheduling algorithms
INF1036	OPERATING SYSTEM	CO1: Recognize the design approaches of advanced operating systems such as memory architectures, scheduling, deadlock handling etc. CO2: Analyze the design issues of distributed operating systems. CO3: Compare various design issues of multi processor operating systems. CO4: Distinguish the concept of various Scheduling algorithms used in distributed system CO5: Explain the concept of security measures used in distributed operating system
CSC1046	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	CO1: Define the various terms and proofs of theorems used in basic discrete mathematics CO2: Apply Predicate and Propositional Calculus to express logical statements and derive conclusions. CO3: Solve

		problems in formal languages, automata and grammars. CO4: Explain the concept of Graphs, Hamiltonian Graph, Euler graphs and graph representation techniques. CO5: Convert real life applications to graph theoretic problems.
INF1056	ADVANCED DATABASE MANAGEMENT SYSTEM	CO1: Define Relational models, schemas and formation of queries in Relational Algebra and Calculus. CO2: Analyze the concepts of Functional dependencies and normalization techniques. CO3: Develop Entity Relationship (ER) and Extended ER diagrams for real life database problems. CO4: Compare different transactions, concurrency control and database recovery techniques. CO5: Explain the concepts of Object-oriented, Distributed, Image, Multimedia and Spatial databases and various content-based indexing and retrieval techniques
INF2016	DATA COMMUNICATION AND COMPUTER NETWORKS	CO1: Describe different synchronous and asynchronous transmission technologies. CO2: Identify the different types of network topologies and protocols. CO3: Explain data communication system and its components. CO4: Apply the skill of sub-netting and routing mechanism. CO5: Compare different network structures.
INF2026	ALGORITHMS AND COMPLEXITY THEORY	CO1: Describe the best, average, worst case time complexity of algorithms. CO2: Explain the big O, omega and theta notations and their usage to give asymptotic upper, lower and tight bounds on time and space complexity of algorithms. CO3: Compare sorting and order statistics algorithms and solve problems using fundamental graph algorithms. CO4: Define the classes P and NP and explain the significance of NP completeness. CO5: Design and explain a simple neural network.
INF2036	SOFTWARE ENGINEERING	CO1: Identify different software development processes and their challenges. CO2: Explain software require specification and translate it into an implementable design, following a structured and organize process. CO3: Apply different software estimation metrics such as cost, effort size, staffing etc. CO4: Design effective use of UML, along with design strategies such as defining software architecture, separation of concerns and design patterns. CO5: Develop a system using OOP concepts
INF2046	COMPUTER GRAPHICS AND MULTIMEDIA	CO1: Describe basic knowledge of core concepts of computer graphics input/output systems. CO2: Explain different techniques such as line drawing algorithms, area filling algorithms, clipping algorithms etc that are essential for designing computer graphics software. CO3: Explain 2D/3D geometric transformations and viewing techniques. CO4: Compare different colour models, visible surface rendering method, methods CO5: Design an animation system for mobile or desktop application.

INF2056	ADVANCED DATA STRUCTURE	<p>CO1: Define linear and non-linear data structures like stacks, queues, linked list etc.          CO2: Explain problems related to data dictionary data structures such as search tree, AVL tree, Red Black trees, Splay trees and Hashing.          CO3: Compare different Sorting and Searching techniques such as Quick sort, Heap Sort, Radix Sort, Counting Sort, BST, Median and Order Statistics and Heap data structures.          CO4: Analyze partition ADT using Union-find algorithms through weighted merge and path compression          CO5: Implement B tree, B+ tree used for external storage operation.</p>
INF3016	WEB PROGRAMMING AND TECHNOLOGIES	<p>CO1: Define and describe working principle of internet and world wide web.          CO2: Analyze a web page and identify its elements and attributes.          CO3: Create interactive web applications using AJAX. Differentiate between client side web technologies and server side web technologies.          CO4: Apply languages like HTML, DHTML, CSS, XML, JavaScript, VBScript, ASP, PHP, JSP, Servlet and protocols in the workings of the web and web applications          CO5: Develop a web project and identify its elements and attributes and build customized web sites and web applications</p>
INF3026	DISTRIBUTED SYSTEMS	<p>CO1: Describe the architecture and different system models of distributed systems.          CO2: Analyze different process synchronization, Global state recording and termination detection algorithms in distributed systems.          CO3: Compare different Mutual Exclusion, leader election algorithms, different distributed file structures          CO4: Distinguish the Inter-process communication techniques in distributed systems.          CO5: Implement the idea of failure handling, concurrency management and Security handling issues</p>
INF3036	COMPILER DESIGN	<p>CO1: Describe about compilers, its phases and working of compilers. CO2: Develop Lexical analyzer using finite automata CO3: Describe and recognize different parsing methods like top down parsing, bottom up parsing and parser generator like YACC CO4: Generation of intermediate code and DAG representation of three address codes. CO5: Explain code optimization.</p>
INF3046	SEMINAR	<p>CO1: Outline different research and development problems on various domains of interest.          CO2: Demonstrate how to improve communication and presentation skills.          CO3: Compare and distinguish different technologies on their domain.          CO4: Prepare and summarize findings on a report on a given topic.          CO5: Develop ideas on selected topics on recent technologies.</p>
INF3056	IMAGE PROCESSING	<p>CO1: Define and identify different steps of digital image processing.          CO2: Apply principles and techniques of digital image processing in applications related to digital imaging system design and analysis.          CO3: Differentiate different image compression techniques.</p>

		CO4: Compare different binary image processing techniques. CO5: Analyze and implement different image transformation and enhancement technique such as DFT, FFT, Filtering, Histogram processing.
INF3066	DATA MINING AND WAREHOUSING	CO1: Describe the components and architecture of data warehouse architecture CO2: Illustrate different data mining techniques such as association rule mining, clustering and classification. CO3: Implement various association mining algorithms like FR-tree growth, A priori and border algorithm CO4: Explain the working principle of various clustering and classification algorithms like K-means, DBSCAN, CURE, BIRC, ROCK, CART, C4.5 etc. CO5: Analyze the uses of web mining, text mining and sequential data mining.
INF3076	E-COMMERCE TECHNOLOGY	CO1: Explain various terms and services associated with internet and web page designing CO2: Discuss client/server model of the web. CO3: Identify and analyze various web security technologies along with various advanced web technologies. CO4: Distinguish the working principle of different web server technologies and architectures. CO5: Design and develop dynamic, interactive web applications with robust server technology and security.
INF3086	SOFTWARE TESTING AND QUALITY ASSURANCE	CO1: Identify different Quality control tools and problems with traditional quality assurance. CO2: Explain the terminologies and approaches used in software testing. CO3: Design a test inventory system. CO4: Differentiate different Risk analysis and data analysis techniques CO5: Analyze the characteristics of static, dynamic and modern testing tools
INF3096	SOFTWARE PROJECT MANAGEMENT	CO1: Identify different Project planning and management infrastructure CO2: Explain various estimation, scheduling concepts and quantitative quality management planning CO3: Illustrate the concept of ACIC measurement and project tracking plans CO4: Summarize concepts of Project review, monitoring and control. CO4: Use project management tools like Microsoft Project 2000
INF4016	PROGRAMMING LANGUAGES	CO1: Define the concept of syntax and semantics used in different types of programming paradigms. CO2: Illustrate the data types, syntax and semantics used in imperative programming paradigms CO3: Distinguish between Imperative programming and OOP paradigms (C++/Java). CO4: Develop functional programming using LISP CO5: Design logical programming using PROLOG
INF4026	PROJECT	CO1: Identify, search, study and work on real-life applications of CS/IT independently. CO2: Devise their thoughts and ideas to develop new innovative solutions. CO3: Compose their findings and analysis in the form of a dissertation. CO4: Compare and distinguish already solved problems and try to improve it. CO5: Develop new systems within a time bound.

INF4036	EMBEDDED SYSTEM	<p>CO1: Define and describe the basic principles of embedded processors.</p> <p>CO2: Explain different I/O programming.</p> <p>CO3: Analyze different embedded processor architecture such as 8085, 8051, 8086.</p> <p>CO4: Distinguish different Concurrency control and Scheduling methodologies used in embedded technology.</p> <p>CO5: Design of systems on RTOS based embedded software in developing a complex embedded system product.</p>
INF4046	ARTIFICIAL INTELLEGENCE	<p>CO1: Describe important historical and current trends addressing Artificial Intelligence.</p> <p>CO2: Identify and distinguish heuristics searching techniques.</p> <p>CO3: Apply logic programming concepts in AI.</p> <p>CO4: Explain the components of expert system.</p> <p>CO5: Analyze different knowledge representation methods.</p>
INF4056	SPEECH PROCESSING	<p>CO1: Define basic properties of speech signal in relation to production and perception.</p> <p>CO2: Explain different algorithms for speech features analysis common to many applications.</p> <p>CO3: Compare different speech features.</p> <p>CO4: Design a speech recognition model.</p> <p>CO5: Develop a speech recognition model using any tool.</p>
INF4066	AGENT TECHNOLOGIES	<p>CO1: Define the attributes, classes and uses of various software agents</p> <p>CO2: Explain the concept of agent oriented programming, agent communication languages and agent based frameworks</p> <p>CO3: Analyze different Inter-agent Interaction Protocols</p> <p>CO4: Illustrate multi-agent interactions communication, Agent security issues and Black Box Security issuses</p> <p>CO5: Develop Java based programming environments such as ABLE, Agent-Builder, Aglets, FIPA-OS, Gossip etc.</p>
INF4076	SYSTEM ADMINISTRATION AND NETWORKING	<p>CO1: Define the basic concepts of Linux OS such as file system, file hierarchy, processes, distributions, disk partitions</p> <p>CO2: Compute various basic commands in Linux for setting user and group ownerships of files and directories, access permissions; commands related to process, system monitoring and logging, file system handling and network configurations.</p> <p>CO3: Explain network systems, the resolver library to arrange TCP/IP services, set up IP-address, network masks etc.</p> <p>CO4: Illustrate the use and configuration of DNS, NFS, NIS, telnet, send mail etc</p> <p>CO5: Explain Linux installation, backup, recovery etc.</p>
INF4086	WIRELESS COMMUNICATION AND NETWORKS	<p>CO1: Define different modulation techniques such AM, FM, BPSK, QPSK, QAM OFDM, FHSS, DSSS</p> <p>CO2: Explain the IEEE 802 protocol Architecture</p>

		CO3: Analyze the concept of Mobility Management - handoff and location management CO4: Illustrate different multiple access techniques for wireless communication such as FDMA, TDMA etc. CO5: Explain WAP architecture and services
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<b>Department:</b>	<b>Department of Bengali</b>	
<b>Programme:</b>	<b>PG Courses</b>	
<b>PSOs</b>	<p>I. Demonstrate an understanding of socio-cultural and political history of Bengal and Bengali literature, neighbouring literature, global Bengali literature up to first two decades of Twenty First Century.</p> <p>II. Exhibit a deep understanding of global issues like partition of India and Bengal, riots in greater part of undivided Bengal, folk culture of Bengal and Northeast India, Bengali writings mainly based on social realism of Bengal and neighbouring states of Bengal.</p> <p>III. Apply critical thinking and theoretical approaches to the reading and analysis of literary and cultural Bengali texts in multiple genres.</p> <p>IV. Conduct high-level research with a strong emphasis on language fields starting with Indo-European, Old Indo Aryan, Middle Indo Aryan, Neo Indo Aryan to Bengali language and its socio-historical background, philology and socio-linguistic aspects.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
BEN1016: Core	Social, Cultural, Political History of Bengal and Bengali Literature (Old and Medieval Era)	<p>CO 1: Be able to describe and outline the Social, Cultural, Political History of Bengal and Bengali Literature of Old and Medieval Era.</p> <p>CO 2: Be able to explain the History of Bengal and Bengali Literature of Old and Medieval Era. At the same time a student will be able to distinguish between the characteristics of Old and Medieval Bengali Literature.</p> <p>CO3: Be able to classify the different types of Bengali literary works of Old and Medieval Era.</p> <p>CO 4: Be able to subdivide the various literary works of Old and Medieval Era.</p> <p>CO 5: Be able to develop the skill of study of the subject matter of different types of Bengali original manuscripts of Old and Medieval period preserved in different Institutions and Libraries and identify the features of such literary works.</p>
BEN1026: Core	Social, Cultural, Political History of Bengal and Bengali Literature (Nineteenth Century)	<p>CO1: Be able to describe and outline the Social, Cultural, Political History of Bengal and Bengali Literature of Nineteenth Century.</p> <p>CO2: Be able to explain the Social, Cultural and Political History of Colonial Bengal and discuss about the History of Bengali Literature of that period.</p> <p>CO3: Be able to classify the different types of Bengali Literary Works of Nineteenth Century and analyse these.</p> <p>CO4: Be able to subdivide the different types of Bengali Literary Works of Nineteenth Century.</p> <p>CO5: Be able to develop the new critical approach of discussion of Nineteenth Century Bengali Literature.</p>

BEN1036: Core	Social, Cultural, Political History of Bengal and Bengali Literature (Twentieth Century).	CO1: Be able to describe and outline a sketch of the Social, Cultural, Political History of Bengal and Bengali Literature of Twentieth Century. CO2: Be able to describe and outline a sketch of the Social, Cultural, Political History of Bengal and Bengali Literature of Twentieth Century. CO3: Be able to classify the different types of Bengali Literary Works of Twentieth Century. CO4: Be able to subdivide the different types of Bengali Literary Works of Twentieth Century. CO5: Be able to develop the new way of critical approach of discussion of Twentieth Century Bengali Literature.
BEN1046: Core	Old and Medieval Bengali Text (Pre-Chaitanya and Chaitanya Era)	<ol style="list-style-type: none"> <li>1. Be able to point out the characteristics of various types of Old and Medieval Bengali Texts included in this course.</li> <li>2. Be able to discuss the different components of the Bengali Texts of Old and Medieval period included in this course.</li> <li>3. Be able to explain subject matter of the particular texts of Old and Medieval period included in this course.</li> <li>4. Be able to analyse the Bengali Texts of Old and Medieval period and compare between the literary works of Old and Medieval Period.</li> <li>5. Be able to develop critical analysing ability to discuss about the various types of literary works of that period.</li> </ol>
BEN1054: Value Added	Mass Media and Mass Communication-Application and Possibilities in Bengali Language.	<ol style="list-style-type: none"> <li>1. Be able to define the various aspects of Mass media and Communication Skill and be able to describe the features of the communication skills.</li> <li>2. Be able to translate from Source language to target language and extend Communication Skill through group discussion.</li> <li>3. Be able to prepare advertisement for various forms such as Newspaper, Radio, TV, Cinema etc.</li> <li>4. Be able to Judge the norms of skill development in various filed such as translation, News reading, Recitation, Pronunciation etc.</li> <li>5. Be able to develop the skill of creative writings related to mass media and mass communication.</li> </ol>
BEN2016: Core	Medieval Bengali Text (Post Chaitanya Era)	<ol style="list-style-type: none"> <li>1. Be able to identify trends of medieval Bengali Language and Literature.</li> <li>2. Be able to discuss and study the history of Bengali Medieval texts which helps students to know about class and sets of Religion, society, culture and development of the Bengali Literature.</li> <li>3. Be able to explain about Vaishnava, Shaiva and Sufi religion and philosophy depicted in the literary Texts of that period.</li> <li>4. Be able to analyze and classify about the society, culture and religious formations in the medieval period of Bengal as depicted through these works of literature.</li> <li>5. Be able to develop a sense of history and historical analysis about medieval Bengali texts among the students.</li> </ol>
BEN2026: Core	Modern Bengali Poetry	<ol style="list-style-type: none"> <li>1. Be able to identify the basic features of Nineteenth and Twentieth centuries epic, narrative and lyrical poetry.</li> </ol>

		<ol style="list-style-type: none"> <li>2. Be able to learn and classify the characteristics of the Bengali poetry of colonial and post-colonial era.</li> <li>3. Be able to explain the style of poetry and philosophical thoughts of poets through reading of 'Meghnadbadhkabya', 'Saradamangala' etc.</li> <li>4. Be able to analyze Nineteenth centuries Renaissance, Humanism, Individualism, Patriotism and Twentieth centuries Realism and Feminism.</li> <li>5. Be able to develop the conception of western genres of writings of Bengali poetry.</li> </ol>
BEN2036: Core	Modern Bengali Prose and Fiction	<ol style="list-style-type: none"> <li>1. Be able to define various characteristics of modern Bengali prose and fiction.</li> <li>2. Be able to discuss various Bengali prose and fiction written by Bankimchandra, Rabindranath, Saratchandra etc. related to Bengali society.</li> <li>3. Be able to classify the development of Bengali prose from colonial to post-colonial period.</li> <li>4. Be able to differentiate between the social structure of colonial and post-colonial Bengali writings.</li> <li>5. Be able to develop the skill to analyze the stage of different Bengali fictional and non-fictional writings.</li> </ol>
BEN2046: Core	Modern Bengali Drama	<ol style="list-style-type: none"> <li>1. Be able to identify various features of modern Bengali drama.</li> <li>2. Be able to explain various Bengali dramas written by Girish Chandra Ghosh, Dinabandhu Mitra, Bijan Bhattacharya, Utpal Dutta, Badal Sarkar etc.</li> <li>3. Be able to classify the development of Bengali drama and theatre from Nineteenth century to Twentieth century.</li> <li>4. Be able to analyze the socio-cultural-political structure of Bengal through the Dramas.</li> <li>5. Be able to develop the skill to understand the art and culture through various experimental forms of theatre and Drama.</li> </ol>
BEN2054: Value Added	Academic activities	<ol style="list-style-type: none"> <li>1. Be able to describe the importance of book review, co-curricular activities and manuscripts studies.</li> <li>2. Be able to discuss the various aspects of literary review and research methodologies.</li> <li>3. Be able to sketch barrier outlines of Bengali inscription studies and its role in medieval Bengali literature.</li> <li>4. Be able to develop skills of research problem and point out research gaps.</li> <li>5. Be able to formulate a detailed plan of future research and hypothesis possible outcome.</li> </ol>
BEN3016: Core	Poetics and Folklore	<ol style="list-style-type: none"> <li>1. Be able to describe the Indian and western poetics, folk culture, folk literature of Bengal and states inhabited by Bengalis.</li> <li>2. Be able to explain the various theories of Indian and western poetics.</li> <li>3. Be able to classify eastern and western poetics, the different types of folk culture and folk literature.</li> <li>4. Be able to judge the characteristics of folk culture and Bengali folk literature.</li> <li>5. Be able to develop their knowledge about eastern and western theory of poetics and will be able to prepare ornamental use of language while speaking and writing.</li> </ol>

BEN3026: Core	Tagore Literature	<ol style="list-style-type: none"> <li>1. Be able to describe Tagore literature with its different types.</li> <li>2. Be able to demonstrate an understanding of Tagore literature mainly Poetry, Novels, Short Stories and dramas.</li> <li>3. Be able to explain the subject matters and literary depth of Tagore literature in context of human emotion, psychology, social realism etc.</li> <li>4. Be able to judge the importance and underlying truth of Tagore literature.</li> <li>5. Be able to develop the knowledge to discuss Tagore literature in context of present global socio-economic-political situation.</li> </ol>
BEN3036: Core	Generic Characteristics and Types of Literature	<ol style="list-style-type: none"> <li>1. Be able to describe generic characteristics and identify different types of Bengali literature.</li> <li>2. Be able to explain different types of Bengali literature such as Non-fictional prose, Poetry, Novels- short stories and drama.</li> <li>3. Be able to design different genres of Bengali literature according to subject matter of these literary works.</li> <li>4. Be able to criticize the various types of Bengali literature in context of the generic characteristics of these literary works.</li> <li>5. Be able to develop knowledge about generic characteristics of Bengali literature and play an important role to recognize another genre of Bengali literature except these.</li> </ol>
BEN3046: Core	Post-Independence Bengali literature	<ol style="list-style-type: none"> <li>1. Be able to describe components of the literary texts of modern poetry, non-fictional prose, novels and short stories included in this course.</li> <li>2. Be able to discuss modern Bengali literature mainly modern poetry, non-fiction prose, novels and short stories. At the same time be able to judge literary talent of contemporary poets and writers of Bengali literature.</li> <li>3. Be able to explain the texts included in this course.</li> <li>4. Be able to criticize the text included in the course.</li> <li>5. Be able to develop knowledge to prepare new thoughts underlying in the literary works of different contemporary litterateurs.</li> </ol>
BEN3056: Elective	Folklore and Folk Literature	<ol style="list-style-type: none"> <li>1. Be able to describe the folklore and folk literature and point out different types of these genres.</li> <li>2. Be able to explain the method of folk study and field work for the research about folklore and folk literature.</li> <li>3. Be able to discuss about different types of folklore and folk literature and explain elaborately mainly on folk drama and folk dance.</li> <li>4. Be able to analyse folklore and folk literature (oral and written).</li> <li>5. Be able to develop knowledge in folk study and discover new contents of it from various new areas.</li> </ol>
BEN3066: Elective	Women Literature`s Writings	<ol style="list-style-type: none"> <li>1. Be able to describe the literary works of women litterateur of Nineteenth and Twentieth Century.</li> <li>2. Be able to discuss about the different types of literary works of women litterateur.</li> <li>3. Be able to explain the contents of literary works of women litterateur and discuss about literary talent of these particular women literary texts.</li> </ol>

		<ol style="list-style-type: none"> <li>4. Be able to criticize women writings and determine place of women litterateur in over all Bengali Literature.</li> <li>5. Be able to develop knowledge about women writings and formulate new ideas against traditional thoughts about women.</li> </ol>
BEN3076: Open Elective	Bengali Song Genre	<ol style="list-style-type: none"> <li>1. Be able to Identify various genres of Bengali songs of Rabindranath Tagore, Dwijendralal Roy, Rajanikanta Sen, Atulprasad Sen, Kazi Nazrul Islam.</li> <li>2. Be able to discuss about these songs and differentiate the methods of presentation (language, lyrics, rhythms, pronunciation etc.)</li> <li>3. Be able to explain the philosophical depth of lyricists, inner meanings, historical elements reflected in folk songs.</li> <li>4. Be able to analyse the deeper meaning of the songs and also the socio-culture scenario of Bengal.</li> <li>5. Be able to develop interest in music and make new ideas of creating songs, compose music and discover new talent.</li> </ol>
BEN4016: Core	Language- 1	<ol style="list-style-type: none"> <li>1. Be able to define Indo-Aryan language and their various theories.</li> <li>2. Be able to distinguish different time period of IA languages and discus their characteristics.</li> <li>3. Be able to explain various phonological rules related to Indo-Aryan languages.</li> <li>4. Be able to analyze fundamental basis of Pali, Prakrit and Bengali Grammar.</li> <li>5. Be able to determine geographical boundaries of Bengali dialects and hypothesize various sources of Bengali Words.</li> </ol>
BEN4026: Core	Language- 2	<ol style="list-style-type: none"> <li>1. Be able to identify different areas of core linguistics and their relation with socio-linguistics.</li> <li>2. Be able to discuss linguistic theories related to Bengali Phoneme, Morpheme and Syntax.</li> <li>3. Be able to clarify different types of Vowels, Consonants, Morphemes and sentences of Bengali Language.</li> <li>4. Be able to analyze stylistics studies of selected Bengali Literature.</li> <li>5. Be able to assess impact of various social factors on Bengali Language and Literature.</li> </ol>
BEN4036: Core	Neighbouring Literature and Bengali Literature of the North-East India	<ol style="list-style-type: none"> <li>1. Be able to outline Bengali literature of North-East India and identify its neighbouring literature special reference to Assamese, Odia, Manipuri and Hindi Languages.</li> <li>2. Be able to clarify the characteristics of Bengali literature of North-East India.</li> <li>3. Be able to explain different literary aspects of narratives of North-East India and its implication in above mention literature.</li> <li>4. Be able to differentiate and Compare between the Bengali Literature written in North-East and its counterparts.</li> <li>5. Be able to develop theoretical knowledge about Literature of North East India and explain about multidimensional approach of the aforesaid literature.</li> </ol>
BEN4046: Elective	Post Independence Bengali Literature (North-East India and Bangladesh)	<ol style="list-style-type: none"> <li>1. Be able to describe historical background of post-Independent India and Liberation War of Bangladesh.</li> </ol>

		<ol style="list-style-type: none"> <li>2. Be able to classify different genres of Post Independent Bengali Literature written in North East India and Bangladesh.</li> <li>3. Be able to show similarities and difference of Bengali literature of North East India and Bangladesh.</li> <li>4. Be able to analyze impact of various political and Social Issues on Post Independent Bengali Literature.</li> <li>5. Be able to develop basic skills to explain different dimension of Post Independent Bengali Literature.</li> </ol>
BEN4056: Elective	Folklore and Folk Literature	<ol style="list-style-type: none"> <li>1. Be able to define Folklore, Folk-Literature and their various aspects.</li> <li>2. Be able to classify Folklore of Bengal, Assam and Tripura.</li> <li>3. Be able to generalize different folk characteristics of people residing in Bengal, Assam and Tripura.</li> <li>4. Be able to point out contribution of Rabindranath, Abanindranath and Pallab Sengupta in folk literature and illustrate different folk elements in Selected Bengali Texts included in the course.</li> <li>5. Be able to justify the importance of folk elements in literature and Society.</li> </ol>
BEN4066: Elective	Women Litterateur's Writings	<ol style="list-style-type: none"> <li>1. Be able to identify the characteristics of women writings.</li> <li>2. Be able to explain importance of women`s Literature and its impact on society.</li> <li>3. Be able to classify different genres of women writings.</li> <li>4. Be able to outline relation between feminist movement and women`s writings in Bengali Literature.</li> <li>5. Be able to determine the place of women Litterateur in overall Bengali Literature.</li> </ol>
BEN4076: Open Elective	Bengali Poetry in the Light of Recitation	<ol style="list-style-type: none"> <li>1. Be able to recite poems of Rabindranath, Nazrul, Jibanananda etc. with proper phonological pronunciation.</li> <li>2. Be able to demonstrate basis understanding of voice modulation and group recitation.</li> <li>3. Be able to explain fundamental ideas about Bengali Poetry and its distinctive characteristics.</li> <li>4. Be able to analyze different aspects of recitation and stage representation.</li> <li>5. Be able to develop Skill of recitation and other voice based creative works.</li> </ol>

<b>Department:</b>	<b>Department of Economics</b>	
<b>Programme:</b>	<b>M.A.</b>	
<b>PSOs</b>	<p>PSO1 Demonstrate an understanding of the theoretical aspects of economics.</p> <p>PSO2 Apply the theoretical aspects, quantitative methods and statistical techniques to analyse and interpret economic data to draw meaningful conclusions for policy implementations.</p> <p>PSO3 Illustrate critical thinking abilities through the examination of the dynamic connections between economics and various societal factors such as poverty, environment, migration, healthcare etc.</p> <p>PSO4. Produce quality research that can significantly contribute to new knowledge in economics.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
ECO 1016		<ol style="list-style-type: none"> <li>1. Describe the theoretical developments in the working of the firm producing a single product and multiple products</li> <li>2. Explain the working of markets operating at differing levels of competition</li> <li>3. Analyse the behaviour of the consumer under different market situations.</li> <li>4. Differentiate between the various financial statements of a firm.</li> <li>5. Compare and contrast the managerial theories of the firm with the traditional theories</li> </ol>
ECO 1026		<ol style="list-style-type: none"> <li>1. Describe the basics of National Income accounting and Income-Employment Determination Process</li> <li>2. Classify various macroeconomics consumption theories and study their policy effectiveness</li> <li>3. Interpret the complications of macroeconomic policymaking in closed and open economy frameworks</li> <li>4. Contrast the Keynesian Ideas of employment and income with that of the classical ideas.</li> <li>5. Integrate macroeconomic theory into micro foundation of consumers' choice and firms' investment decisions</li> </ol>
ECO 1036		<ol style="list-style-type: none"> <li>1. Identify the basic mathematical tools used in economics.</li> <li>2. Discuss how mathematical tools can be applied in economics.</li> <li>3. Operate under various constraints to optimise the economic objectives</li> <li>4. Use statistical tools in the process of economic decision making</li> <li>5. Make the student empirically analyse economic theory.</li> </ol>
ECO 1046		<ol style="list-style-type: none"> <li>1. Outline the meaning of development in economics.</li> <li>2. Illustrate how elements of economics and political economy influence the allocation of resources and can facilitate the reduction of poverty, inequality and unemployment in a given society.</li> <li>3. Interpret the various development strategies and theories to assess the different development paths followed by different societies of the world.</li> <li>4. Assess the measurement issues relating to development, including the measurement of poverty and inequality.</li> <li>5. Explain the concept of planning in a developing economy.</li> </ol>
ECO 1054		<ol style="list-style-type: none"> <li>1. Describe the use of computers for presenting and summarizing data.</li> <li>2. Use diagrams and tables for presentation of information.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Apply statistical software in computing basic statistical tools and other relevant statistical technique</li> <li>4. Estimate the relationships among the different economic variables.</li> <li>5. Analyse the real-life economic situations using statistical tools.</li> </ol>
ECO 2016		<ol style="list-style-type: none"> <li>1. Discuss how an individual could take decision under conditions of uncertainty.</li> <li>2. Analyze market outcomes under the situation of incomplete information experienced by economic agents</li> <li>3. Outline the concept of social welfare to enhance society's well-being</li> <li>4. Measure the risks involved in different real-life situation and mitigate the same.</li> <li>5. Integrate the ideas of partial and general equilibrium in economics</li> </ol>
ECO 2026		<ol style="list-style-type: none"> <li>1. Apply the macroeconomics theories for formulations of policies.</li> <li>2. Interpolate the ideas of Monetary Economics to the working the wider Financial Economy</li> <li>3. Appraise the nuances of different schools of thought in macroeconomics</li> <li>4. Assess the latest advances in theories of growth and business cycles</li> <li>5. Compare and contrast the determinants of growth under different theories in macroeconomics</li> </ol>
ECO 2036		<ol style="list-style-type: none"> <li>1. Compute the classical equilibrium analysis under the conditions of maximization of profit and minimization of cost.</li> <li>2. Illustrate the techniques of game theory to solve various economic problems.</li> <li>3. Apply the dynamic optimization techniques to model and solve various economic problems.</li> <li>4. Analyze and interpret statistical data using inference methods to make predictions.</li> <li>5. Justify the use of various techniques of sampling and hypothesis testing for research purposes.</li> </ol>
ECO 2046		<ol style="list-style-type: none"> <li>1. Identify the various sources of financing for economic development.</li> <li>2. Outline the theoretical models suggesting the objective and the practical outcomes of economic development</li> <li>3. Indicate the linkages between trade and development, and environment and development</li> <li>4. Analyse the effects of education and health on the development outcomes of a society</li> <li>5. Explain the role of institutions in development</li> </ol>
ECO 2054		<ol style="list-style-type: none"> <li>1. Locate number series as a tool of mathematical reasoning</li> <li>2. Demonstrate numerical ability using the ideas of ratio and proportion</li> <li>3. Interpret economic data in the form of tables, graphs and charts,</li> <li>4. Develop logical reasoning through the use of analogies and codes</li> <li>5. Generate skills for competitive examinations.</li> </ol>
ECO 3016		<ol style="list-style-type: none"> <li>1. Recognise econometric tools to read technical literature in economics</li> <li>2. Examine the techniques for undertaking empirical research</li> <li>3. Analyse the stochastic situation commonly encountered in real-life economic situation</li> <li>4. Apply time series analysis to study the dynamic aspects of economic phenomena.</li> <li>5. Estimate the cause-and-effect relationships between different economic variables.</li> </ol>
ECO-3026		<ol style="list-style-type: none"> <li>1. Discuss the role of the state in Public Finance in terms of the various functions.</li> <li>2. Interpret the phenomenon of total and partial market failure and prescribe potential corrections.</li> <li>3. Illustrate the Cost-Benefit Technique which can be applied to various social security issues.</li> <li>4. Analyze effects of subsidy under various preconditions.</li> <li>5. Assess Public Budgeting and interpret the implications of the various budget deficits.</li> </ol>



ECO 3036		<ol style="list-style-type: none"> <li>1. Analyse the theories applied in international trade.</li> <li>2. Examine the changing pattern of international trade given developments in trade environments</li> <li>3. Explain how different international trade policies are undertaken by the trading nations</li> <li>4. Illustrate the historical facts and present status of international trade relations among countries</li> <li>5. Point out the dimensions of debt crisis and outline the causes of the same.</li> </ol>
ECO 3046		<ol style="list-style-type: none"> <li>1. Identify the various components of a financial system.</li> <li>2. Estimate parameters like cash flow, annuity, net present value, rates of return etc.</li> <li>3. Illustrate the trading in the stock market and analyze the complexities of the derivative market.</li> <li>4. Assess the operation of the various instruments of the money market.</li> <li>5. Explain the modalities of resource mobilization in capital markets through various capital market assets.</li> </ol>
ECO 3056		<ol style="list-style-type: none"> <li>1. Outline the alternative theories of the firm as opposed to the traditional theories of the firm</li> <li>2. Interpret the Pricing process and Investment Decision of the firm, the sources of industrial finance, and the factors determining industrial location</li> <li>3. Analyse the structure, conduct, and performance of the firm under different market conditions.</li> <li>4. Categorise the different motives and measures of firm Diversification, Integration, and Merger</li> <li>5. Examine the industrial economy of India and develop a policy framework.</li> </ol>
ECO 3066		<ol style="list-style-type: none"> <li>1. Locate the issues of the environment in an interdisciplinary context.</li> <li>2. Discuss various pollution control measures to mitigate the adverse effects of pollution.</li> <li>3. Indicate the issues related to the use of natural resources</li> <li>4. Analyse the working of the environment and the economy from the neoclassical and ecological perspective.</li> <li>5. Examine the various techniques of valuation of environmental goods and services.</li> </ol>
ECO 3074		<ol style="list-style-type: none"> <li>1. Outline the components of a research proposal</li> <li>2. Explain the content and guidelines of a budget.</li> <li>3. Apply knowledge of presentation techniques for discussing results and recommendations.</li> <li>4. Analyze the importance of references/bibliography in academic research proposals.</li> <li>5. Evaluate the effectiveness of budget planning in research project execution.</li> </ol>
ECO-4016		<ol style="list-style-type: none"> <li>1. Outline the concept and evolution of the Global Economy,</li> <li>2. Examine the economic history of India and place it in the global perspective.</li> <li>3. Analyse the process and outcome of India's Economic Reforms</li> <li>4. Assess the key issues like trade, labour, finance, environment, governance, gender etc pertaining to the economy.</li> <li>5. Generate skills for competitive exams.</li> </ol>
ECO 4026		<ol style="list-style-type: none"> <li>1. Describe the size, composition and distribution of human populations over time and across space.</li> <li>2. Discuss the various population policies affecting fertility in the developed and less developed countries.</li> <li>3. Examine contemporary and burning issues faced by every country of the world like migration.</li> <li>4. Utilize the different method to project population at the national level, integrating demographic factors such as fertility, mortality, and migration.</li> <li>5. Compare and critique the different theories of population.</li> </ol>

ECO 4036		<ol style="list-style-type: none"> <li>1. Identify opportunities and shortcomings associated with Operations Research methodologies.</li> <li>2. Describe the queuing theory and use it for solving various problems.</li> <li>3. Explain the various linear and non-linear programming techniques.</li> <li>4. Use techniques of project management for developing network diagrams.</li> <li>5. Analyze the application of the scientific method in Operations Research.</li> </ol>
ECO 4046		<ol style="list-style-type: none"> <li>1. Describe the tools for analyzing financial markets</li> <li>2. Recognize the nature and advantages of Panel Data.</li> <li>3. Explain the tools of intensive empirical analysis</li> <li>4. Interpret the concepts of trend versus difference stationary.</li> <li>5. Assess simulation and forecasting techniques.</li> </ol>
ECO 4056		<ol style="list-style-type: none"> <li>1. Describe the basics of Model Building in Economics</li> <li>2. Illustrate specific empirical and policy models used in India.</li> <li>3. Differentiate between various models</li> <li>4. Analyse the various methods of estimation and evaluation of models</li> <li>5. Examine principles and criteria for testing the validity of models.</li> </ol>
ECO 4066		<ol style="list-style-type: none"> <li>1. Outline the behaviour of agricultural prices</li> <li>2. Describe the various issues of farming systems and farm management</li> <li>3. Discuss the factor markets in agricultural sectors</li> <li>4. Apply the mathematical tools for analysing Agricultural Production Functions</li> <li>5. Analyse the Economics of Agricultural Production</li> </ol>
ECO 4076		<ol style="list-style-type: none"> <li>1. Describe the process of investing in securities and assets in terms of investment policy, security analysis, portfolio construction</li> <li>2. Interpret the principles of market valuation of debt instruments as well as valuation of stocks</li> <li>3. Analyse the technicalities regarding the mechanics of futures market in terms of convergence of futures price and spot price, margin operation etc. along with various measures relating to bank management and performance evaluation</li> <li>4. Develop understanding of the financial system and its functioning</li> <li>5. Measure risk and return of financial assets, in particular risk of a stock, volatility of a stock and stock portfolio</li> </ol>
ECO 4086		<ol style="list-style-type: none"> <li>1. Locate the Indian Economy in the global context</li> <li>2. Show understanding of the basic issues of the Indian economy.</li> <li>3. Interpret the strategies and sectoral policies adopted in the Indian economy since independence.</li> <li>4. Relate theoretical learning with actual economic situation</li> <li>5. Plan and prepare for competitive examinations.</li> </ol>
ECO 4106		<ol style="list-style-type: none"> <li>1. Express health related aspects from an economic perspective</li> <li>2. Demonstrate theoretical understanding of the various features of health economics</li> <li>3. Illustrate the relationship between health and development</li> <li>4. Analyse the role of insurance, including the issues of adverse selection and moral hazard, and the role of innovations in the health industry</li> <li>5. Relate the theoretical models with health policy debates around the world</li> </ol>
ECO 4116		<ol style="list-style-type: none"> <li>1. Identify and quantify demand and supply factors of energy</li> <li>2. Discuss on the more efficient use of energy and the environmental resources</li> <li>3. Analyse the ill effects of excessive use of energy</li> </ol>

		<ol style="list-style-type: none"><li>4. Develop models /policies for more efficient energy use by institutions</li><li>5. Assess the value of environmental resources</li></ol>
ECO 4096		<ol style="list-style-type: none"><li>1. Outline the various steps in research activity</li><li>2. Apply statistical methods in data processing</li><li>3. Analyze characteristics of good research designs and their suitability for different research purposes.</li><li>4. Explain characteristics of a good report and the importance of presentation.</li><li>5. Develop research questions, collect and analyze data, testing of hypotheses, and interpret results effectively.</li></ol>

<b>Department:</b>	<b>English Language Teaching.</b>	
<b>Programme:</b>	<b>M.A.</b>	
<b>PSOs</b>	PSO1: Demonstrate an understanding of the theoretical aspects of English language and English Language Teaching. PSO2: Design teaching materials and assessment tools based on the English language needs of different groups of learners. PSO3: Train teachers of English on different aspects of language pedagogy viz. methodology, materials design etc. PSO4: Produce high-level research output that can significantly contribute to new knowledge and practical ideas in the field of English Language Teaching.	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
LEL 1016	Introduction to Language and Linguistics	<ol style="list-style-type: none"> <li>1. CO1: Describe the basic concepts of human language and language study</li> <li>2. CO2: Characterize and relate properties of the two mediums of language transmission – speech and writing</li> <li>3. CO3: Describe the internal structure of language and the processes of speech production, word-formation, and sentence formation</li> <li>4. CO4: Identify, define and relate various branches of linguistics, such as historical linguistics, cognitive linguistics, and sociolinguistics to core linguistics and language study</li> <li>5. CO5: Critically relate language study to their own contexts</li> </ol>
LEL 1026	Phonetics and Phonology	<ol style="list-style-type: none"> <li>1. CO1: Identify the ‘organs of speech’ in speech production</li> <li>2. CO2: Describe the process of speech sound production</li> <li>3. CO3: Classify speech sounds into various types</li> <li>4. CO4: Transcribe speech sounds using IPA</li> <li>5. CO5: Describe various kinds of phonological processes found in languages.</li> </ol>
LEL 1036	Introduction to Language Teaching	<ol style="list-style-type: none"> <li>1. CO1: Describe the theoretical bases of language teaching in the context of the actual teaching process</li> <li>2. CO2: Discuss the process of teaching language skills such as listening, speaking, reading and writing</li> <li>3. CO3: Demonstrate a basic understanding of different types of assessment and of assessing the different language skills</li> <li>4. CO4: Illustrate the process of designing effective lesson plans</li> <li>5. CO5: Explain how to manage an English language classroom</li> </ol>
LEL 1046	Study Skills in English	<ol style="list-style-type: none"> <li>1. CO1: Survey a long text efficiently by using specific reading strategies</li> <li>2. CO2: Employ note-taking strategies while listening to and/or reading a long text</li> <li>3. CO3: Make presentations on various academic topics and research projects</li> <li>4. CO4: Use effective study skills strategies to prepare for examinations</li> <li>5. CO5: Apply study skills effectively in other subject areas and contexts.</li> </ol>
LEL 1054	Academic Reading I	<ol style="list-style-type: none"> <li>1. CO1: Extract meanings of texts using vocabulary strategies in various academic contexts</li> <li>2. CO2: Identify main and supporting ideas and key details of a text</li> <li>3. CO3: Apply critical reading skills in a variety of reading texts</li> <li>4. CO4: Paraphrase and summarise information from various reading texts</li> </ol>

		5. CO5: Use academic reading skills for other courses of study
LEL 2016	Semantics	<ol style="list-style-type: none"> <li>1. CO1: Differentiate between the core concepts of meaning such as word meaning, sentence meaning, sense, reference, etc.</li> <li>2. CO2: State the meaning of words in terms of their association with other words</li> <li>3. CO3: Recognize the relation between grammar and semantics</li> <li>4. CO4: Apply basic concepts of logic to understand meaning</li> <li>5. CO5: Outline the scope of semantics.</li> </ol>
LEL 2026	Sociolinguistics	<ol style="list-style-type: none"> <li>1. CO1: Characterize social and regional variations of a particular language</li> <li>2. CO2: Recognize the relationship between language and society</li> <li>3. CO3: Apply various approaches of sociolinguistics to language studies in multilingual contexts</li> <li>4. CO4: Analyze the use of language in the social context</li> <li>5. CO5: Conduct research projects and report findings of socio-linguistic studies</li> </ol>
LEL 2036	Morphology and Syntax	<ol style="list-style-type: none"> <li>1. CO1: Describe the processes of language analysis and description with reference to grammar</li> <li>2. CO2: Define terms and categories relating to morphology and syntax</li> <li>3. CO3: Identify word classes and grammatical categories with reference to English grammar.</li> <li>4. CO4: Identify and classify types of clauses and sentences with reference to English grammar.</li> <li>5. CO5: Relate the linguistic units and categories of English with other languages with an awareness of the differences involved.</li> </ol>
LEL 2046	Introduction to Language Analysis	<ol style="list-style-type: none"> <li>1. CO1: Identify different levels of linguistic analysis</li> <li>2. CO2: Describe the process of speech production</li> <li>3. CO3: Analyze the consonants, vowels, and suprasegmental features of a particular language</li> <li>4. CO4: Identify morphemes, allomorphs, and morphological processes such as inflection, derivation, compounding, reduplication in particular language.</li> <li>5. CO5: Solve linguistic problem sets on different levels of linguistic analysis and write brief reports.</li> </ol>
LEL 2054	Academic Reading II	<ol style="list-style-type: none"> <li>1. CO1: Apply reading strategies to academic texts efficiently and critically</li> <li>2. CO2: Extract the main and supporting ideas and key details of a text</li> <li>3. CO3: Display understanding of language style, cohesion and coherence through original texts</li> <li>4. CO4: Synthesize information from different sources</li> <li>5. CO5: Use a variety of academic skills in different contexts.</li> </ol>
ELT 3016	Methodology of Teaching English	<ol style="list-style-type: none"> <li>1. CO1: Explain the theoretical constructs of ELT, the history of ELT and the teaching of English in India and North East</li> <li>2. CO2: Describe the various approaches and methods of language teaching</li> <li>3. CO3: Differentiate between traditional and learner-centred methods of English language teaching</li> <li>4. CO4: Identify relevant pedagogies for teaching English to multilingual learners</li> <li>5. CO5: Analyze the process of curriculum and syllabus design</li> </ol>
ELT 3026	Syllabus and Materials Design	<ol style="list-style-type: none"> <li>1. CO1: Explain approaches and techniques of teaching language skills, grammar, vocabulary and language functions</li> <li>2. CO2: Devise effective pedagogical strategies for using instructional materials appropriately in the classroom</li> <li>3. CO3: Select and adapt materials for language teaching and learning</li> </ol>

		<ol style="list-style-type: none"> <li>4. CO4: Design instructional materials for teaching English language skills</li> <li>5. CO5: Use effective techniques for teaching language skills based on sound ELT principles</li> </ol>
ELT 3036	English for Specific Purposes	<ol style="list-style-type: none"> <li>1. CO1: Identify the English language needs of various groups of students</li> <li>2. CO2: Explain the origin and development of ESP as an approach</li> <li>3. CO3: Design need based syllabi</li> <li>4. CO4: Produce need based materials for learners who need English for specific purposes</li> <li>5. CO5: Apply learning centred methodology to teach English for Specific Purposes.</li> </ol>
ELT 3056	English for Academic Purposes	<ol style="list-style-type: none"> <li>1. CO1: Use reading skills efficiently in reading academic texts</li> <li>2. CO2: Identify relevant information from academic sources for responding to academic assignments</li> <li>3. CO3: Apply techniques for maintaining academic integrity while using English for academic purposes</li> <li>4. CO4: Develop longer academic texts by applying appropriate writing techniques</li> <li>5. CO5: Create class presentations and seminar presentations</li> </ol>
ELT 4016	Testing and Evaluation in ELT	<ol style="list-style-type: none"> <li>1. CO1: Identify different types of tests meant for different purposes</li> <li>2. CO2: Distinguish between teaching and testing</li> <li>3. CO3: Design effective testing material to assess English language skills</li> <li>4. CO4: Create tests that have a positive effect on teaching and learning</li> <li>5. CO5: Construct valid and reliable tests</li> </ol>
ELT 4026	Practice Teaching	<ol style="list-style-type: none"> <li>1. CO1: Make effective lesson plans for English Language Teaching at the school level</li> <li>2. CO2: Conduct peer teaching and provide constructive feedback to peers on teaching and learning</li> <li>3. CO3: Evaluate pedagogic issues in ESP</li> <li>4. CO4: Analyse ESP-oriented syllabi and teaching materials</li> <li>5. CO5: Design ESP syllabi based on learner-needs.</li> </ol>
ELT 4036	English Language Teacher Education	<ol style="list-style-type: none"> <li>1. CO1: Describe models of English Language Teacher Education (ELTE)</li> <li>2. CO2: Explain and critique the social, cultural and intellectual factors that affect English Language Teacher Education (ELTE)</li> <li>3. CO3: Design appropriate curricula for ELTE; select, develop and adapt teaching and training materials for ELTE</li> <li>4. CO4: Apply strategies of teacher mentoring and supervision and support English language teachers in their professional development</li> <li>5. CO5: Develop their own identities as informed and sensitive EL teacher educators and teacher researchers.</li> </ol>
ELT 4046	Projects in ELT	<ol style="list-style-type: none"> <li>1. CO1: Conduct needs analysis of a specific context of study</li> <li>2. CO2: Analyze ESP-oriented syllabi and teaching materials</li> <li>3. CO3: Design ESP syllabi and instructional materials for different purposes and groups of learners</li> <li>4. CO4: Give oral presentations on ESP projects</li> <li>5. CO5: Prepare a project dissertation on ESP projects.</li> </ol>
ELT 4056	Literacy and Language Education	<ol style="list-style-type: none"> <li>1. CO1: Demonstrate an understanding of multilingual contexts</li> <li>2. CO2: Identify and analyze issues faced by smaller language communities</li> <li>3. CO3: Define literacy in terms of the functions it serves in different contexts</li> <li>4. CO4: Relate literacy practices to the underlying politics that influences such practices</li> </ol>

ELT 4076	Education Psychology and Language Teaching	<p>5. CO5: Adopt innovative approaches in teaching in a multilingual setting</p> <ol style="list-style-type: none"><li>1. CO1: Demonstrate their understanding of the meaning and scope of behavioural psychology</li><li>2. CO2: Describe affective factors and learner motivation and their influence on learning</li><li>3. CO3: Explain ways of developing learner autonomy</li><li>4. CO4: Devise appropriate pedagogical strategies to demonstrate understanding of the psychology of individual differences</li><li>5. CO5: Apply different approaches and methods of language teaching according to learning situations and the psychology of learners</li></ol>
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**Course Structure for  
MSc in Instrumentation and Applied Physics (under  
CBCS 2019)**

**Semester-I**

Course	Course Title	Hrs /week	Credit				Marks		Total Marks
			L	T	P	C	Internal	Final	
IAP-1014	Instrumentation & Measurement <b>Tech-niques</b>	4	3	1	-	4	40	60	100
IAP-1024	Applied Mathematics	4	3	1	-	4	40	60	100
IAP-1034	Automatic Control System	4	3	1	-	4	40	60	100
IAP-1044	Analog and Digital Electronics	4	3	1	-	4	40	60	100
IAP-1053	<i>Workshop and Engineering Drawing</i>	6	-	-	3	3	50	-	50
IAP-1066	<i>Instrumentation Lab-I</i>	12	-	-	6	6	40	60	100
<i>Instrumentation Lab-I: Analog, <b>Digital</b>, Sensor</i>									

Total Credits = 25

Total Marks = 550

**Semester-I**

Course	Course Title	Hrs /week	Credit				Marks		Total Marks
			L	T	P	C	Internal	Final	
IAP-2014	Industrial Instrumentation	4	3	1	-	4	40	60	100
IAP-2024	Numerical Method and Computer <b>Pro-gramming</b>	4	3	1	-	4	40	60	100
IAP-2034	Microprocessor and Microcontroller	4	3	1	-	4	40	60	100
IAP-2044	Material Science	4	3	1	-	4	40	60	100
IAP-2053	<i>Computer Programming (C/C++)</i>	6	-	-	3	3	50	-	50
IAP-2066	<i>Instrumentation Lab-II</i>	12	-	-	6	6	40	60	100
<i>Instrumentation Lab-II: Microprocessor Interfacing, Industrial Instrumentation and Material Science</i>									

Total Credits = 25

Total Marks = 550



**Semester-III**

Course	Course Title	Hrs /week	Credit				Marks		Total Marks
			L	T	P	C	Internal	Final	
IAP-3014	Communication Techniques	4	3	1	-	4	40	60	100
IAP-3024	Process Control and Industrial Automation	4	3	1	-	4	40	60	100
IAP-3034	Digital Signal Processing	4	3	1	-	4	40	60	100
IAP-3046	Forensic Instrumentation	6	4	2	-	6	40	60	100
IAP-3056	Advanced Embedded System	6	4	2	-	6	40	60	100
IAP-3063	<i>Instrumentation Lab-III</i>	6	-	-	3	3	50	-	50
IAP-3076	<i>Instrumentation Lab-IV</i>	12	-	-	3	3	40	60	100
<i>Instrumentation Lab-III: Forensic Instrumentation / Advanced Embedded System Instrumentation Lab-IV: Communication Techniques, Process Control, Industrial Automation</i>									

Total Credits = 27

Total Marks = 550

IAP-3046 and IAP-3056 are elective papers. Students must choose any one of the following papers.

**Departmental:** A. Forensic Instrumentation (IAP3046) B. Advanced Embedded System (IAP3056)**Interdepartmental (Dept. of ECT):** Introduction to Nanoscience & Nanotechnology (ECT304C)**Semester-IV**

Course	Course Title	Hrs /week	Credit				Marks		Total Marks
			L	T	P	C	Internal	Final	
IAP-4014	Analytical Instruments	4	3	1	-	4	40	60	100
IAP-4024	A: Entrepreneurship Skills	2	2	-	-	2	20	30	50
	B: Virtual Instrumentation and CAD for Instrumentation	2	2	-	-	2	20	30	50
IAP-4034	Optical Instruments and Photonics	4	3	1	-	4	40	60	100
IAP-4046	Biomedical Instrumentation	6	4	2	-	6	40	60	100
IAP-4056	Advanced Industrial Automation	6	4	2	-	6	40	60	100
IAP-4063	<i>Instrumentation Lab-V</i>	6	-	-	3	3	50	-	50
IAP-4076	<i>Project</i>	12	-	-	6	6	40	60	100
<i>Instrumentation Lab-V: Advanced Industrial Automation / Biomedical Instrumentation</i>									

Total Credits = 27

Total Marks = 550

IAP-4046 and IAP-4056 are elective papers. Students must choose any one of the following papers.

**Departmental:** A. Biomedical Instrumentation (IAP4046) B. Advanced Industrial Automation (IAP4056)

Department:	Department of modern Indian languages and literary studies	
Programme:	M.A in comparative Indian literature	
PSOs	<ol style="list-style-type: none"> <li>1. Identify the spirit of Indianness as reflected in Indian literature, language, and culture.</li> <li>2. Reconstruct the traditional concept of single-language literary study towards developing a comparative understanding of multiple language and literary traditions through a spirit of mutual illumination.</li> <li>3. Compare and contrast the distinctive features of the vernacular literary traditions of India applying the principles of equity and justice.</li> <li>4. Formulate and develop an Indian School of Comparative Literature that would propagate the aforementioned idea of Indianness vis-a-vis the other prevalent schools of Comparative Literature.</li> </ol>	
Course Code	Course Name	Course Outcomes
1016	Idea of Comparative Indian Literature	CO1: Outline the basic ideas and premises underlying the discipline of CIL CO2: Identify the existing schools of Comparative Literature CO3: Explain the principles and ideologies behind their formation and conceptualization CO4: Examine the Indian context within the discipline of Comparative Literature CO5: Analyze the relationship between Comparative Literature and Translation Studies
1026	Introduction to Indian Languages and Literature	CO1: Develop a comprehensive understanding of the diversity of Indian languages and literary traditions CO2: Outline the various schools of Indian philosophy and their reflection through literature CO3: Survey the life and works of modern Indian thinkers CO4: Analyze the impact of the Indian philosophical traditions on Indian literature CO5: Describe the narrative traditions in Indian literature with special reference to Assamese literature
1036	Introduction to Cultural Studies	CO1: Discuss the theories of cultural studies and comparative cultural studies CO2: Describe the cultural life of India with special reference to Assam CO3: Identify and analyze the problems and prospects of cultural assimilation CO4: Develop an understanding of various cultural process prevalent in the society CO5: Produce a compulsory project work on various cultural issues related to the society.
1046/1056/1066/1076	Introduction to an Indian Language (Assamese/Odia/Tamil/Nepali)	1 CO1: Recognize the alphabet and language system of the chosen language CO2: Develop an understanding of the history of literature in the chosen language CO3: Discuss selected readings of litterateurs from the chosen language CO4: Analyze selected readings of literary texts written in the chosen language CO5: Develop a multilingual understanding of literary studies in keeping with aims and objectives of Comparative Literature.
1084	Translation Studies (Value Added)	CO1: Identify and outline the theoretical and practical aspects of translation CO2: Explain the importance of translation in the present age CO3: Discuss the significance of translation as the major shaping force for Comparative Indian Literature

		CO4: Assess the role of translation studies in the Indian context CO5: Produce a work of translation
2016	Literary Criticism and Thoughts	CO1: Illustrate the principles of Indian literary criticism CO2: Illustrate the principles of Western literary criticism CO3: Analyze various dimensions of Indian literary thought CO4: Analyze various dimensions of Western literary thought CO5: Identify and interpret the similarities and divergences between the two traditions vis-a-vis the genres of literature like poetry, drama, and the novel.
2026	Concepts of Linguistics	CO1: Define and describe the basic concepts of linguistics CO2: Identify the nature and scope of linguistics CO3: Explain the major concepts of linguistics and their application as essential tools for modern literary criticism CO4: Interpret and reconstruct their understanding of literature through certain key concepts of linguistics CO5: Analyze the social dimension of language study
2036	Special Readings on Early Indian Literatures	CO1: Identify and categorize the literary traditions and texts across the ancient and medieval periods of Indian history CO2: Analyze and compare the representative works in the Sanskrit literary tradition CO3: Analyze and compare the representative works in Pali and Prakrit literary traditions CO4: Analyze and compare the representative works belonging to the traditions of Bhakti literature CO5: Examine the genealogical aspects of the vernacular literary traditions of India.
2046	Special Readings on Modern Indian Narratives	CO1: Identify the literary traditions of the modern period of Indian history CO2: Classify the fictional genres of composition constituting modern Indian narratives CO3: Examine the development of novel as a genre in select Indian languages CO4: Examine the development of short-story as a genre in select Indian languages CO5: Analyze and compare representative novels and short-stories in select Indian languages
2054	Text Editing (Value Added)	CO1: List and locate the significant features of text editing as a method of literary analysis CO2: Examine various aspects of text and its constituent elements CO3: Develop a close understanding of the aesthetic and technical aspects of text editing CO4: Outline and identify the traditions of textual criticism in Indian languages CO5: Identify and examine the aspects of publishing and various components involved in the conceptualization and designing that goes into the making of a serious academic book
3016	Ramayana Traditions in Indian Literatures	CO1: Identify the multiple and diverse traditions of Ramkatha across the country CO2: Examine the conceptual and intertextual dimensions of the Ramkatha narratives CO3: Develop an understanding of the Ramkatha tradition from the monogenetic Valmiki-based model towards a larger paradigm inclusive of the regional expressions of Ramkatha CO4: Discuss specific retellings of the Ramayana in select Indian languages CO5: Examine the reception of Ramayana in modern Indian literatures

3026	Indian Fiction with Special Reference to the Freedom Movement	CO1: Discuss the history and background of the freedom movement in India CO2: Examine the principle of non-violence as a guiding ideal in Indian literature CO3: Analyze the impact of violence and trauma upon the literary sensibility of post-Independence India CO4: Compare and critique the representation of freedom in select Indian novels CO5: Compare and critique the representation of freedom in select Indian short-stories
3036	Folk Elements and Modern Indian Drama	CO1: Outline and identify the major elements of modern Indian drama CO2: Appraise the major trends of dramatic practice in Indian languages CO3: Recognize the transformation brought about in modern Indian drama through the use of folk and indigenous elements CO4: Interpret the use and application of folk motifs, metaphors and mythologies within the textures of modern theatrical narratives in Indian literatures CO5: Critique the presence and proliferation of folk elements in select dramatic works in Indian languages.
3046	Bhakti Movement and Indian Literature	CO1: Identify and list the sectarian traditions that developed within the pan-Indian framework Bhakti Movement CO2: Discuss the pan-Indian perspectives and their regional manifestations in select vernacular literatures of India CO3: Examine and illustrate the major role of Bhakti literatures in forming the base for national integration CO4: Appraise the expanse and outreach of the pan-Indian Bhakti movement cutting across geographical and linguistic barriers CO5: Compare and critique the significance of neo-Vaishnavite hagiography as a genre of Bhakti literature in India
3056	Asom Vidya (Assam Studies) (Elective/Open)	CO1: Define the scope and importance of Assam Studies as a discipline CO2: Identify and outline the general state of history, tradition, and present-day scenarios of Assam under a unified field of study CO3: Explain the multidisciplinary nature of the said discipline CO4: Develop an understanding of Assam Studies as an Area Study Programme CO5: Propose a case study for analyzing one or more aspects related to the multidisciplinary paradigm of Assam Studies
4016	Literatures beyond India	CO1: Define what is World Literature and identify the major trends characterizing its growth and development CO2: Identify the major genres of literature constituting the domain of World Literature CO3: Develop a comparative understanding of select representative works from various genres of World Literature CO4: Illustrate and interpret the major themes and issues as reflected in the works studied within the course

		CO5: Critique and justify the issues of canon-formation and the importance of translation in the formulation of a distinct canon of World Literature
4026	Women in Literature	CO1: Define and identify the characteristic features of Women's Studies, Gender Studies, and Feminism CO2: Illustrate and interpret various aspects related to the representation of women in literature CO3: Develop a comprehensive understanding of women's writing in Indian languages CO4: Examine and assess the reflection of women's issues in Assamese literature through select readings of texts CO5: Develop an understanding of the problems and predicaments confronting women in the society and how such issues find representation through works of literature.
4036	Influence & Reception: Special Study on Srimanta Sankardeva	CO1: Identify and outline the significance of influence and reception as two key aspects of Comparative Literature CO2: Apply the concepts of influence and reception towards studying the life and works of Srimanta Sankardeva CO3: Appraise the influence of his personality and works upon the latter-day literary and artistic creations in Assamese Literature CO4: Compare and critique the representation of his life through modern-day works of literature CO5: Analyze his contribution to the tradition of songs and dramas in Assamese language
4046	Village Life in Modern Assamese Literature	CO1: Identify and outline the diverse and multiple cultural textures of Indian rural life CO2: Analyze the varied dynamics of their representation in present-day Assamese literature CO3: Examine the reflection of village life in modern Assamese literature through a survey of songs and poems composed in the language CO4: Compare and critique the representation of village life in the Assamese novel CO5: Develop an acquaintance with the culture, tradition, and social structure of village life of Assam.
4056	Dissertation	CO1: Identify the major areas of engagement within the broader domain of Comparative Indian Literature CO2: Choose a specific field of study within the discipline for carrying out a sustainable research project CO3: Select a workable topic of research within the specified field of study and adhering to the principles of Comparative Indian Literature CO4: Produce an original work of research based on comparative analysis CO5: Develop an enhanced understanding with respect to language, literature and culture within the comparative literature paradigm

4066	Speech and Oratory (Elective/Open)	CO1: Recognize the role and significance of speech as an essential medium of human communication CO2: Identify and outline various dimensions of speech and oratory CO3: Examine the discursive significance of speech and appraise its qualitative parameters CO4: Determine the efficacy of speech and oratory as vehicles for the propagation of literary discourse CO5: Devise and develop specific exercises in speech and oratory
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<b>Department:</b>	<b>Department of Information Technology</b>	
<b>Programme:</b>	<b>B.Tech [IT]</b>	
<b>PSOs</b>	<p>PSO1. Identify the traditional and contemporary philosophical trends in Indian as well as in the Western Civilization.</p> <p>PSO2. Illustrate the knowledge of ideas espoused by the great thinkers of the world.</p> <p>PSO3. Develop critical and construct philosophical outlook towards problems of life and world.</p> <p>PSO4. Produce enhanced reasoning skill.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
<b>PHI 1016</b>	<b>Theory of knowledge – Indian (core)</b>	<ol style="list-style-type: none"> <li>1. Identify various theories of knowledge advocated by different Schools of Indian philosophy.</li> <li>2. Distinguish various kinds of valid knowledge. (Prama)</li> <li>3. Explain the sources of valid knowledge recognised in different schools of Indian philosophy. (Pramana)</li> <li>4. Analyse the theories of validity and invalidity of knowledge. (Pramanyavada)</li> <li>5. Explain theories of error. (Khyativada)</li> </ol>
<b>PHI 1026</b>	<b>Theory of knowledge – Western (core)</b>	<ol style="list-style-type: none"> <li>1. Describe the nature and extent of knowledge as dealt with in the Western philosophical tradition.</li> <li>2. Distinguish between knowledge and belief.</li> <li>3. Explain the conditions concerning knowledge, e.g., grounds, truth, meaning etc.</li> </ol>

		<p>4. Analyse the fundamental philosophical doubts about the possibility of knowing anything at all (philosophical skepticism)</p> <p>5. Explain how philosophers have sought to make the foundation of knowledge. unshakable by putting forward various theories.</p>
<b>PHI 1036</b>	<b>Logic-I (Core)</b>	<p>CO1. Define truth function.</p> <p>CO2. Distinguishing between argument and argument forms</p> <p>CO3. Using formal techniques for evaluating arguments as valid and invalid</p> <p>CO4. Apply Venn diagrammatic method of testing arguments involving sets.</p> <p>CO5. Analyze the idea of set and set relations.</p>
<b>PHI 1046</b>	<b>Analytic Philosophy (Core)</b>	<ol style="list-style-type: none"> <li>1. Understanding the fundamental concepts such as logic, sets, functions, and relations.</li> <li>2. Developing proficiency in mathematical reasoning and the ability to construct proofs, including direct, indirect, and proof by contradiction.</li> <li>3. Describing combinatorics, graph theory, and their applications in computer science.</li> <li>4. Preparing students to solve problems involving algebraic structures and elementary number theory, such as divisibility, congruences, and prime numbers.</li> <li>5. Applying principles of mathematical induction to prove statements involving natural numbers.</li> </ol>
IT311	Database Management Systems	<ol style="list-style-type: none"> <li>1. Describe the fundamental elements of relational database management system.</li> <li>2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.</li> <li>3. Design ER-models to represent simple database application scenarios.</li> <li>4. Extend the ER-model to relational tables, populate relational database and formulate SQL queries on data.</li> <li>5. Transform the database design by normalization.</li> </ol>
IT312	Formal Language and Automata Theory	<ol style="list-style-type: none"> <li>1. Define foundational concepts: formal languages, alphabets, strings, grammars (Chomsky hierarchy), automata models (FA, PDA, TM), and their components (states, transitions, symbols). (Level 1)</li> <li>2. Explain the relationships between formal languages and their generating grammars. Differentiate between</li> </ol>



		<p>different automata models based on their capabilities and limitations. (Level 2)</p> <ol style="list-style-type: none"> <li>Given a formal description (regular expression, grammar) or a language, identify the appropriate automata model (FA, PDA, TM) to recognize it. (Level 3)</li> <li>Analyse the time and space complexity of computations performed by different automata models. (Level 4)</li> <li>Critically evaluate the suitability of different automata models for specific applications based on their efficiency and expressive power.(Level 5)</li> </ol>
IT313	Operating Systems	<ol style="list-style-type: none"> <li>Describe process control, threads, concurrency, memory, Scheduling, virtual memory management.</li> <li>Use system calls to directly communicate with operating system.</li> <li>Apply different process synchronization algorithms to a few real-life examples.</li> <li>Create page tables for memory management.</li> <li>Construct knowledge about protection and security of different operating system like Unix.</li> </ol>
IT314	Software Engineering	<ol style="list-style-type: none"> <li>Describe basics of software development lifecycle models</li> <li>Summarize various design principles used in software development.</li> <li>Apply software engineering principles in programming for development of different software.</li> <li>Summarize various approaches and methodologies used for software testing.</li> <li>Develop software which adheres to various standards of software engineering</li> </ol>
IT321	Compiler Design	<ol style="list-style-type: none"> <li>Identify the various phases of a compiler and their functionalities (lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization, code generation). (Level 1)</li> <li>Explain the concepts of regular expressions and finite state automata (FSA) for pattern matching and tokenization in lexical analysis. Additionally, understand context-free grammar (CFG) and their role in syntax analysis. (Level 2)</li> <li>Design and implement a lexical analyzer using tools like LEX or regular expression libraries to recognize tokens from a simple programming language. (Level 3)</li> <li>Compare and contrast different parsing techniques (top-down vs bottom-up) and identify suitable parsing algorithms (LL(1), LR(0) etc.) based on the characteristics of a given grammar. Analyze the efficiency of these parsing algorithms. (Level 4)</li> <li>Critique the effectiveness of various optimization techniques (e.g., constant folding, dead code elimination) applied to intermediate code. Evaluate the trade-off between code size and execution speed after optimization. (Level 5)</li> </ol>
IT322	Computer Network	<ol style="list-style-type: none"> <li>Explain basic concepts of networking, different layers of OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, and network topology.</li> <li>Apply framing, error control, flow control and multiple access control techniques.</li> <li>Describe the various functions of Network Layer i.e. Logical addressing, sub netting &amp; Routing Mechanism and also use of IP addresses.</li> <li>Explain the different Transport Layer functions i.e.</li> </ol>

		<p>Port addressing, Connection Management, Error control and Flow control mechanism.</p> <ol style="list-style-type: none"> <li>5. Explain the functions offered by session and presentation layer and the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, SSH etc.</li> </ol>
IT902	Speech Processing	<ol style="list-style-type: none"> <li>1. Explain a speech signal with its different acoustic representation and phonemic behavior.</li> <li>2. Discuss various types of signals and systems.</li> <li>3. Measure speech signal in terms of Fourier coefficient.</li> <li>4. Determine different acoustic parameters using MFCC, LPC and ZCR.</li> <li>5. Build a software interface which can recognize a speech signal with its different phonemic and acoustic attributes.</li> </ol>
IT903	Neural Network and Machine Learning	<ol style="list-style-type: none"> <li>1. Understanding the foundational concepts of neural networks, including their architecture and how they learn from data.</li> <li>2. Integrating multiple facets of practical machine learning in a single system: data preprocessing, learning, regularization, and model selection.</li> <li>3. Analyzing and implementing existing learning algorithms for classification, regression, clustering, and reinforcement learning.</li> <li>4. Building, training, and applying fully connected deep neural networks.</li> <li>5. Designing experiments to evaluate and compare different machine learning techniques on real-world problems.</li> </ol>
IT904	Natural Language Processing	<ol style="list-style-type: none"> <li>1. Define Natural Language Processing in the context of contemporary intelligent computing.</li> <li>2. Explain various aspects of natural language in the context of computational paradigm.</li> <li>3. Classify language phenomenon into rules and patterns and use them for machine learning ecosystem.</li> <li>4. Illustrate the syntax and semantics of natural languages considering understanding the language by a computational framework.</li> <li>5. Construct Computational Models for processing and understanding Natural Language</li> </ol>
IT905	Artificial Intelligence	<ol style="list-style-type: none"> <li>1. Describe the fundamentals of Artificial Intelligence, including the structure of knowledge representation and knowledge searching.</li> <li>2. Illustrate the building blocks of AI system and formalize the problem solving as a state space searching.</li> <li>3. Explain intelligent algorithms for constraint satisfaction problems and designing intelligent systems.</li> <li>4. Analyse different heuristic search techniques in light of creating intelligent system.</li> <li>5. Construct general understanding of knowledge representation techniques including logic, symbolic reasoning, and statistical reasoning</li> </ol>
IT906	Advance Computer Organization and Architecture	<ol style="list-style-type: none"> <li>1. Compute simple calculations of power, cost and performance on computer design.</li> <li>2. Classify to demonstrate pipeline, pipeline hazards and implementation of pipeline.</li> <li>3. Demonstrate instruction level parallelism various architectures.</li> <li>4. Measure the performance of the architecture in terms of the right parameters.</li> <li>5. Analyse advanced optimization of cache performance, protection of virtual memory &amp; amp; virtual machines</li> </ol>

IT912	Wireless Network	<ol style="list-style-type: none"> <li>1. Understand the basics of propagation of radio signals, basic concepts of Cellular System and the design requirements.</li> <li>2. Explain the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs.</li> <li>3. Describe various mobile radio propagation models and how diversity can be exploited to improve performance.</li> <li>4. Explain the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.</li> <li>5. Understanding of the emerging trends in Wireless communication like WiFi, WiMAX, Software Defined Radio (SDR) and related issues and challenges</li> </ol>
IT913	Adhoc and Sensor Network	<ol style="list-style-type: none"> <li>1. Describe Ad hoc and Sensor network.</li> <li>2. Explain the protocols, network architectures and applications of Ad hoc and wireless Sensor networks.</li> <li>3. Analyze the protocol design issues of Ad hoc and Sensor networks.</li> <li>4. Design routing protocols for Ad hoc and wireless Sensor networks with respect to some protocol design issues.</li> <li>5. Evaluate the QoS related performance measurements of Ad hoc and Sensor Networks.</li> </ol>
IT915	Cryptography and Network Security	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities.</li> <li>2. Apply the different cryptographic operations of symmetric cryptographic algorithms.</li> <li>3. Apply the different cryptographic operations of public key cryptography.</li> <li>4. Apply the various Authentication schemes to simulate different applications.</li> <li>5. Understand various Security practices and System security standards.</li> </ol>
IT918	Web Technology	<ol style="list-style-type: none"> <li>1. Identify the basic concepts and services associated with the WWW and internet.</li> <li>2. Explain the functions and working principles of web browsers, including the roles of plug-ins and helper applications.</li> <li>3. Differentiate between client-server computing models and apply them to real-world scenarios.</li> <li>4. Compare and contrast the advantages and disadvantages of Fat Client and Fat Server architectures.</li> <li>5. Evaluate the various web development based on their suitability for specific application purposes.</li> </ol>
<b>Department:</b>	<b>Department of Information Technology</b>	
<b>Programme:</b>	<b>B.Tech [CSE]</b>	
<b>PSOs</b>	<p>PSO1. Students will have sound knowledge and skill about software, and hardware of computer systems along with computer networks and security aspects of it to compete and sustain as a professional.</p> <p>PSO2. Students will be able to apply fundamental knowledge of theoretical computer science and critically analyze problems to provide computer-based solutions for engineering applications.</p> <p>PSO3. Students will be able to use the core concepts of computing and optimization techniques to develop more efficient and effective computer algorithms.</p> <p>PSO4. Students will be able to take up research works in specific areas such as theoretical computer science, natural language processing, speech processing, image processing, and IoT.</p>	

IT211	Data Structure and Algorithm (IT/BET)	<ol style="list-style-type: none"> <li>1. Remember: Define fundamental data structures like arrays, stacks, queues, linked lists, trees, and graphs. (Level 1)</li> <li>2. Comprehend: Explain the operations (insertion, deletion, searching) associated with different data structures and their time and space complexities. (Level 2)</li> <li>3. Apply: Use data structures effectively to solve algorithmic problems. Explain the underlying data structure concepts used in popular libraries and frameworks. (Level 3)</li> <li>4. Analyze: Analyze a given problem and choose the most appropriate data structure to represent and manipulate the data efficiently. (Level 4)</li> <li>5. Evaluate: Critically assess the trade-offs between different data structures in terms of memory usage, access time, and maintainability when designing complex software systems. (Level 5)</li> </ol>
IT221	Computer Organization and Architecture	<ol style="list-style-type: none"> <li>1. Analyze the instruction cycle of a computer, explaining the role of each component. (Control Unit, ALU, Memory) and their interactions.</li> <li>2. Evaluate the trade-offs between different memory hierarchy levels (cache, main memory, secondary storage) based on access time and capacity.</li> <li>3. Explain the concept of pipelining and its impact on instruction execution performance.</li> <li>4. Compare and contrast different instruction set architectures (RISC vs. CISC) based on their design principles and instruction complexity.</li> <li>5. Write a simple assembly language program to demonstrate understanding of basic instructions and addressing modes.</li> </ol>
IT222	Object Oriented Programming	<ol style="list-style-type: none"> <li>1. Describe the fundamental concepts of OOP such as objects, classes, inheritance, encapsulation, abstraction, and polymorphism.</li> <li>2. Discuss OOP languages like C++ and use them to solve various problems.</li> <li>3. Apply OOP concepts and C++ language to design and implement software using OOP principles.</li> <li>4. Develop the ability to create modular, flexible, and reusable code.</li> <li>5. Applying data structures and algorithms within an OOP context to manage large amounts of data efficiently.</li> </ol>
IT223	Discrete Mathematics	<ol style="list-style-type: none"> <li>1. Understanding the fundamental concepts such as logic, sets, functions, and relations.</li> <li>2. Developing proficiency in mathematical reasoning and the ability to construct proofs, including direct, indirect, and proof by contradiction.</li> <li>3. Describing combinatorics, graph theory, and their applications in computer science.</li> <li>4. Preparing students to solve problems involving algebraic structures and elementary number theory, such as divisibility, congruences, and prime numbers.</li> <li>5. Applying principles of mathematical induction to prove statements involving natural numbers.</li> </ol>

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		<p>characteristics of a given grammar. Analyze the efficiency of these parsing algorithms. (Level 4)</p> <p>5. Critique the effectiveness of various optimization techniques (e.g., constant folding, dead code elimination) applied to intermediate code. Evaluate the trade-off between code size and execution speed after optimization. (Level 5)</p>
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IT903	Neural Network and Machine Learning	<ol style="list-style-type: none"> <li>1. Understanding the foundational concepts of neural networks, including their architecture and how they learn from data.</li> <li>2. Integrating multiple facets of practical machine learning in a single system: data preprocessing, learning, regularization, and model selection.</li> <li>3. Analyzing and implementing existing learning algorithms for classification, regression, clustering, and reinforcement learning.</li> <li>4. Building, training, and applying fully connected deep neural networks.</li> <li>5. Designing experiments to evaluate and compare different machine learning techniques on real-world problems.</li> </ol>
IT904	Natural Language Processing	<ol style="list-style-type: none"> <li>1. Define Natural Language Processing in the context of contemporary intelligent computing.</li> <li>2. Explain various aspects of natural language in the context of computational paradigm.</li> <li>3. Classify language phenomenon into rules and patterns and use them for machine learning ecosystem.</li> <li>4. Illustrate the syntax and semantics of natural languages considering understanding the language by a computational framework.</li> <li>5. Construct Computational Models for processing and understanding Natural Language</li> </ol>
IT905	Artificial Intelligence	<ol style="list-style-type: none"> <li>1. Describe the fundamentals of Artificial Intelligence, including the structure of knowledge representation and knowledge searching.</li> <li>2. Illustrate the building blocks of AI system and formalize the problem solving as a state space searching.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Explain intelligent algorithms for constraint satisfaction problems and designing intelligent systems.</li> <li>4. Analyse different heuristic search techniques in light of creating intelligent system.</li> <li>5. Construct general understanding of knowledge representation techniques including logic, symbolic reasoning, and statistical reasoning</li> </ol>
IT906	Advance Computer Organization and Architecture	<ol style="list-style-type: none"> <li>1. Compute simple calculations of power, cost and performance on computer design.</li> <li>2. Classify to demonstrate pipeline, pipeline hazards and implementation of pipeline.</li> <li>3. Demonstrate instruction level parallelism various architectures.</li> <li>4. Measure the performance of the architecture in terms of the right parameters.</li> <li>5. Analyse advanced optimization of cache performance, protection of virtual memory &amp; amp; virtual machines</li> </ol>
IT912	Wireless Network	<ol style="list-style-type: none"> <li>1. Understand the basics of propagation of radio signals, basic concepts of Cellular System and the design requirements.</li> <li>2. Explain the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs.</li> <li>3. Describe various mobile radio propagation models and how diversity can be exploited to improve performance.</li> <li>4. Explain the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.</li> <li>5. Understanding of the emerging trends in Wireless communication like WiFi, WiMAX, Software Defined Radio (SDR) and related issues and challenges</li> </ol>
IT913	Adhoc and Sensor Network	<ol style="list-style-type: none"> <li>1. Describe Ad hoc and Sensor network.</li> <li>2. Explain the protocols, network architectures and applications of Ad hoc and wireless Sensor networks.</li> <li>3. Analyze the protocol design issues of Ad hoc and Sensor networks.</li> <li>4. Design routing protocols for Ad hoc and wireless Sensor networks with respect to some protocol design issues.</li> <li>5. Evaluate the QoS related performance measurements of Ad hoc and Sensor Networks.</li> </ol>
IT915	Cryptography and Network Security	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities.</li> <li>2. Apply the different cryptographic operations of symmetric cryptographic algorithms.</li> <li>3. Apply the different cryptographic operations of public key cryptography.</li> <li>4. Apply the various Authentication schemes to simulate different applications.</li> <li>5. Understand various Security practices and System security standards.</li> </ol>
IT918	Web Technology	<ol style="list-style-type: none"> <li>1. Identify the basic concepts and services associated with the WWW and internet.</li> <li>2. Explain the functions and working principles of web browsers, including the roles of plug-ins and helper applications.</li> <li>3. Differentiate between client-server computing models and apply them to real-world scenarios.</li> <li>4. Compare and contrast the advantages and disadvantages of Fat Client and Fat Server architectures.</li> <li>5. Evaluate the various web development based on their suitability for specific application purposes.</li> </ol>

<b>Department:</b>	<b>Department of Information Technology</b>	
<b>Programme:</b>	<b>M.Tech [IT]</b>	
<b>PSOs</b>	<p>PSO1. Students will have adequate skills and competency to work as a professional to deliver quality results in industries, academia, research organizations, and in the professional world.</p> <p>PSO2. Students will be capable of developing software solutions for different relevant problems in the world of Information and Communication Technology, by applying knowledge of various domains such as Database Technologies, Information Systems, Internet and Network Technologies, Cloud Technologies, Algorithms, Artificial Intelligence, Machine Learning, Image Processing, and associated interdisciplinary subjects.</p> <p>PSO3. Students will be able to handle software and network security issues.</p> <p>PSO4. Students will be able to take up research works in specific areas such as natural language processing, speech processing, image processing, IoT etc.</p>	
ITC1024	Design and Analysis of Algorithms	<ol style="list-style-type: none"> <li>1. Analyse the efficiency of algorithms using asymptotic notation and complexity analysis.</li> <li>2. Apply algorithmic design paradigms such as greedy algorithms, divide and conquer, dynamic programming, and backtracking to solve problems.</li> <li>3. Use advanced data structures such as heaps, hash tables, and balanced trees for algorithm design.</li> <li>4. Utilize algorithmic techniques for graph traversal, shortest paths, and minimum spanning trees.</li> <li>5. Develop algorithms for optimization problems, network flow, and string matching.</li> </ol>
ITC2014	Web Technologies	<ol style="list-style-type: none"> <li>1. Compare and contrast the structure and functionalities of XML with HTML.</li> <li>2. Develop an interactive web application using AJAX to retrieve and manipulate data a Document Object Model (DOM) concept.</li> <li>3. Assess the advantages and disadvantages of JSP compared to other server-side scripting languages.</li> <li>4. Design and implement a web application using JSP and JDBC, connecting to a MySQL database to perform CRUD operations (Create, Read, Update, Delete) and display data dynamically.</li> <li>5. Compare and contrast different HTML5 elements and APIs with their traditional counterparts, evaluating their impact on web development practices.</li> </ol>
ITC1214	Natural Language Processing	<ol style="list-style-type: none"> <li>1. Define Natural Language Processing in the context of contemporary intelligent computing.</li> <li>2. Explain various aspects of natural language in the context of computational paradigm.</li> <li>3. Classify language phenomenon into rules and patterns and use them for machine learning ecosystem.</li> <li>4. Illustrate the syntax and semantics of natural languages in light of understanding the language by a computational framework.</li> </ol>



		<ol style="list-style-type: none"> <li>5. Construct Computational Models for processing and understanding Natural Language.</li> </ol>
ITC1234	Speech Processing	<ol style="list-style-type: none"> <li>1. Identify a speech signals, its acoustic representation and phonemic behavior.</li> <li>2. Interpreting different types of signals.</li> <li>3. Generate Fourier series, Fourier transform and Filters for a speech signal</li> <li>4. Integrate different speech analysis tool with for speech data.</li> <li>5. Design algorithms for speech synthesis and recognition.</li> </ol>
ITC1354	Fuzzy Logic and Neural Networks	<ol style="list-style-type: none"> <li>1. Describe and explain the fundamental theory and concepts of neural networks, neuro-modelling, several neural network paradigms and its applications.</li> <li>2. Illustrate and design the feed forward and backward neural networks (NN)</li> <li>3. Explain and interpret the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.</li> <li>4. Interpret the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.</li> <li>5. Analyse the various NN's and apply the same to inductive and/or deductive problems.</li> </ol>
ITC 2424	Cloud Computing	<ol style="list-style-type: none"> <li>1. Describe the basic concepts of cloud computing.</li> <li>2. Distinguish between fog, cloud, and edge computing.</li> <li>3. Apply optimization techniques in designing task scheduling algorithms for cloud environment.</li> <li>4. Design security solutions for cloud-based applications.</li> <li>5. Compare different <i>cloud resource management</i> techniques.</li> </ol>
ITC2234	Digital Image Processing	<ol style="list-style-type: none"> <li>1. Demonstrate the fundamentals of digital image and its mathematical transforms.</li> <li>2. Apply various image enhancement algorithm.</li> <li>3. Categorize different image compression method.</li> <li>4. Explain color image processing segmentation and image restoration.</li> <li>5. Design and develop image recognition tool.</li> </ol>
ITC2304	Artificial Intelligence and Intelligent Systems	<ol style="list-style-type: none"> <li>1. Describe the fundamentals of Artificial Intelligence, including the structure of knowledge representation and knowledge searching.</li> <li>2. Illustrate the building blocks of AI system and formalizing the problem solving as a state space searching.</li> <li>3. Explain intelligent algorithms for constraint satisfaction problems and designing intelligent systems.</li> <li>4. Analyse different heuristic search techniques in light of creating intelligent system.</li> </ol>

		5. Construct general understanding of knowledge representation techniques including logic, symbolic reasoning, and statistical reasoning.

Department:	Department of statistics	
Programme:	M.SC.	
PSOs	<p>PSO 1: Demonstrate an understanding of the mathematical basis of Statistical methods and practices and a specialized knowledge on various domains of Statistics to model complex random phenomena including techniques to make valid inferences on them.</p> <p>PSO 2: Acquire the proficiency to handle relevant Statistical software to analyze real life situations appropriate to the domains of specialization in Statistics.</p> <p>PSO 3: Develop a deeper understanding of various domains of Statistics and critical thinking leading to quality research.</p> <p>PSO 4: Exhibit the ability to articulate complex ideas and communicate them to a variety of audiences and acquire the traits of ethical human beings who can commit to the betterment of society.</p>	
Course Code	Course Name	Course Outcomes
STA1016	Real analysis (core)	<p>CO1: Recall the basic properties of the field of real numbers.</p> <p>CO2: Explain various tools of real analysis like power series, differentiation, multiple integrals uniform convergence of multiple integrals and special functions.</p> <p>CO3: Compute differentiation under the integral sign and multiple integrals by changing their order.</p> <p>CO4: Apply differentiation of multiple variables in the context of constrained optimization.</p> <p>CO5: Assess the needs of special functions in the field of Mathematical Analysis and conclude on their properties.</p>
STA1026	Linear Algebra (Core)	<p>CO1: Describe the basic concepts of basis and dimension for a linear space and recall the various operations on matrix theory.</p> <p>CO2: Demonstrate the construction of orthogonal basis by the use of Gram Schmidt orthogonalization process and solve a system of homogenous and non- homogeneous equations.</p> <p>CO3: Apply the principle of matrix algebra in linear transformation and concept of Eigen values and vectors to optimize quadratic forms and conduct spectral decomposition of matrices.</p> <p>CO4: Apply Cayley Hamilton theorem to find the inverse of matrices and the annihilating polynomials to find the higher order power of a matrix.</p> <p>CO5: Utilize the concept of vector space in multivariate analysis and other domains of Statistics.</p>
STA1036	Measure theory and Probability (core)	<p>CO1: Describe the concepts of set, field algebra and Sigma algebra and some of their related theorems.</p> <p>CO2: Explain various concepts of measure theory namely, measurable set, outer measure, measurable functions, simple functions and convergence of measurable sets.</p> <p>CO3: Explain distribution function for univariate and multivariate set up and the related theorems.</p> <p>CO4: Discuss various functions of random variables and the theorems on convergence of Random variables and their sequences.</p> <p>CO5: Apply the central limit theorem and its various forms in approximating the distribution of the sum of a number of random variables.</p>
STA1046	Sample Survey (core)	<p>CO1: Recall the concept of population and sample, importance of sampling, principle underlying sampling and designing of large scale survey; comparison between census and sample survey; SRSWR and SRSWOR.</p>

		<p>CO2: Discuss the estimation procedure of sample size with different types of allocation, construction of strata, determination of optimum number of strata, method of collapsed strata and post stratification in case of stratified random sampling. Also Illustrate some other scheme of probability sampling like cluster (Equal and unequal size), two stage (Equal and unequal first stage unit) and multistage sampling.</p> <p>CO3: Discuss the unequal probability sampling procedures viz. PPSWR and PPSWOR, different kind of estimators viz. Horvitz-Thompson, Hansen-Hurwitz, Desraj ordered estimator (for general as well as particular case), Murthy's estimator etc;</p> <p>CO4: Apply the technique of systematic sampling in population with linear trend, periodic trend. Comparison between Systematic sampling, stratified, SRSWR and SRSWOR. Explain modified systematic sampling in presence of linear trend; some ideas on advanced concept of non-sampling errors and sampling technique like randomized response technique (Warner's model), quota sampling, distance sampling, snowball sampling, importance sampling, network sampling etc.</p> <p>CO5: Distinguish between the concept of ratio method of estimation and regression method of estimation. Explain Jackknife estimator, combined ratio estimator, Separate estimator and their optimum properties.</p>
STA1056	Practicals based on sample survey (core)	<p>CO1: Analyze data for a stratified random sampling under different types of allocation.</p> <p>CO2: Calculate the estimate of the population mean and its variance under systematic sampling.</p> <p>CO3: Construct estimates of population parameters for populations with auxiliary information.</p> <p>CO4: Estimate the unknown population mean for some other sampling designs like cluster sampling and multistage sampling and compare the relative efficiency of these estimates with other competing sampling schemes.</p> <p>CO5: Appraise the various schemes of drawing samples with and without replacement from PPS sample design and estimate the population parameters under these schemes along with their variance.</p>
STA2016	Distribution theory and Simulation (Core)	<p>CO1: Reproduce the basic tools of distribution theory viz., joint, marginal, and conditional probability. Explain the function of random variables and their distributions using Jacobian of transformation and other tools which will help in deeper understanding of the subject.</p> <p>CO2: Explain some basic distributions viz., Logarithmic, positive, and negative multinomial distributions, probability distributions of extremes and its asymptotic distribution.</p>

		<p>CO3: Explain and formulate order statistics and their properties; concept of censoring, truncation, and weighted distributions; Explain and construct Mixture distributions and zero modified distributions: Mixed Poisson distribution and its properties, Mixture of Binomial distributions with examples.</p> <p>CO4: Classify some of the sampling distributions viz., non-central Chi square, non-central t, and F distributions; Explain the results on other related distributions and prescribe their properties.</p> <p>CO5: Generate random variables from some basic distributions using Congruence method, inverse transform method and acceptance rejection method generation of random variables. Propose and devise single and multiple integrals using Monte Carlo simulation.</p>
STA2026	Statistical Inference-1 (Point and Interval Estimation) (Core)	<p>CO1: Outline the problem of point and interval estimation.</p> <p>CO2: Discuss the various criteria of a good estimator namely consistency, unbiasedness, sufficiency, efficiency and completeness.</p> <p>CO3: Compute point estimators of unknown parameters of some commonly used distributions satisfying the criteria of good estimators.</p> <p>CO4: Construct UMVUE using Lehmann Scheffe's theorem and determine the lower bound to the variance of unbiased estimators.</p> <p>CO5: Construct Estimators using the various methods of estimation like Maximum Likelihood Estimation, Method of moments and minimum Chi square and examine the large sample and small sample properties of these estimators.</p>
STA2036	Linear Estimation and Design of experiments (Core)	<p>CO1: Recall analysis of variance techniques, principles of design of experiments and the basic designs based on them.</p> <p>CO2: Describe the Gauss Markov set up of the linear models and its relevance to Design of Experiments.</p> <p>CO3: Explain the working principle behind missing plot techniques, factorial and fractional experiments for studying the interaction effects among the various levels of the factor.</p> <p>CO4: Discuss the technique of confounding in Factorial Experiments.</p> <p>CO5: Design and analyse experiments with incomplete blocks like BIBD and PBIBD.</p>
STA2046	Computer Programming (Core)	<p>CO1: Describe the intricacies of number systems.</p> <p>CO2: Classify different data types available in C language together with their modifiers.</p>

		<p>CO3: Apply the basic elements like control statements, loops, Arrays and Strings to code programs. Also apply pointers to solve the memory access problems</p> <p>CO4: Develop C programs for basic statistical analysis.</p> <p>CO6: Analyze data using SPSS</p>
STA2056	Practical on Design of experiments, Estimation and Simulation (Core)	<p>CO1: Test the hypothesis of no difference between various treatments for some basic designs, designs with missing observations and some advanced designs like BIBD, PBIBD, ANOCOV and split plot designs.</p> <p>CO2: Test the significance of the main effects and the interaction effects for factorial experiments (<math>2^5</math> and <math>3^3</math>)</p> <p>CO3: Compute the MLE estimators for some distributions with no closed form of MLE using the “nlm” function of R and the method of scoring.</p> <p>CO4: Compute numerically or analytically the method of moment estimators and minimum chi square estimators for some distributions.</p> <p>CO5: Simulate random observations from some basic distributions like Poisson, exponential and Normal.</p>
STA-3016	Multivariate Analysis (Core)	<p>CO1: Describe multivariate data by the construction of its mean vector and variance covariance matrix; Explain and demonstrate the Multivariate Normal distribution, its properties and drawing random samples from it; Compute Maximum Likelihood Estimators of its parameters and the distribution of the sample mean vector; Illustrate singular and spherical Multivariate Normal distribution.</p> <p>CO2: Explain and derive Wishart Matrix, and its distribution; Explain and prescribe properties, deriving the distribution of the sample generalized variance.</p> <p>CO3: Illustrate and derive the Null distribution of the sample correlation coefficient, partial and multiple correlation coefficients including the non-null distribution of the sample correlation coefficient; stating their applications in testing and interval estimation.</p> <p>CO4: Derive the null distribution of Hotelling <math>T^2</math> and illustrate its uses for testing of hypothesis based on the mean vector of Multivariate Normal distribution; construct confidence ellipsoid for the mean vector; conduct Multivariate Linear Regression and Multivariate Analysis of Variance (MANOVA) for one, and two-way classified data.</p> <p>CO5: Explain and formulate classification and discrimination procedures for discriminating between two multivariate Normal populations; propose and devise some multivariate data reduction techniques like Principal Component analysis, Canonical Correlation Analysis and Factor Analysis using data from real-life.</p>
STA3026	Statistical Inference –II (Testing of	CO1: Recall the concept of two types of errors, critical region, power function, Neyman-Pearson

	Hypothesis) (core)	<p>Lemma.</p> <p>CO2: Discuss the properties of tests of hypothesis such as consistency, monotonicity of power function, invariance, monotone likelihood ratio.</p> <p>CO3: Apply the Neyman-Pearson Lemma to construct Most Powerful (MP) and Uniformly Most Powerful (UMP) critical regions, Type-A and Type-A<sub>1</sub> critical regions, similar regions.</p> <p>CO4: Apply the concept of likelihood ratio test to perform test of simple null against simple/composite alternative hypothesis.</p> <p>CO5: Illustrate the working principle behind Sequential Probability Ratio Test (SPRT), test a simple null against a simple alternative using SPRT and determine the related functions like ASN function, OC function.</p>
STA3036	Stochastic Processes and Time Series (core)	<p>CO1: Define the terms – stochastic processes, stationary processes, second order process, counting process, Markov Chain, auto-covariance and auto-correlation function.</p> <p>CO2: Classify the states of a Markov Chain and compute the transition probabilities using the transition probability matrix and classify the time series processes as auto-regressive (AR), moving average (MA), ARMA and ARIMA.</p> <p>CO3: Explain an AR(1) and AR(p), MA(1), MA(q), ARMA (p,q) process and state the conditions for stationarity, invertibility, and characteristics of the ACF and PACF and solve numerical problems on their stationarity and invertibility, the concepts of discrete state space viz. Poisson process and its generalizations, Birth and death process, Erlang process.</p> <p>CO4: Explain how to model non- stationary processes using the ARIMA model, spectral densities, and apply linear filters to AR and MA processes.</p> <p>CO5: Utilize the concept of Poisson process to solve numerical problems.</p>
STA3046	Actuarial Statistics-I ( Special Paper, Option A)	<p>CO1: Recognize the optimum conditions for the establishment of the contract of insurance based on utility functions and the expected value principle.</p> <p>CO2: Examine the two uncertainties in term of claim number and claim count in the domain of General insurance and model them with a view to estimate the optimal reserves.</p> <p>CO4: Apply the individual risk model to some practical scenario with emphasis on estimating the distribution of aggregate claim for a portfolio and the security loading factor.</p> <p>CO3: Illustrate the application of Collective Risk model over a single period and that over an extended period to calculate the distribution of aggregate claim amount and the probability of ultimate ruin.</p> <p>CO4: Discuss the fundamental concepts of Life Contingency Mathematics with emphasis on Life tables and Multiple Decrement Life tables.</p>

STA -3046	Biostatistics-I (Special paper option B)	<p>CO1: Outline demographic transition theory, Evaluation, and adjustment of age data, the definition and Scope of epidemiology. Explain and demonstrate measurement of health and diseases: Definitions of health and disease, measures of disease frequency, comparing disease occurrence.</p> <p>CO2: Explain indexes of age preference: Whipple's index, Myre's index, smoothing of age data, construction of complete and abridged life table by Chiang's methods; outline life table from the perspective of Markov chain, Multiple decrement life table, - cause specific life table, multistage life table, health expectancy, Statistical theory of life table, competing risk, structure of population, Mathematical models in fertility and Human reproduction, population projection by the matrix method.</p> <p>CO3: Analyze type of Study: observational epidemiology, Experimental epidemiology, potential errors in epidemiological studies.</p> <p>CO4: Illustrate causation in Epidemiology, and prevention its scope, levels, and Screening, communicable disease epidemiology: epidemic and epidemic disease, chain of infection, environmental and occupational epidemiology, public health surveillance, Epidemiology, health services and health policy.</p> <p>CO5: Develop Epidemic processes: Simple and General; Chain binomial models.</p>
STA 3046	Knowledge Discovery and Data Mining (Special paper: Option C)	<p>CO1: Outline the Data Mining and Data Mining Techniques, Statistical perspective on data mining, and Genetic algorithms, Temporal Mining, Modelling temporal events, Pattern detection.</p> <p>CO2: Demonstrate and explain the problems and procedures of classification, probabilities of misclassification, Decision trees, Statistical based algorithms, and Neural Networks- Based algorithms.</p> <p>CO3: Explain and sketch clustering, Similarity and distance measures, Hierarchical algorithms, Partitional algorithms, Vectors quantization, Supervised Learning Methods, Fisher Linear Discriminate, Artificial Neural Networks, Extension of regression models and regression trees, Describe unsupervised learning methods, Univariate and multivariate data, Explain association rules and prediction; data attributes, applications to electronic commerce.</p> <p>CO4: Examine and compare the databases, Relational databases, Data warehouses, Introduction to online analytical data processing.</p> <p>CO5: Organize the problems for practical classes.</p>
STA3046	Demography –I(Special paper-Option D)	<p>CO1: Outline ideas on recent census, Sample Registration System, National Family Health Survey, National Population policy and describing the demographic transition theory. Describe various methods to reduce the irregularities in terms of coverage and content of demographic data, adjustment of age data through the use of Whipple and Myer's index.</p> <p>CO2: Discuss analytical laws of mortality, distribution of life table functions and their estimation, multiple decrement life table with special reference to cause specific life table, ideas on health expectancy.</p> <p>CO3: Discuss the various fertility measures from cohort data and discuss stable population model, projection procedure of population by component and Leslie matrix method.</p> <p>CO4: Explain method of smoothing and age and sex ratio analysis, life table as a tool to measure mortality, compute life table, estimate life table functions explain the human reproduction as a stochastic model, estimate fertility rates by indirect methods; explain stochastic models for reproductive distribution of time to first birth, estimate parameters of Shep's model.</p>



		CO5: Analyze life table from the prospective of Markov chain, analyze stable population model.
STA3046	Econometrics-I (Special Paper Option E)	CO1: Recall the concept of Ordinary Least Squares method and multiple linear regression. CO2: Illustrate the k-variate Linear Regression Model in Matrix notation and interpret the partial regression co-efficients. CO3: Explain the concept of dummy variables and dummy variable trap in regression analysis and illustrate the use of ANOVA and ANOCOVA models in dummy variable regression analysis, GLS.  CO4: Explain the consequences of violations of assumptions of CLRM viz. (i) if the regressors are correlated (multicollinearity), (ii) if the error variance is non-constant (heteroscedasticity), (iii) if the error terms are correlated (autocorrelation).  CO5: Detect the presence of multicollinearity, heteroscedasticity and autocorrelation, and process remedial actions.
STA 3046	Operations Research-I (Special Paper, Option F)	CO1: Explain various characteristic features of a queuing system. CO2: Classify Markovian and non-Markovian queuing models viz: M/M/1, M/M/c, M/M/c/c, M/M/1/K, M/M/c/K, Machine interference model, Bulk arrival queue, M/D/1 and M/G/1. CO3: Explain numerically quantitative metrics of performance of different queuing systems. CO4: Discuss queues with Poisson arrivals, single server and multi-server exponential service requirements together with non-Poisson Queues. CO5: Apply and extend queuing models to analyze real world problems.
STA 3046	Survival Analysis-I (Special Paper, Option G)	CO1: Describe Survival data. Order and random censoring. CO2: Analyse survival data using some Life distributions and perform Statistical inference. CO3: Analyse failure rates through various tools like Life tables, Ageing classes and Bath tub model. CO4: Construct various estimators for survival function like the Actuarial estimator and Kaplan -Meier Estimator. CO5: Make Estimation of survival function under the assumption of IFR/DFE.
STA 3056	Practical on Multivariate Analysis, Time Series and Testing of Hypothesis.	CO1: Construct the mean vector and variance covariance matrix for multivariate data and infer on them. CO2: Apply some multivariate techniques like Multiple regression, Classification and data reduction techniques like principal component analysis and factor analysis to real life data. CO3: Represent graphically the power curves for testing the parameters of some common distributions like Normal, Poisson, Binomial and Exponential. CO4: Construct Uniformly Most Powerful similar regions for testing unknown parameters of Normal distribution.

		CO5: Compute autocovariance and autocorrelation function of a time series and perform spectral and periodogram analysis.
STA4016	Non-Parametric Statistical Inference and Semi Parametric Methods and Decision Theory and Bayesian Inference (core)	CO1: Describe the one sample run test, Sign test, Wilcoxon one sample and two sample test, Kolmogorov-Smirnov one sample and two sample test, Mann-Whitney U-test, Kruskal-Wallis test. CO2: Explain the concepts of prior and posterior distribution, E-M algorithm, MCMC, Gibbs sampling, U-statistic, kernel and symmetric kernel, jack-knifing and bootstrapping and their applications, Cox proportional hazard model and the method of Partial likelihood for estimating the parameters of the model. CO3: Differentiating between the frequentist approach and the Bayesian approach of statistical theory and utilize the approaches to solve numerical problems. CO4: Explain the elements of decision theory viz. Bayes and Minimax decision rules, different types of loss function and framing of test of hypothesis as a decision problem. CO5: Estimation of parameters and intervals using the Bayesian approach.
STA 4026	Regression and Operation Research (core)	CO1: Discuss the role of regression to model natural and social phenomena, explain multiple linear regression models, estimate its parameters and its validation exercises, role of residuals, violation of assumptions of linear regression model (detection and remedial measures) CO2: Convert a real life scenario to a general linear programming problem (LPP), explain the concept of duality of LPP, assignment problems and transportation problems and procedures of solving these in an optimum manner. CO3: Illustrate the concepts of competitive game, strategy, payoff, maximin and minimax principle and equilibrium of a game. CO4: Explain competitive game without saddle point, 2 x 2 game, 2xn or mx2 game and mxn game, procedures of solving (Graphical, Dominance property and LPP) a competitive game. CO5: Apply optimization techniques in real life scenario.
STA 4036	Demography and Statistics for National development (Core)	CO1: Outline the ideas on recent census, Sample Registration System, National Family Health Survey, National Population policy and the demographic transition theory. CO2: Describe various methods to reduce the irregularities in terms of coverage and content of demographic data, adjustment of age data and analyze mortality and fertility through life tables and other related tools. CO3: Explain the idea of stable population model, population projection, migration and National Population policy, various concepts of National Income, and the various methods of estimation of National Income, Pareto's Law of Income Distribution., Malthusian Theory of population, the optimum theory of population, the theory of demographic CO4: Describe the criteria for measurement of inequality (anonymity, population, relative income and Dalton principles), Lorenz Curve with respect to the four criteria, complete measures of inequality (Range, Kuznets Ratio, Mean absolute deviation, Co-efficient of variation, Gini co-efficient), Theil's T-

		<p>statistic, measures of poverty including Amartya Sen's index and Kakwani's index.</p> <p>CO5: Calculate Human Development Index, Gender Inequality Index, Multidimensional Poverty Index.</p>
STA4046	Actuarial Statistics-II ( Special Paper, OPTION A)	<p>CO1: Identify different types of Life insurance models payable at the moment of death and those payable at the end of the year of death and calculate their actuarial present values.</p> <p>CO2: Demonstrate the role of Life annuities as a foundation of pension theory and calculate the Actuarial present value of some very simple life annuities.</p> <p>CO3: Calculate the expected claim amount to be paid by the insurer and the reinsurer for different types of reinsurance.</p> <p>CO4: Combine the evidence of data and prior information to determine credibility premium through Empirical Bayes approach.</p> <p>CO5: Differentiate the policy holders based on premium using the principle of Experience rating and create algorithms to project the future development of a run off triangle.</p>
STA -4046	Biostatistics-II (Special paper option B)	<p>CO1: Recall basic biological concepts in genetics (relevant to this course).</p> <p>CO2: Explain, assess, and formulate Mendel's law, Hardy Weinberg equilibrium. Mating tables, estimation of allele frequency (dominant/ codominant cases). Approach to equilibrium for X-linked gene, natural selection, mutation, genetic drift, equilibrium when both natural selection and mutation are operative, non-parametric estimation of basic qualities for right censored data – Product limit estimator, Nalson- Aalen estimator, methods of Randomization: Stratified randomization, Unequal randomization Blinding and Placebos, Crossover Trials, The size of a clinical trial; Monitoring Trial progress, Forms and Data management, Protocol Deviations, Basic Principles of Statistical Analysis: Describing the data, Significance tests, estimation, and confidencelimits. Publication and interpretation of findings.</p> <p>CO3: Reproduce concepts of survival time distributions, brief idea of some survival distributions, detailed discussion on censoring and truncation.</p> <p>CO4: Describe the rationality of Clinical trials. The Historical Development of Clinical trials. The Justification of Randomized Controlled Trails.</p> <p>CO5: Devise Two sample problems – Gahen's generalized Wilcoxon test, The Cox-Mantel test, The log Rank test.</p>
STA -4046	Computational Mathematics (Special paper option C)	<p>CO1: Outline various sources and classification of errors.</p>

		<p>CO2: Illustrate Step Matrices and Operations involving them, Inversion of matrices by Partitioning into Blocks, The Algorithm of Successive Bordering.</p> <p>CO3: Explain and devise Krylov's algorithm of Expansion of a Characteristic Determinant, Krylov's algorithm of computing eigenvectors, The Leverrier-Faadeev algorithm, Danilevsky's algorithm of finding eigenvectors, Iterative algorithm of finding the First Eigenvalue of a matrix, Method of Chords, Newton's method, Combination of the Method of Chords and Newton's Method, Algorithm of two-point Interpolation, The algorithm of False Positions, Horner's algorithm, Determination of number of real roots of an algebraic equation.</p> <p>CO4: Explain and derive Approximation theory, Polynomial interpolation, Lagrange's Interpolating Polynomial, Newton's Interpolating Polynomial, Aitken's Iterated Interpolation, Optimal-Interval Interpolation, Trigonometric Interpolation, Backward Interpolation, Basic Formulas of Numerical Differentiation, Peculiarities of Numerical Differentiation, basic Quadrature Formulae, Newton-Cotes Quadrature, Compounded Quadrature, Method of Successive Approximation, Euler's Method, Euler-Cauchy Algorithm, Successive Euler-Cauchy Algorithm, R-K Algorithm, Adam's algorithm, Milne's algorithm, Second Order differential equation, Boundary Value Problems.</p> <p>CO5: Formulate Basic Elimination Algorithm, Gaussian Elimination Scheme, Gauss-Jordan Algorithm, Cholesky's algorithm, Iterative Scheme or the Algorithm of Successive Approximation, Seidel's Algorithm.</p>
STA -4046	Demography -II (Special paper, option D)	<p>CO1: Describe stable population as an equilibrium state under the persistent fertility and mortality conditions and comparing with the stationary population and quasi stable population; outline the concept of Multistate Life tables, Multiregional Life tables and Multiregional Stable population.</p> <p>CO2: Explain the methods of estimating basic demographic measures from incomplete data. Explain Multistate demography as an extension of classical mathematical demography to the case of individuals grouped in various categories of demographic values.</p> <p>CO2: Explain the construction procedure of model life table, Brass two parameter Logit system; explain different nuptiality measures and their construction.</p> <p>CO3: Explain the concept of internal and international migration, Stochastic models for migration and the phenomenon of social and occupational mobility from the perspective of Markov Chains; explain the use of discrete branching process to render insights into population dynamics and destiny of human population.</p> <p>CO4: Explain the concepts of small area estimation and some applications of the Poisson Process in demography.</p>

		CO5: Construction of Multistate Life tables, Multiregional Life tables
STA -4046	Econometrics -II (Special paper, option E)	<p>CO1: Identify non-linear regression models and demonstrate the difference between the estimation of linear and non-linear regression models.</p> <p>CO2: Explain qualitative response regression models viz. Linear Probability Model (LPM), Logit and Probit Models and estimate them.</p> <p>CO3: Explain Dynamic Econometric Models viz. autoregressive and distributed lag models, Partial Adjustment and Adaptive Expectations Model, estimate partial Adjustment and adaptive expectations model, estimate distributed lag models using the Koyck approach.</p> <p>CO4: Illustrate simultaneous equation models with examples and discuss the Identification Problem.</p> <p>CO5: Estimate a just identified, under identified and over identified equation, explain the method of Indirect Least Squares (ILS) and the method of two stage Least Squares (2SLS).</p>
STA -4046	Operations Research-II (Special paper, option F)	<p>CO1: Define the concept of reliability with reference to real life examples. Also define the terms such as failure rate, failure density and cumulative failure rate.</p> <p>CO2: Explain the concept of Structure functions, coherent structure; reliability bounds of parallel and series structures using inclusion and exclusion methods.</p> <p>CO3: Discuss System Reliability under Markovian setup (Series, Parallel and Multistate systems); Calculate its probability of occurrence of number of renewals in a random interval in terms of Laplace transform. Also estimate the mean time to failure and reliability of the above mentioned system. Explain Replacement and Maintenance Policies, Repairable Systems and their Availability.</p> <p>CO4: Estimate the reliability function, mean life times when a number of systems are put on test under failure censored scheme with exponential failure time distribution. Compare exponential distribution with other distributions in respect of survival function.</p> <p>CO5: Utilize the concept of censoring and its importance in life testing problems.</p>
STA -4046	: Survival Analysis -II (Special paper, option F)	<p>CO1: Infer on the exponentiality of the underlying survival distribution using Deshpande test.</p> <p>CO2: Apply and interpret two sample tests for survival data like Log rank test, Mantel -Haenszel test and others.</p> <p>CO3: Estimate marginal probability of an event in the presence of competing events using appropriate competing risk models.</p> <p>CO4: Measure the possibility of attrition through different causes in survival analysis using multiple decrement life tables.</p>

		CO5: Devise semi parametric regression model for failure rate including the Cox's proportional hazard model and interpret model diagnostics.
STA -4056	Project	<p>CO1: Choose a social/ natural phenomenon with random variation and to extract some research question out of it which can be solved with the help of the knowledge on the Statistical concepts and methods acquired throughout the program.</p> <p>CO2: Demonstrate skills to justify the study and assess its social ramifications with a view of providing some vital input to the process of policy making at the regional level.</p> <p>CO3 Demonstrate the ability to probe deeper into a theoretical concept and extract some new properties associated with it.</p> <p>CO4: Assess the appropriate sample design to carry out the empirical analysis and interpret the results in a scientific manner.</p> <p>CO5: Defend the findings from the study while presenting the project before an audience of teachers and external examiners.</p>

<b>Department:</b>	<b>B.A programme in Gender and Women's Studies</b>	
<b>Programme:</b>	<b>FYUG Programme under implementation of NEP 2020</b>	
<b>PSOs</b>	<p><b>PSO 1:</b> Demonstrate an understanding of the existing socialisation process and pattern, gender identities and feminist theories to integrate knowledge and skills to address gender issues</p> <p><b>PSO 2:</b> Illustrate the significance of critical thinking, analytical skills, interdisciplinary and multidisciplinary perspectives to assess gendered knowledge of education, history, public policies, human rights &amp; law, health, science &amp; technology, etc. and its implication in the society.</p> <p><b>PSO 3:</b> Develop deeper understandings of the local, regional, national and global gender issues to effectively assess multicultural perspectives and socio-cultural diversity.</p> <p><b>PSO 4:</b> Exhibit the ability to critically analyse data, provide arguments and employ feminist theories and feminist research methodology to create new insights and contribution to the knowledge of Gender and Women's Studies.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
GWS010104	Understanding Gender	<p>CO 1: Define the basic concepts of sex, gender and sexuality.</p> <p>CO 2: Determine the use of gender as an analytical category.</p> <p>CO3: Develop a comprehensive understanding of gender fluidity and gender as a social construct.</p> <p>CO 4: Outline an understanding of the intersectionality of gender, class, caste, religion, race and ethnicity.</p> <p>CO 5: Critique the biological assumptions behind the understanding of the body.</p>
GWS020104	Gender Issues I	<p>CO1: Identify gendered language in textbooks and media</p> <p>CO2: Locate 'women' in the sphere of economy and work.</p> <p>CO3: Explain the concepts and types of gender based violence</p> <p>CO4: Describe the paradigm of gender sensitivity within the constitution of India.</p> <p>CO5: Determine the legal and constitutional provisions for gender and violence.</p>
GWS030104	Gender Issues II	<p>CO1: Explain the emerging issues of gender and health.</p> <p>CO2: Outline the role of education in promoting gender equality and gender equity.</p>

		<p>CO3: Explain the concepts of politics and power as agencies of gender equality.          CO4: Discuss the role of media as agents of socialization and empowerment.          CO5: Show socio-cultural determinants of gender issues</p>
GWS040104	Women's Movement and Women's and Gender Studies	<p>CO1: Identify the trajectory and the history of the women's movement in the West.          CO2: Explain the women's uprisings at different points of history, time and region in India.          CO3: Discuss the meaning and the history of gender and women's studies.          CO4: Locate the emergence of Women Studies Research Centers in India.          CO5: Sketch the history and debates of feminism in India and across the globe..</p>
GWS040204	Gender and Education (Elective 01)	<p>CO1: Explain the role of education in gendering of individuals.          CO2: Illustrate the approaches to women's education.          CO3: Discuss the government and non-government policies and programmes related to Women's Education.          CO4: Demonstrate the role of education as an instrument for women's empowerment          CO5: Explain education as an agent for social change.</p>
GWS040304	Women, Science and Technology (Elective 01)	<p>CO1: Explain the basic concepts and issues of gender, science and technology.          CO2: Examine data and trends on the gender gaps in STEM and strategies for improvement          CO3: Discuss the leadership issues of women in Science and Technology.          CO4: Illustrate the life stories of Women Scientists in the global and national levels          CO5: Demonstrate the socio- cultural determinants of women's role in science and technology.</p>
GWS040404	Gender, Society and Culture (Elective 02)	<p>CO1: Illustrate social construction of gender in societies          CO2: Interpret the gendered understanding of family.          CO3: Indicate the relationship between gender and social institutions.          CO4: Explain the female body as a site of gender-based oppression.          CO5: Paraphrase the basic concepts, structures, institutions and processes in constructing gender identities.</p>
GWS040504	Public Policy and Gender (Elective 02)	<p>CO1: Explain the nature, origin and significance of public policy and its implementation.          CO2: Explain gender exclusion through intersectionality in framing gender welfare policies.          CO3: Demonstrate the significance of gender mainstreaming in public policies.          CO4: Assess the major gender-based schemes and policies.          CO5: Assess the major gender-based schemes and policies in India.</p>
GWS040604	Gender, Rights and Law (Elective 03)	<p>CO1: Describe the basic concepts of law, justice, and human rights.          CO2: Discuss the Indian constitutional laws and women's rights.</p>



		<p>CO3: Illustrate the legal provisions in the Indian constitution for women.</p> <p>CO4: Illustrate the rights and legal provisions for persons with disabilities and non-binary individuals in India.</p> <p>CO5: Interpret the major legislations from a feminist lens.</p>
GWS040704	Women and Entrepreneurship (Elective 03)	<p>CO1: Describe the concepts related to women and entrepreneurship.</p> <p>CO2: Discuss the importance of resource mobilization for women's entrepreneurship.</p> <p>CO3: Explain the role of technology in women's entrepreneurship.</p> <p>CO4: Illustrate stories of successful female entrepreneurs.</p> <p>CO5: Examine the alternative models of entrepreneurship.</p>
GWS050104	Feminist Theory-I	<p>CO1: Discuss the meaning and definition of feminism.</p> <p>CO2: Describe the origin, concepts and criticisms of liberal feminism.</p> <p>CO3: Illustrate the origin, concepts and criticisms of marxist feminism.</p> <p>CO4: Explain the origin, concepts and criticisms of marxist feminism.</p> <p>CO5: Sketch different dimensions of women's subordination and oppression.</p>
GWS050204	Gender, Work and Livelihood (Elective 01)	<p>CO1: Outline concepts of work and related gender issues.</p> <p>CO2: Explain globalisation and contemporary debates on gender and work.</p> <p>CO3: Examine globalisation and its impact on women's work.</p> <p>CO4: Illustrate the meaning, issues and challenges on gender and livelihood in India.</p> <p>CO5: Discuss the gendered policies and programmes of livelihood in India.</p>
GWS050304	Gender in North-East India (Elective 01)	<p>CO1: Describe the geo-political, cultural and ethical significances of gender and North-east India.</p> <p>CO2: Demonstrate gender issues in the context of Northeast India.</p> <p>CO3: Demonstrate women's agency for change and development in NEI.</p> <p>CO4: Outline queer activism in NEI.</p> <p>CO5: Illustrate the formation of gender identities and relations in the context of NEI.</p>
GWS050404	Gender, Empowerment and Governance (Elective 02)	<p>CO1: Describe the concepts and agents of governance.</p> <p>CO2: Demonstrate gender and governance in India and South Asia.</p> <p>CO3: Illustrate the approaches of women's empowerment in development and governance.</p> <p>CO4: Explain gender budgeting, gender auditing and gender mainstreaming in policies and planning process.</p> <p>CO5: Outline women's participation in the governance process, with a special focus on India.</p>
GWS050504	Gender, Environment (Climate Change) and Sustainability (Elective 02)	<p>CO1: Describe the relationship between gender and environment.</p> <p>CO2: Discuss the relationship between gender and sustainability.</p> <p>CO3: Explain the issues of gender, climate change and resource management.</p> <p>CO4: Assess case studies and make poster presentations on gender, climate change and sustainable development.</p> <p>CO5: Develop competence to discuss gender, environment and the issues involved from global to local level.</p>
GWS050604	Gender and Human Rights (Elective 03)	<p>CO1: Discuss the concepts of human rights and its evolution.</p> <p>CO2: Illustrate international conventions and mechanisms on women's rights.</p>

		CO3: Explain global movements on women's rights. CO4: Examine international legal principles and human rights of non-binaries. CO5: Interpret movies on human rights from gender and women's perspectives.
GWS050704	Women and Finance (Elective 03)	CO1: Describe finance and financial system. CO2: Describe features of banks and non-banking financial institutions. CO3: Demonstrate types and features of negotiable instruments of finance. CO4: Identify tools and resources for financial literacy and financial planning for women. CO5: Sketch unique financial needs and goals of women at different life stages.
GWS060104	Feminist Theory-II	CO1: Discuss the thoughts and ideas of psychoanalytic and socialist feminism. CO2: Illustrate the significance of intersectionality in feminist discourses CO3: Sketch the history and challenges of queer feminism. CO4: Explain the relevant theories and contemporary developments in feminism CO5: Examine the different ideological affiliations within feminist movements.
GWS060204	Feminist Traditions in India (Elective 01)	CO1: Describe the making of Indian feminism. CO2: Recognize the contributions of Indian feminists. CO3: Explain the colonial interventions in the construction of 'nation' and 'woman'. CO4: Interrelate class, caste, land and gender in India. CO5: Outline the alternative forms of feminism in India.
GWS060304	Gender in Popular Writing (Elective 01)	CO1: Describe popular writings and literature on gender. CO2: Locate women's voices in colonial and post-colonial India. CO3: Discuss popular culture and writings in Assamese. CO4: Illustrate life writings by popular feminists in India and the west. CO5: Interrelate popular fictions and its engagement with the questions of identity, gender, race, etc.
GWS060404	Introduction to the Atlas of Women of the World (Elective 02)	CO1: Describe map, components of map and fundamentals of map reading. CO2: Demonstrate social elements of the map and relate them with the gendered space CO3: Sketch global gender disparities associated with the socio- cultural and economic attributes in the creation of gendered space. CO4: Spatial analyses of gender issues across the world. CO5: Assess gender issues across the countries of the world through map work.
GWS060504	Gender and Development (Elective 02)	CO1: Explain concepts and approaches to gender and development. CO2: Demonstrate indexes to measure gender and development. CO3: Illustrate sustainable approaches towards gender and development. CO4: Show various approaches to women's empowerment. CO5: Examine development policies and practices from a gender lens.
GWS060604	Quantitative and Qualitative Research	CO1: Define the characteristics, objectives and types of research. CO2: Demonstrate the steps in planning and conducting research. CO3: Explain qualitative, quantitative and feminist research. CO4: Prepare qualitative and quantitative research tools.

	CO5: Demonstrate and apply knowledge fo academic research
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<b>Department:</b>	<b>Political Science</b>	
<b>Programme:</b>	M.A in Political Science	
<b>PSOs</b>	PSO 1: Discuss the key concepts and theories in political science, particularly the way power is acquired and exercised at the state, national, and/or international levels PSO 2: Apply political science theories and concepts to comprehend current political events PSO 3: Analyze the significance of different concepts and ideas in political theory to understand the state-citizen interface. PSO 4: Develop conceptual and methodological frameworks of research for exploring new knowledge to understand society	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
POL1016	WESTERN POLITICAL THOUGHT	CO 1. Define different terms and concepts of western political thought CO 2. Explain the historical context behind the emergence of different political ideas and thoughts CO 3. Associate the different theories with the thinkers CO 4. Compare the strengths and weaknesses of the political ideas and thoughts of different thinkers CO 5. Assess the contemporary and contextual relevance of these ideas
POL1026	POLITICAL THOUGHT IN MODERN INDIA	CO 1) Describe the key ideas of modern Indian political thought CO 2. Explain the major civilisational and historical influences on Indian political thought CO 3. Compare the specific historical, social and political contexts for the emergence of different streams of political thought CO 4. Develop critical perspective to understand the past and present societies in India CO 5. Explain the relative relevance of those ideas in the contemporary period
POL1036	INTERNATIONAL RELATIONS-I	CO 1. State the major theories of International relations CO 2. Define issues, concepts and themes that are integral to the understanding of International Relations. CO3. Explain the relationship between different states in terms of these theories CO 4. Analyse the historical, geographical and political biases of existing IR theories CO 5. Assess the relative contemporary significance of different theories of international relations
POL1046	PUBLIC ADMINISTRATION -I	CO 1. Describe the major concepts and evolution of Public Administration CO 2. State the major theories of Public Administration CO 3. Compare the relative strengths and weaknesses of these theories in present context CO 4. Interpret the significance of these theories in Indian context CO 5. Explain the significance of bureaucracy in development
POL1054	RECONCILIATION AND SOCIAL HARMONY	CO 1. Describe the concepts of peace and conflict resolution. CO 2. Explain the relationship among conflict resolution, reconciliation and social harmony. CO 3. Examine the relevance of reconciliation and social harmony in a democracy.

		<p>CO 4. Analyse certain case studies involving models of conflict resolution.</p> <p>CO 5. Develop an insight into challenges facing conflict resolution in North East India.</p>
POL2016	POLITICAL THEORY-I	<p>CO 1. Define the themes, concepts and debates in political theory</p> <p>CO 2. Discuss the relevance of political ideas, political traditions and concepts in understanding the crisis, change and continuity that marks the politics in contemporary world.</p> <p>CO 3. Explain the interface between nation, state and globalization</p> <p>CO 4. Analyze the relationship between individual and state in democratic political structures</p> <p>CO 5. Develop insights regarding the functioning of modern political institutions, processes and power structures of the society</p>
POL2026	POLITICS IN INDIA	<p>CO 1. Describe the ideas, institutions and processes of politics in India</p> <p>CO 2. Outline the origin of Indian democracy and the challenges it faced during different moments</p> <p>CO 3. Illustrate the grounding ideas and principles of the Indian constitution</p> <p>CO 4. Interpret the significance of caste, class, gender and ethnicity in Indian politics</p> <p>CO 5. Illustrate the nature and impact of social movements on society and politics in India</p>
POL2036	INTERNATIONAL RELATIONS-II	<p>CO 1. Describe the major concepts and issues of international relations</p> <p>CO 2. Illustrate the existing approaches for management of international peace</p> <p>CO 3. Explain the legal and institutional mechanism for management of inter-state relations</p> <p>CO 4. Analyze the conceptual and evolving dynamics of International Political Economy.</p> <p>CO 5. Assess the major concepts to understand the existing nature of international relations</p>
POL2046	PUBLIC ADMINISTRATION-II	<p>CO 1. Define the key concepts in public administration</p>

		<p>CO 2. Discuss the contemporary challenges and evolving mechanisms to address these challenges.</p> <p>CO 3. Apply the concepts to understand the issues and challenges of public administration in India</p> <p>CO 4. Appraise the impact of technology in the management of governance</p> <p>CO 5. Explain the recent trends in administrative culture</p>
POL2054	PARTICIPATORY DEMOCRACY AND LOCAL GOVERNMENT	<p>CO 1. Discuss basic concepts of participatory democracy and local governance</p> <p>CO 2. Describe the working of Panchayati Raj Institutions and Urban Local Bodies in India.</p> <p>CO 3. Analyse the challenges facing local governance in India.</p> <p>CO 4. Assess the importance of citizen participation in a democracy.</p> <p>CO 5. Develop an insight into challenges facing local governance in North East India.</p>
POL3016	POLITICAL THEORY-II	<ol style="list-style-type: none"> <li>1. Define the themes, concepts, and debates in Political Theory.</li> <li>2. Identify the relevance of political ideas, political traditions and concepts in Political Theory.</li> <li>3. Explain the crisis, change and continuity that marks the study of politics in contemporary world.</li> <li>4. Critique the concepts like justice, liberty, equality and toleration in political theory .</li> <li>5. Develop insights on political concepts to offer explanations onchallenges markingthe ideas of civil society, hegemony and citizenship in contemporary times.</li> </ol>
POL3026	RESEARCH METHODOLOGY-I	<ol style="list-style-type: none"> <li>1. Define the themes and issues in research methodology.</li> <li>2. Outline the distinctions between Research Method Research Methodology.</li> <li>3. Identify the status and relevance of theories and concepts in understanding the use of research methods in social science.</li> <li>4. Compareand contrast the use of quantitative and qualitative methods in social science research.</li> <li>5. Develop a research proposal</li> </ol>
POL3036	POLITICS OF SOCIAL AND NEW SOCIAL MOVEMENTS	<ol style="list-style-type: none"> <li>1. Outline the themes and issues relevant in the study of social movements.</li> <li>2. Discuss various components and major characteristics of social movements.</li> <li>3. Analyse the relevance of social movements in a democracy.</li> <li>4. Compare and contrast different kinds of social movements in India</li> </ol>

		<ol style="list-style-type: none"> <li>5. Interpret theoretical insights and perspectives in the study of social movements in context of various kinds of social mobilisation taking place in India.</li> </ol>
POL3046	INDIAN FOREIGN POLICY-ISSUES AND CHALLENGES	<ol style="list-style-type: none"> <li>1. Discuss the themes and issues in the study of Indian Foreign Policy.</li> <li>2. Outline various components, core institutions, major determinants and significant moments of Indian foreign policy.</li> <li>3. Analyse the change and continuity in Indian foreign policy and India's engagements with both the major powers of the world as well as major regions in the world.</li> <li>4. Appraise the nuclear options that India carries in the changing world order.</li> <li>5. Develop a perspective on the current geopolitical realities and policy options before India.</li> </ol>
POL3056	GENDER AND POLITICS	<ol style="list-style-type: none"> <li>1. Discuss themes and issues in the study of gender and politics.</li> <li>2. Distinguish diverse perspectives on the origin and consolidation of patriarchy and its relationship with the idea of state.</li> <li>3. Explain debates in western political tradition on patriarchy, feminism, nature-culture dichotomy, public-private dichotomy.</li> <li>4. Assess the question of gender in western political theory and situate it in the Indian context.</li> <li>5. Develop a perspective on key issues in Indian feminism like Uniform Civil Code, Personal Laws, women reservation and political representation, violence and its various manifestations</li> </ol>
POL3066	COMPARATIVE PUBLIC ADMINISTRATION	<ol style="list-style-type: none"> <li>1. Discuss concepts, issues and debates in the study of Comparative Public Administration.</li> <li>2. Interpret comparative perspective in the study of Public Administration in context of US, UK and India.</li> <li>3. Explain the significant features of administration in India, the US and the UK.</li> <li>4. Compare and contrast the working of administration in US, UK and India.</li> <li>5. Develop a perspective on the challenges facing administration in India.</li> </ol>
POL3076	POLITICAL IDEAS AND IDEOLOGIES	<ol style="list-style-type: none"> <li>1. Discuss political ideas and ideologies in western political tradition.</li> <li>2. Summarize the origin, meaning and relevance of political ideologies.</li> <li>3. Explain the relevance of ideology to map crisis, change and continuity marking the contemporary global politics.</li> <li>4. Analyse the debates on 'end of ideology theses' and its contemporary relevance.</li> <li>5. Develop a perspective on the relevance of political ideologies in context of India.</li> </ol>

POL3086	DEMOCRACY AND MULTICULTURALISM	<ol style="list-style-type: none"> <li>1. Discuss the themes and issues in the study of democracy and multiculturalism.</li> <li>2. Summarize the diverse perspectives on the origin and consolidation of the idea of multiculturalism in western society and its relationship with democracy.</li> <li>3. Explain both the possibilities as well as limitations of multiculturalism in a deeply diverse society.</li> <li>4. Analyse the contestations that underlie the clash between group rights and individual rights in a democracy.</li> <li>5. Critique the relationship among culture, community and citizenship in democracies and Idea of multiculturalism in India.</li> </ol>
POL3096	POLITICS OF ETHNICITY AND IDENTITY	<ol style="list-style-type: none"> <li>1. Discuss themes, concepts and debates that underlie the study of ethnicity and identity.</li> <li>2. Summarize the relevance of ethnicity and identity in shaping contemporary politics.</li> <li>3. Explain the relationship among class, ethnicity, and race in a deeply diverse society.</li> <li>4. Analyse the process of social construction of identity in a democracy and the question of intersectionality.</li> <li>5. Develop a perspective on aspects of ethnicity and identity and its relevance in understanding politics in North-East India.</li> </ol>
POL3104	GENDER AND ECOLOGY	<p>CO 1. Describe the concepts of gender and ecology.</p> <p>CO 2. Explain the relationship between gender, ecology and rights and its relevance.</p> <p>CO 3. Examine the issues of gender and ecology in contemporary socio-economic and political context.</p> <p>CO 4. Assess the importance of gender and ecological rights</p> <p>CO 5. Apply the knowledge to frame research proposals on the issue of gender and ecology</p>
POL3116	SOUTH EAST ASIAN STUDIES	<p>CO 1. Discuss the themes and issues in the study of politics in Southeast Asia.</p> <p>CO 2. Summarise the historical linkages, colonial legacies and culture that characterise Southeast Asia.</p> <p>CO 3. Analyse the present crisis and contestations in Southeast Asia.</p> <p>CO 4. Assess the challenges facing political cooperation and economic integration of Southeast Asia.</p> <p>CO 5. Develop a perspective on the changing world order, rise of China and policy options before India.</p>
POL4016	COMPARATIVE	CO 1. Describe the various themes and issues in the study of Comparative Political Analysis



	POLITICAL ANALYSIS	<p>CO 2. Discuss the emerging insights on the diverse perspectives and approaches</p> <p>CO 3. Analyze the diverse political cultures and their impact on understanding the nature of politics in any society</p> <p>CO 4. Develop a contextual understanding of political processes and institutions</p> <p>CO 5. Critique the different methodologies and perspectives for understanding comparative politics</p>
POL4026	RESEARCH METHODOLOGY-II	<p>CO 1. Describe different methods of conducting social science research</p> <p>CO 2. Comprehend both qualitative and quantitative methods for conducting social science research</p> <p>CO 3. Use qualitative and quantitative methods of data collection</p> <p>CO 4. Apply the statistical tools to organize and interpret data</p> <p>CO 5. Create research proposals using different concepts and methods</p>
POL4036	POLITICAL IDEAS AND THOUGHT IN ASSAM	<p>CO 1. Identify the texts relevant for understanding political thought in Assam</p> <p>CO 2. Apply the significant political ideas relevant for understanding current political debates.</p> <p>CO 3. Explain the chronology of the emergence of political ideas in different periods.</p> <p>CO 4. Analyze the relevance of past political thought to understand ethno national politics in Assam</p> <p>CO 5. Assess the significance of past ideas in shaping the present politics of Assam</p>
POL4046	INDIA AND ITS NEIGHBOURS	<p>CO 1. Identify the major objectives and goals of India's neighbourhood policy</p> <p>CO 2. Discuss the historical and social context in which India's relations with its neighbours have evolved</p> <p>CO 3. Interpret the major areas of confrontation and cooperation</p> <p>CO 4. Illustrate the evolving regional and global dynamics that has shaped India's relationship with its neighbours</p>

		CO 5. Assess the strengths and weaknesses of India's policy towards its neighbours
POL4046	INDIA AND ITS NEIGHBOURS	<p>After completing the course the student will be able to -</p> <p>CO 1. Identify the major objectives and goals of India's neighbourhood policy</p> <p>CO 2. Discuss the historical and social context in which India's relations with its neighbours have evolved</p> <p>CO 3. Interpret the major areas of confrontation and cooperation</p> <p>CO 4. Illustrate the evolving regional and global dynamics that has shaped India's relationship with its neighbours</p> <p>CO 5. Assess the strengths and weaknesses of India's policy towards its neighbours</p>
POL4056	ISSUES IN WORLD POLITICS	<p>After completing the course the student will be able to -</p> <p>CO 1. Define some of the major emerging issues of world politics</p> <p>CO 2. Illustrate the current dynamics of world politics</p> <p>CO 3. Analyze how some of the emerging issues have impact the traditional understanding of international relations</p> <p>CO 4. Compare the unfolding global cooperative arrangements to address the emerging challenges to the world community.</p> <p>CO 5. Develop a critical perspective for understanding the dynamics of global politics in the information age</p>

POL4066	ENVIRONMENT AND POLITICS	<p>After completing the course the student will be able to -</p> <p>CO 1. Identify the core principles and beliefs of Ecologism</p> <p>CO 2. Describe the fundamental theoretical frameworks for understanding Environment and Politics</p> <p>CO 3. Analyze the debates on the interface between environment, gender and sustainable development</p> <p>CO 4. Assess the various policy measures and civil society responses to environmental concerns</p> <p>CO 5. Develop a critique of the existing developmental model and the impact on environment</p>
POL4076	DEVELOPMENT STUDIES	<p>After completing the course the student will be able to -</p> <p>CO 1. Define the major concepts and approaches to Development Studies</p> <p>CO 2. Explain the contestations between the existing model of development and environment</p> <p>CO 3. Analyze the relationship between gender development and environment</p> <p>CO 4. Assess the significance of rights based approach to development</p> <p>CO 5. Develop a critical perspective on the existing and emerging understanding of development</p>
POL4086	ELECTIONS IN INDIA	<p>After completing the course the student will be able to –</p> <p>CO 1. Describe the various approaches for understanding electoral processes for ensuring representative democracy in India</p>

		<p>CO 2. Explain the possibilities and challenges of the existing electoral system in a diverse country like India</p> <p>CO 3. apply the various insights to understand the actual conduct of elections in India</p> <p>CO 4. analyse the role of political parties in the political process of India.</p> <p>CO 5. Assess the success and failure of electoral processes in strengthening democracy in India</p>
POL4096	HUMAN RIGHTS	<p>After completing the course the student will be able to –</p> <p>CO 1. Describe the broad conceptual and theoretical framework to understand the issue of human rights</p> <p>CO 2. Summarise the global mechanisms for the promotion and protection of human rights</p> <p>CO 3. Explain the significance of different concepts and theories of human rights in the context of India</p> <p>CO 4. Analyze the challenges and possibilities of ensuring human rights in Indian context.</p> <p>CO 5. Assess the effectiveness of existing mechanisms of ensuring the rights of vulnerable groups in India</p>
POL4104	NGOs AND SOCIAL SERVICES	<p>At the end of the course the student will be able to</p> <p>CO 1. Describe the concepts of NGOs and Social Service.</p> <p>CO 2. Explain the relationship between civil society, NGOs and social service and its relevance.</p> <p>CO 3. Examine the relevance of NGOs in contemporary socio-economic and political context.</p> <p>CO 4. Analyse the best practices regarding social service in everyday life.</p> <p>CO 5. Develop aninsight into the working of NGOs in North East India.</p>

<b>Department:</b>	<b>Department of Law</b>	
<b>Programme:</b>	<b>Masters in Law(LL.M.)</b>	
<b>PSOs</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
1001	Basics of Constitutional Law of India	<ol style="list-style-type: none"> <li>1. Describe the provisions of State, Law and Citizenship</li> <li>2. Discuss the Constitutional Provisions relating to Services under the Union and States</li> <li>3. Explain the background and philosophy of the Constitution of India</li> <li>4. Analyze the Directive Principles of State Policy</li> <li>5. Examine the Constitutional provisions pertaining to Parliamentary Privileges</li> </ol>
1002	Federalism Under the Constitution of India	<ol style="list-style-type: none"> <li>1. Explain the concept of Federalism</li> <li>2. Examine the Centre-State relationship</li> <li>3. Illustrate the concept of Freedom of Trade and Commerce with the help of case laws analysis</li> <li>4. Compare the different type of Emergency Provisions</li> <li>5. Interpret the provisions of Co-operative Federalism</li> </ol>
1003	Modern Theories of Law and State	<ol style="list-style-type: none"> <li>1. Describe the Theories of Natural Law</li> <li>2. Examine the relevance of philosophies of Bentham, Austin, Hart and Kelson in the context of Indian Legal System</li> <li>3. Illustrate the various aspects of law, such as liberty, values, value-judgement</li> <li>4. Outline the recent development of the legal theory</li> <li>5. Interpret the concept of liberty under the constitution of India</li> </ol>
1004	Theory of Legislation	<ol style="list-style-type: none"> <li>1. Explain the drafting mechanism pertaining to Legislation and the assessment of utilitarianism</li> <li>2. Examine the principles of Civil Code and Penal Code</li> <li>3. Analyze the importance of Judicial Legislation and codification</li> <li>4. Compare and contrast the views on Public Opinion in India and U.K</li> <li>5. Interpret the mandates of the Law Commission of India on Legislative process</li> </ol>
1005	Hindu Law-I	<ol style="list-style-type: none"> <li>1. Explain the sources and schools of Hindu Law</li> <li>2. Discuss the concept of marriage, matrimonial causes and theories of divorce</li> <li>3. Examine the provisions of Minority and guardianship under Hindu Law</li> <li>4. Assess the personal laws of Hindus relating to Debts, alienation and Coparcenary Property</li> <li>5. Evaluate the provisions of Adoption and Maintenance under the Hindu Law</li> </ol>

2001	Civil Liberties andJudicial Process	<ol style="list-style-type: none"> <li>1. Explain the concept of Independence ofJudiciary and Judicial Review</li> <li>2. Analyze the fundamental rights relatingto equality, freedom and liberty under the Constitution of India</li> <li>3. Examine the fundamental rights relatingto Right against Exploitation, Right to Religion, Educational and Cultural Rights under the Constitution of India</li> <li>4. Analyze the history and process of Amendment of the Constitution of India</li> <li>5. Determine the applicability of Writs.</li> </ol>
2002	Law andJustice	<ol style="list-style-type: none"> <li>1. Analyze the concept of Eight Legal Materials and its practical implications</li> <li>2. Examine the various aspects of justice</li> <li>3. Illustrate the concept of Justice, Law andorder, Distributive Justice and JohnRawl’s Philosophy on Justice</li> <li>4. Explain the Realist Thought Process andCritical Legal Studies Movement</li> <li>5. evaluate the Marxian Philosophy, Historical School of Thought, Sociological Approaches in the context of Indian Legal System</li> </ol>
2003	Methods of Interpretation of Statutes	<ol style="list-style-type: none"> <li>1. Discuss the general methods of Interpretation of Statutes</li> <li>2. Apply the various rules of Interpretation of Statutes</li> <li>3. Examine the internal and external aids tointerpretation</li> <li>4. Analyze the process of judicialinterpretation of the Constitution, penal, procedural and remedial Statutes</li> <li>5. Assess the Dynamic Statutory Interpretation</li> </ol>
2004	Hindu LawII	<ol style="list-style-type: none"> <li>1. Discuss the concept and sources of Stridhana and women’s estate and distinguish between the two.</li> <li>2. Explain the types of succession and the rules for devolution of property under theHindu Succession Act, 1956</li> <li>3. Examine the facets of personal law in thecontext of Uniform Civil Code and Fundamental Rights</li> <li>4. Appraise the provision of partition, Domestic Violence Act, 2005 and FamilyCourts Act, 1984</li> <li>5. Interpret the different amendments to ameliorate the position of women under</li> <li>6. Hindu Law.</li> </ol>
2005	Legal Research Methodology	<ol style="list-style-type: none"> <li>1. Describe the steps in legal research</li> <li>2. Identify the research problem and formulate research questions, hypothesis</li> <li>3. Explain the importance of social survey methods to carry out Empirical research</li> <li>4. Analyze the theoretical research based onlegal reasoning, case study method ofresearch and appraise the applicability ofethics in legal research</li> </ol>

		<ol style="list-style-type: none"> <li>5. Organize the methods of data collection,</li> <li>6. analysis and its interpretation</li> </ol>
3011	Principles of Constitutional Law-I	<ol style="list-style-type: none"> <li>1. Describe the nature and scope of Constitutional Law.</li> <li>2. Identify the components of the preamble of the Constitution of India.</li> <li>3. Distinguish between co-operative and conflicting federalism.</li> <li>4. Determine the centrifugal and centripetal forces of Indian federalism.</li> <li>5. Explain the doctrines of Constitutional law.</li> </ol>
3012	Principles of Constitutional Law-II	<ol style="list-style-type: none"> <li>1. Distinguish between Parliamentary and Presidential forms of government.</li> <li>2. Explain the concept, meaning and importance of civil liberties.</li> <li>3. Discuss the historical perspective of Constitutional amendments in India.</li> <li>4. Assess the impact of emergency on Fundamental Rights.</li> <li>5. Determine the significance of independence of judiciary with case law analysis.</li> </ol>
3013	Comparative Constitutional Law I	<ol style="list-style-type: none"> <li>1. Illustrate the features of the Constitutions of Australia, Canada, UK and the US.</li> <li>2. Explain the changing pattern of federal constitutions.</li> <li>3. Compare and contrast the concept of Rule of Law in the U.S., U.K. Australia and India.</li> <li>4. Discuss the doctrine of Separation of Powers in the US, UK and India.</li> <li>5. Analyse the provisions of Freedom of Trade, Commerce and Intercourse under the Constitutions of the U.S., Australia and Canada and compare it with that of the Constitution of India.</li> </ol>
3014	Comparative Constitutional Law II	<ol style="list-style-type: none"> <li>1. Describe the amending provisions under the Constitution of India with special reference to the doctrine basic feature.</li> <li>2. Discuss the powers and functions of the President of the U.S. and India.</li> </ol>
		<ol style="list-style-type: none"> <li>1. Examine the jurisdiction of the Supreme Court of the US and India.</li> <li>2. Assess the role of Judicial Review in the U.S., U.K. and India.</li> <li>3. Determine the trends of functioning of the legislative organs of the governments of the U.K., US and India.</li> </ol>
4011	Principles of Administrative Law-I	<ol style="list-style-type: none"> <li>1. Define Administrative law and locate its sources.</li> <li>2. Point out the reasons for the growth of Administrative Law.</li> <li>3. Differentiate between Constitutional Law and Administrative Law.</li> <li>4. Assess the evolution of Administrative Law, in England, the U.S. and France.</li> <li>5. Appraise the importance and scope of Administrative Law</li> </ol>
4012	Principles of Administrative Law-II	<ol style="list-style-type: none"> <li>1. Outline the features of administrative adjudication.</li> <li>2. Discuss the Administrative Procedure Act, 1946.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Examine the Tribunals and inquiries Act, 1958.</li> <li>4. Analyse Administrative powers and Discretionary powers.</li> <li>5. Explain Estoppel and Waiver</li> </ol>
4013	Indian Administrative Law I	<ol style="list-style-type: none"> <li>1. Explain the concept of Rule of Law and its application in India.</li> <li>2. Discuss the different kinds of Writs in India and its applicability with relevant case laws.</li> <li>3. Breakdown the idea of delegated legislation in India with relevant case laws.</li> <li>4. Determine the scope and applicability of Separation of Powers under the Constitution of India.</li> <li>5. Explain the concept of Natural Justice in India with its applicability to civil servants.</li> <li>6.</li> </ol>
4014	Indian Administrative Law II	<ol style="list-style-type: none"> <li>1. Outline the importance of ombudsman and the need of Lok pal in India.</li> <li>2. Explain the doctrine of ultravires (procedural and substantive) focussing on its components.</li> <li>3. Examine the Right to Information Act, 2005 and the Vigilance commission with relevant case laws.</li> <li>4. Analyse the tortious and contractual liability of the State with decided case laws.</li> <li>5. Assess the historical background and the efficacy of the Commission of Inquiry Act, 1952.</li> </ol>
	Writing of Dissertation	Organise, elaborate and compare on a theme pertaining to the specialisation area strictly adhering to the legal research methodology
	Viva voce examination	Justify the writings of the Dissertation with the help of research questions, case laws analysis and comparative views on the topic
3051	International Bill of Human Rights, Right to Development and Right to Environment	<ol style="list-style-type: none"> <li>1. Identify the issues and problems relating to the realisation of promotion and protection of human rights and strengthens the ability to contribute to the resolution of human rights problems</li> <li>2. Explain the rights conferred under the International Bill of Human Rights</li> <li>3. Analyse the historical development of Human Rights in global, regional and national perspectives</li> <li>4. Differentiate between the two covenants of human rights- ICCPR and ICESCR 1966</li> <li>5. Assess the third Generation of Human Rights- Right to Development and Right to Environment</li> </ol>
3052	Conventions	<ol style="list-style-type: none"> <li>1. Discuss about the provisions of Conventions on Genocide, Racial Discrimination, Torture, Rights of Child, Discrimination against women and Migrant workers</li> <li>2. Explain the Convention on Disability and the National endeavour to fulfil those guidelines</li> <li>3. Analyse the commitment laid down in the Conventions on Racial Discrimination, Genocide, Torture, Child Rights, Migrant Workers</li> <li>4. Critically evaluate the provisions of CEDAW and Rights of the Child</li> <li>5. Justify India's commitment towards upholding those rights of the Conventions and protocols</li> </ol>



3053	Regional Bodies and Collective Rights	<ol style="list-style-type: none"> <li>1. Describe about the events that led to the formation of regional human rights mechanism viz. American Convention, African Convention and European Convention</li> <li>2. Differentiate between the concept of regionalism and universalism and how it has impacted the world community</li> <li>3. Analyse the Human Rights components and its implementations provided under the regional bodies of major Continents</li> <li>4. Assess the independent coherent human rights sub-regimes nested within the larger framework of international human rights law</li> <li>5. Determine the political, social and economic, legal aspects of the concept of self-determination and its impending problems</li> </ol>
3054	Courts and Tribunals	<ol style="list-style-type: none"> <li>1. Explain about the provisions of justice delivery system under the global forum</li> <li>2. Explain the creation of the Rome Statute and the functioning of International Criminal Court (ICC)</li> <li>3. Analyse the Judicial Trends and mechanisms under the UN regime</li> <li>4. Critically evaluate the working of the Adhoc Tribunals and Mixed Tribunals</li> <li>5. Compare and contrast the functioning of regional courts established under the Convention of Inter-American, European and African (Banjul) Charter of Human Rights</li> </ol>
4051	International and National Institutions on Human Rights	<ol style="list-style-type: none"> <li>1. Explain the composition, powers, functions and jurisdictions of the major organs of the UN</li> <li>2. Illustrate the working of the National Human Rights Institutions</li> <li>3. Explain the <i>modus operandi</i> of the National Human Rights Commission, State Human Rights Commission</li> <li>4. Analyse the functioning of National Commission for Women and Child</li> <li>5. Make a brief assessment of reports submitted by thematic rapporteur's and country rapporteur's</li> <li>6. rapporteur's</li> </ol>
4052	Humanitarian Law-I	<ol style="list-style-type: none"> <li>1. Explain the gradual development of the International Humanitarian laws</li> <li>2. Analyse the making and adoption of the Four Geneva Conventions, August, 1949</li> <li>3. Illustrate the functioning of the ICRC</li> <li>4. Assess the various provisions of Third Geneva Convention relating to treatment of prisoners of war</li> <li>5. Make a detailed analysis of the Fourth Geneva Convention relating to protection of civilians</li> </ol>
4053	Humanitarian Law-II	<ol style="list-style-type: none"> <li>1. Explain the Post Geneva Conventions including the Additional Protocols</li> <li>2. Analyse the Ottawa Treaty and the impact of landmines on humanity</li> <li>3. Critically evaluate the impact of Small Arms and Light Weapons- National and International Perspective</li> <li>4. Enumerate the role of International NGOs promoting Humanitarian laws</li> <li>5. Compare and contrast the functioning of different International NGOs</li> </ol>

4054	Refugee Laws	<ol style="list-style-type: none"> <li>1. Explain the legislative mechanism pertaining to Refugees and its Protocols with emphasis on the functioning of the UNHCR</li> <li>2. Analyse the provisions pertaining to guidelines on Internally Displaced persons, 1998 and Convention on Stateless persons and reduction of statelessness</li> <li>3. Differentiate between various categories of refugees and migrants under the current global refugee and economic crisis</li> <li>4. Determine the functions and powers of the Office of the United Nations High Commissioner for Refugees (OHCHR)</li> <li>5. Critically examine the International Convention of the Protection of the Rights of All Migrant workers and Members of their Families at the Global perspective</li> </ol>
	Writing of Dissertation	Organise, elaborate and compare on a theme pertaining to the specialisation area strictly adhering to the legal research methodology
	Viva voce examination	Justify the writings of the Dissertation with the help of research questions, case laws analysis and comparative views on the topic
3021	Law of Crimes -I	<ol style="list-style-type: none"> <li>1. Discuss the concept and development of criminal law in India and distinguish between crime and other wrongs</li> <li>2. Demonstrate an understanding of applicability of <i>mens rea</i> and the various principles of liability under Indian Penal Laws</li> <li>3. Explain the provisions relating to preliminary crimes under the Indian penal code</li> <li>4. Analyse the various general exceptions to liability under the Indian Penal Code</li> <li>5. Interpret the concept and applicability of Vicarious liability and Joint Liability in criminal law</li> </ol>
3022	Law of Crimes -II	<ol style="list-style-type: none"> <li>1. Analyse the various offences against human body based on judicial pronouncements</li> <li>2. Distinguish the various offences against property based on their constituent elements and determine their applicability in different case scenarios.</li> <li>3. Examine the offences relating to public servants under the Indian penal code and the Prevention of Corruption Act, 1988</li> <li>4. Illustrate the nature, types, and the legal frameworks of cyber crime encompassing cyber terrorism, cyber forensics, and cyber crime against women and children</li> <li>5. Appraise the significance of the relevant law commission reports on criminal law</li> </ol>
3023	Socio-Economic Crimes-I	<ol style="list-style-type: none"> <li>1. Explain the scope, evolution, causes and significance of socio-economic crimes and white-collar crimes in India</li> <li>2. Distinguish between the nature of socio-economic crimes, white collar crimes, traditional crimes and organised crimes</li> </ol>

		<ol style="list-style-type: none"> <li>3. Examine the relevant provisions of the Information Technology Act, 2000 in the context of socio-economic crimes</li> <li>4. Analyze the applicability of vicarious liability, strict liability and mens rea with reference to socio-economic crimes</li> <li>5. Illustrate the role of Indian judiciary in relation to preventive and remedial measures to combat socio-economic crimes</li> </ol>
3024	Socio-Economic Crimes-II	<ol style="list-style-type: none"> <li>1. Discuss the legislative measures to control socio-economic crimes in India</li> <li>2. Analyse the relevant provisions of the Prevention of Corruption Act, 1988, the Prevention of Food Adulteration Act, 1954, the Narcotic Drugs and Psychotropic Act, 1985 and the Essential Commodities Act, 1955.</li> <li>3. Explain the impact of economic crimes on national security with reference to the National Security Act and Arms Act</li> <li>4. Examine the relevant legislation relating to crime against women</li> <li>5. Appraise the significance of the relevant Law Commission Reports and Santhanam Committee Report on socio-economic crimes in India</li> </ol>
4021	Criminal Jurisprudence-I	<ol style="list-style-type: none"> <li>1. Discuss the development of criminal jurisprudence in</li> <li>2. primitive society</li> <li>3. Explain the public conceptions and misconceptions of crime</li> <li>4. Analyze the elements of crime and theories of criminal liability</li> <li>5. Examine the inchoate crimes such as abetment, attempt and conspiracy under the Indian Penal Code (IPC)</li> <li>6. Interpret the provisions relating to group and joint liability</li> </ol>
4022	Criminal Jurisprudence-II	<ol style="list-style-type: none"> <li>1. Apply the understanding of mental elements and criminality under Criminal Jurisprudence</li> <li>2. Analyze the scope and rationale of General Defences and its applicability to offences under IPC, Special or Local laws</li> <li>3. Illustrate the provisions relating to punishments and its categories under the IPC</li> <li>4. Examine the recent trends and contemporary issues in relation to criminal law</li> <li>5. Appraise the role of judiciary in crime control process</li> </ol>
4023	Criminology	<ol style="list-style-type: none"> <li>1. Discuss the historical perspective, objectives and dynamism of criminology</li> <li>2. Explain the ideologies of various Schools of Criminology</li> <li>3. Examine the theories of crime causation</li> <li>4. Analyze the modern trends in criminology and the theories of Feminism and Gender sensitization</li> <li>5. Evaluate the legislative provisions relating to juvenile delinquency</li> </ol>
4024	Penology	<ol style="list-style-type: none"> <li>1. Explain the theories, objective and effectiveness of punishment in ancient and modern India</li> </ol>

		<ol style="list-style-type: none"> <li>2. Illustrate the interrelation of policing and human rights with an emphasis on policereforms</li> <li>3. Analyse the Criminal Justice System and its reform in the present-day context</li> <li>4. Examine the prisonadministration and correctional institutions in thecontext of human rights and the Constitution of India</li> <li>5. Interpret the scope ofVictimology and the role of victim in criminal justice</li> <li>6. system</li> </ol>
	Writing of Dissertation	Organise, elaborate and compare on atheme pertaining to the specialisationarea strictly adhering to the legal research methodology
	Viva voce examination	Justify the writings of the Dissertation with the help of researchquestions, case laws analysis and comparative views on the topic

<b>Department:</b>	<b>Folklore</b>	
<b>Programme:</b>	M.A. in Folklore	
<b>PSOs</b>	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the tradition of folklore and the theoretical aspects of folkloristics.</li> <li>2. Identify the issues of contemporary relevance of folklore and engage students in the exploration of the applied aspects of folklore.</li> <li>3. Train students to apply various folk knowledge and resources to their daily lives and contemporary society.</li> <li>4. Produce a repository of different forms of folklore and create strategies for the protection and preservation of folklore and traditional knowledge.</li> </ol>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
Fo 1	Introduction to Folklore	CO 1: Illustrate the growth of folklore as a discipline CO 2: Demonstrate the scope and importance of folklore CO 3: Combine the knowledge of folklore with other allied dsciplines CO 4: Determine the folklore materials of different genres CO 5: Integrate the four sectors of folklore in social context
Fo2	Folk Literature	CO 1: Outline the forms of folk literature CO 2: Identify the narrative genres of oral literature of Assam CO 3: Relate the festivals and folk performing art forms of Assam

		CO 4: Apply the verbal art forms in performances CO 5: Produce a catalogue of folk songs of different communities of Assam
Fo 3	Material Culture and Folk Customs	CO 1: Explain the concept of material culture CO 2: Identify the social folk customs CO 3: Categorize the folk religions of Assam and the Northeast CO 4: Relate the ceremonies and agricultural practices of Assam CO 5: Assess the vernacular housing patterns and associated cultural motifs of Assam
Fo 4	Folk Performing Art	CO 1: Interrelate different forms of folk performing arts CO 2: Identify folk songs of Assam and their characteristics CO 3: Categorize different folk theatre forms and their social context CO 4: Compare the folk dance forms of Assam in different social settings CO 5: Produce an inventory of different forms of folk performing Arts of Assam
Fo 5	Folklore and Traditional Knowledge System	CO 1: Explain traditional knowledge CO 2: Illustrate traditional knowledge of material culture for the conservation of environment and sustainable livelihood CO 3: Apply traditional knowledge in everyday life and occupation CO 4: Evaluate Social Relevance of traditional knowledge in contemporary Society CO 5: Construct strategies for the protection and preservation of traditional knowledge
Fo 6	Tribal Studies	CO 1: Recognize the tribes of Assam and their spatial distribution CO 2: Interpret the characteristic features of the tribes CO 3: Analyze the relation between culture and ecology in context of the tribes of the Northeast CO 4: Summarize a broad overview of the tribes of Assam and Northeast India CO 5: Combine ethnicity and identity movements
Fo 7	Folklore in the Contemporary World	CO 1: Explain urban folklore CO 2: Demonstrate folklore in the digital world CO 3: Examine commodification of folklore CO 4: Assess films created on the basis of folklore materials CO 5: Create advertising campaigns using folklore materials
Fo 8	Folklore and Fieldwork	CO 1: Demonstrate the importance of fieldwork in folklore CO 2: Judge the use of tools and modern devices in fieldwork of folklore. CO 3: Operate methods of data collection in fieldwork specific to folklore CO 4: Compilation and analysis of primary (field) data CO 5: Produce reports on the basis of field data

Fo 9	Project Work	<p>CO 1: Demonstrate techniques of field study          CO 2: Categorize samples of research          CO 3: Examine the empirical tradition in folklore          CO 4: Documentation and analysis of field data          CO 5: Produce a project report from field data</p>
Fo 10	Introduction to Cultural Studies	<p>CO 1: Define the theoretical aspects of cultural studies          CO 2: Associate the context of folklore and cultural studies          CO 3: Analyze the different types of culture          CO 4: Relate culture and civilization          CO 5: Interpret the process of social change</p>
Fo 11	Archives and Museums	<p>CO 1: Describe the concept and nature of museums and archives          CO 2: Classify museums and archives          CO 3: Explain the role and functions of archives and museums          CO 4: Show legal and ethical issues of archives and museums          CO 5: Produce case study reports on museums</p>
Fo 12	Crafts and Artisans	<p>CO 1: Identify the folk arts and crafts          CO 2: Illustrate the folk art tradition of Assam          CO 3: Evaluate the social relevance and present scenario of folk art tradition of Assam          CO 4: Combine artifact and artisan, and artisan society          CO 5: Compile the knowledge of folk craft tradition of Assam for production strategies</p>
Fo 13	Folklore and Tourism Management	<p>CO 1: Explain tourism and its scope          CO 2: Interrelate folklore and tourism , especially heritage tourism          CO 3: Combine tourism resources and market of the folklore materials</p> <p>CO 4: Assess the significance of <i>Satras</i> of Assam as a cultural and religious tourist attraction          CO 5: Design roadmaps for tourism development of Assam on the basis of the folk resources</p>
Fo 14	Folklore of India	<p>CO 1: Identify the major folklore genres of India          CO 2: Illustrate Indian folk literature          CO 3: Classify folk music and dance forms of India          CO 4: Assess the folk theatrical tradition of India          CO 5: Generate a repository of folk arts and crafts forms in India</p>

Fo 15	Theories and Concepts of Folkloristics	CO 1 : Outline the early philology of folklore and associate folklore and ideology CO 2: Illustrate different academic approaches of folklore CO 3: Assess the growth of folklore studies in India CO 4: Summarize the folklore studies in Assam and the Northeast CO 5 : Integrate contemporary issues of Folklore
<b>Department:</b>	<b>Mass Communication</b>	
<b>Programme:</b>	MA in Mass Communication	
<b>PSOs</b>	<ul style="list-style-type: none"> <li>• Discuss the various theoretical and practical aspects of mass communication.</li> <li>• Enumerate the existing and emerging trends of journalism and mass communication.</li> <li>• Explain the methods of appropriate use of mass communication tools.</li> <li>• Develop their skills on online journalism, broadcast journalism, advertising and public relations, film studies and community communications.</li> </ul>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
MMC 1015	Indian Society and Politics	CO 1: Label various aspects of Indian Society. CO 2: Interrelate the Indian Social Structure. CO 3: Outline the features of constitution of India. CO 4: Illustrate the functionalities of Union and State Govt. CO 5: Examine the different issues of Indian political system and nation building from Mass Communication Perspectives.
MMC 1025	History of Media and Global Media Scenario	CO 1: Recall the growth and history of Global Communication. CO 2: State the development of Electronic Media in India and interrelate it to Global scenario. CO 3: Illustrate global media scenario. CO 4: Develop critical thinking on structure and changing dynamics of global media. CO 5: Reconstruct reports on content, Hypothesize ethical perspectives on global media.
MMC 1035	Perspectives on Communication Theory	CO 1: Discuss various theoretical and practical aspects of Mass Communication. CO 2: Outline the existing and emerging trends of Mass Communication & Journalism. CO 3: Grade the methods of appropriate use of Mass Communication tools. CO 4: Develop skills on online journalism broadcast, advertising and public relations, films studies &

		community communication. CO 5: Reconstruct ideas for application of media theories in changing social dynamics.
MMC 1045	Basics of Journalism	CO 1: Recognize various aspects of journalism. CO 2: Identify the basic principles of reporting and editing for print media. CO 3: Classify different types of beats, reporting and editing. CO 4: Develop skills on identifying news source, credible reporting and survey. CO 5: Construct and translate news from locality for developing lab journal, GU Times.
MMC 1054	Practical	CO 1: Discuss the format of lab journal GU Times (Reporting's, editing, designing & Layout) CO 2: Develop skills on opinion writing and photography. CO 3: Prepare awareness campaign on various issues through Letters to Editor and Article writing. CO 4: Demonstrate the tools of community communication through puppetry, street play, Workshops etc. CO 5: Design Port-folio for presentation & viva-voce.
MMC 2015	Electronic Media	CO 1: Out-line the technical know-how of electronic media production. CO 2: Identify audience pattern for message design. CO 3: Explain the art of script writing for media production (News Packaging, Radio Script, Films and Documentary) CO 4: Develop the art of electronic media presentation. CO 5: Create audio-visual production and Radio Programme.
MMC 2025	Advertising	CO 1: Define different types of advertisement. CO 2: Outline the tools and terms associated with ad making. CO 3: Analyze the dynamics of revenue and advertisement. CO 4: Assess the functional and operational aspects of brands and advertising agencies. CO 5: Design print and audio-visual advertising campaign.
MMC 2035	Public Relations and Corporate Communication	CO 1: Identify and summarize the concepts of Public Relation & Corporate Communication CO 2: Define crisis situation. CO 3: Develop PR Skills and Illustrate their applications CO 4: Apply ICT in the field of Public Relation & Corporate Communication. CO 5: Generate and plan messages for Public Relations & Corporate Communication along with event management.



MMC 2045	Media Laws and Ethics	<p>CO 1: State the existing media laws.</p> <p>CO 2: Relate media laws with current scenario.</p> <p>CO 3: Interpret the application of media laws, rights and duties. CO 4: Critique existing media laws through case studies.</p> <p>CO 5: Formulate skills to identify ethical guidelines, international human rights and their application.</p>
MMC 2054	Practical & Internship	<p>CO 1: Demonstrate writing and production skills through Internship.</p> <p>CO 2: Apply theoretical understanding for production of Advertisement copy, marketing strategy etc.</p> <p>CO 3: Distinguish organizational differences between Government &amp; Private Public Relation Sector.</p> <p>CO 4: Organize Press conferences and events for PR Skill development.</p> <p>CO 5: Create portfolios for presentation and viva-voce.</p>
MMC3016	Photojournalism	<p>CO1: Demonstrate various aspects of Photography</p> <p>CO2: Distinguish the nuances of photojournalism</p> <p>CO3: Apply various technicalities of photojournalism</p> <p>CO4: Measure the understanding of theoretical knowledge for practical utility</p> <p>CO5: Combine the knowledge on ethics and trends in photojournalism for practical usage</p>
MMC 3024	Media and Communication research	<p>CO1: Outline the basics of media research</p> <p>CO2: Label the areas and methods of data collection CO3: Compare the changing trends in media research</p> <p>CO4: Determine the methods of data analysis and interpretation CO5: Formulate research design on selected topic.</p>
MMC3035-I	Online journalism	<p>CO 1: Identify and outline the purpose and objectives of Advertising CO 2: Comprehend and interrelate the dynamics of advertising</p> <p>CO 3: Develop a critical thinking on branding and marketing</p> <p>CO 4: Construct and compare advertising strategy and audience mapping CO 5: Interpret the role of Advertising in Society and Gender Issues.</p>
MMC 3045-I	Online journalism	<p>CO 1: Summarize the dynamics of Public Relations and Corporate Communication CO 2: Interrelate the different challenges and solutions of PR management</p> <p>CO 3: Categorize and distinguish the modern techniques of PR tools and their applications CO 4: Interpret the dynamics of Public Relations and Corporate Communication</p> <p>CO 5: Formulate and label PR tools applicable in different crisis situations</p>

MMC 3035-II	Specialization I (Broadcast Journalism)	CO 1: Identify the elements of online journalism CO 2: Outline the areas of online journalism. CO 3: Graph an in-depth study of online journalism and media convergence CO 4: Illustrate the current trends of Web Design. CO 5: Formulate and integrate the changing trends in online journalism
MMC 3045-II	Specialization II (Broadcast Journalism)	CO 1: Label the elements of online journalism CO 2: Estimate the areas of online journalism. CO 3: Interpolate online media literacy CO 4: Breaking down the alternative media limitations CO 5: Formulate and understand the changing trends in online journalism
MMC 3035	S.CC: Community Communications-I	CO 1: Define the various concepts on community communication. CO 2: Discuss the traditional folk forms of communication. CO 3: Sketch the basic characteristics of community media. CO 4: Outline the concepts on community and volunteerism. CO 5: Formulate the basic characteristics of community media
MMC 3045	S.CC: Community Communications-II	CO 1: Outline the concept of community newspaper. CO 2: Summarize the growth and development of Community Radio in South Asia. CO 3: Dramatization of video programmes for content generation. CO 4: Discriminate between community participation and mobilization. CO 5: Produce community radio programmes involving community members.
MMC 3035	Specialization I (Film Studies: Introduction)	CO 1: Discuss basics of Film studies. CO 2: Outline growth and development of National and International cinema. CO 3: Explain Cinematic Storytelling: Fiction and Non-Fictional. CO 4: Interpret the different Genres Film and Discuss censorship. CO 5: Design various Stages in Film Production. Pre to post-production.
MMC 3045	Specialization II (Film Studies: Theoretical Perspective)	CO 1: Discuss various film theories. CO 2: Classify various models of Film criticism. CO 3: Illustrate the language of cinema: semiotics CO 4: Summarize the growth and development of cine society movement in India and Assam. CO 5: Explain the significance of eco-cinema.
MMC 3035	S.CC: ICT and Educational Media-I	CO1: Define the concept and meaning of ICT CO2: Estimate the current trends and its application in different sector. CO3: Apply ICT Tools for e-learning CO4: Summarize the challenges and opportunists for ICT in the future. CO5: Combine Media theories and ICT Tools for academic interpretation.
MMC 3045	S.CC: ICT & Educational Media-II; (Specialization for Open and Distance Learning Learners)	CO1: Explain the concept of educational mediums like Radio and Television. CO2: Comprehend the relevance of OER. CO3: Examine the role of Media in Community communication. CO4: Determine the methods of measuring media matrix. CO5: Devise strategies for developing content on radio, television including ICT.
MMC3054C	Practical and Portfolio	CO 1: Demonstrate the industry specific skills to the students. CO 2: Restate hands on training on the specialized areas. CO 3: Interpret and summarize the workings of the media and communication sector

		CO 4: Develop command over specialized areas CO 5: Produce the acquired skills in the field of communication through different mediums.
MMC 4016	O&E: Digital and Social Media	CO1: Point the various aspects of digital media. CO2: Predict the significance and emerging trends of social media CO3: Critique the functionalities and challenges of social media CO4: Estimate the growth of digital and social media in the internet era. CO5: Invent ways to integrate digital social media tools for developmental and promotional activities.
MMC4024	(C): Communication for Development (C4D)	CO1: Select the innovative approaches to C4D concepts, process and practices. CO2: Identify the tools and techniques for Social and Behavior change Communication (SBC). CO3: Develop skills on community communication. CO4: Produce C4D strategies for community communication in local area. CO5: Devise skills on carrying out research, content analysis, monitoring and intervention for C4D.
MMC 4034	(C): Specialized Communication	CO1: Label various fields of communication CO2: Examine the basics of business communication CO3: Develop communication tools for specialized areas like science, political, cultural and sports. CO4: Appraise the organizational structure of the media establishments with its functionalities CO5: Revise skills on writing & presenting for specialized communication.
MMC 4044	(C): Current Affairs and Communicative Language	CO1: List relevant topics of current affairs CO2: Give examples of major issues and events of Political and Social Importance from media perspectives CO3: Develop skills on communicative language CO4: Demonstrate personality development traits by giving topic-based presentation CO5: Reconstruct representation of content in media.
MMC 4056	C: Dissertation and Comprehensive Viva-voce	CO1: Identify media-based research problems. CO2: Justify the necessity of research in media and communication. CO3: Prepared research report on the basis of field survey. CO4: Relate concepts on application of research in various mass communication issues. CO5: Plan and execute research design.

<b>Department:</b>	<b>Applied Sciences</b>
<b>Programme:</b>	MTech in MST
<b>PSOs</b>	PSO1: Able to apply the concepts of Material Science, Material Fabrication, Material Characterization, and Material Technology in analyzing the work being handled in relevant fields/domains of activity.

	<p>PSO2: Able to associate the learning from the courses related to Mathematics and Statistics, Physics, Chemistry, Computing, and Laboratory Practices to arrive at solutions to real world problems.</p> <p>PSO3: Acquire the required skill-set to communicate effectively in both oral and written forms, to carry forward the work already done, keeping an eye on the organizational goal with adequate road maps, demonstrating the practice of professional ethics and concern for societal and environmental well-being.</p> <p>PSO4: Exhibit the skill to assess data, concepts and reasoning critically by employing sophisticated analytical techniques to derive new insights and contribute to the knowledge and understanding of the subject</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
MST 1015	Fundamentals of Materials Science	<p>CO1: Identify the fundamentals of materials structure and properties.</p> <p>CO2: Apply knowledge gained in CO1 for solving engineering/numerical problems. CO3: Summarize ideas about different synthetic methodologies.</p> <p>CO4: Design suitable methodologies for specific synthesis.</p> <p>CO5: Generate synthesised materials using various characterization tools and use for suitable applications</p>
MST 1025	Nanoscience and Engineering	<p>CO1: Describe development of nanoscale science as well as its historical perspective, distinguish various nanomaterials</p> <p>CO2: Illustrate concepts of band theory of solids; distinguish metals, insulators and semiconductors.</p> <p>CO3: Apply methods learnt in CO2 to calculate DOS in 2D, 1D and 0D nanostructures, solve numerical problems.</p> <p>CO4: Design synthesis, characterization and application of thin film materials.</p> <p>CO5: Interpret novel nano-materials in engineering techniques.</p>
MST 1035	Fundamentals of Characterization Techniques	<p>CO1: Outline various spectroscopic techniques in the study of structure and properties of materials etc.</p> <p>CO2: Discuss basic principles of spectroscopic techniques (eg.- NMR, ESR, MS, IR, UV, Raman, etc.)</p> <p>CO3: Explain the magnetic character of certain material by observing the hysteresis loop.</p> <p>CO4: Test characterization of materials</p> <p>CO5: Design and develop dc and ac resistivity measurement techniques</p>
MST 1045	Engineering Mathematics	<p>CO1: Define and identify the differential equations.</p> <p>CO2: Discuss the different methods to solve ODE's CO3: Solve the PDE involving different techniques.</p> <p>CO4: Estimate the Fourier series expansion of a given function.</p> <p>CO5: Construction of matrices and its applications in material science.</p>
MST 1053	Computer Programming LAB - I	<p>CO1: Describe a given program for the test cases written.</p> <p>CO2: Illustrate a maintainable program in Matlab/Python/R/Fortran/C/C++ for a given algorithm and implement the same.</p> <p>CO3: Explain the process of problem solving using computer.</p>

		CO4: Interpret a given Matlab/Python/R/Fortran/C/C++ program. CO5: Design an algorithmic solution for a given problem.
MST 2015	Numerical Analysis	CO1: Outline the merits and demerits of the various methods of root isolation of transcendental equations. CO2: Compute a given curve to an available data set by minimizing the root mean square error. CO3: Calculate numerical integration and obtain the area under a curve using numerical methods. CO4: Analyse simple roots of transcendental equations by using different numerical techniques. CO5: Apply interpolation techniques using Newton's Forward Interpolation Formula, Lagrange's Interpolation Formula and Newton's Divided Difference Interpolation Formula to a data set and obtain intermediate values of the dependent variable.
MST 2025	Smart Materials and Analysis	CO1: Describe various composite materials as well as their fabrication techniques, testing and characterization methods. CO2: Demonstrate understanding of various forms of energy and the need for energy storage. CO3: Relate the different composite materials to their suitable application area by the knowledge of its properties. CO4: Analyse the present energy scenario of our country and hence design and apply energy storage devices so as to solve real world problems and test their performances. CO5: Determine different classes of materials and illustrate their applications.
MST 2035	Environmental Science and Green Energy	CO1: Describe earth energy systems. CO2: Classify the present energy scenario and energy conservation. CO3: Use of renewable energy sources for both domestic and industrial application. CO4: Analyse the environmental aspects of renewable and non-renewable energy resources. CO5: Summarize the environmental aspects of non-conventional energy resources in comparison with various conventional energy systems.
MST 2056	Green and Renewable Energy	CO1: Describe the origin of earth, earth's radiation mechanism and different energy sources. CO2: Classify the present energy scenario and the need for energy conservation. CO3: Explain the surrounding system in global and societal context. CO4: Analyse the environmental aspects of renewable energy resources. CO5: Justify the new technological advancements in terms of renewable energy sources.
MST 2063	Materials Synthesis and Characterization	CO1: Identify material characterization. CO2: Classify material fabrication. CO3: Apply methods learnt in CO1 to obtain approximate solutions to physical problems. CO4: Apply methods learnt in CO2 to obtain solutions to physical problems. CO5: Organise a presentation for the material synthesis and characterization processes
MST 3015	Advanced characterization techniques	CO1: Discuss neutron and electron diffraction techniques. CO2: Classify advanced characterization methods. CO3: Compare and explain various scanning probe techniques. CO4: Utilize different characterization methods for material CO5: Design novel materials through advanced characterization techniques.
MST 3025	Molecular modelling and simulation	CO1: Describe molecular simulation and its application. CO2: Classify different quantum and molecular mechanical methods. CO3: Compute simulation techniques using high level programming.

		CO4: Illustrate the applications of molecular modelling software. CO5: Design the molecular geometry of crystal structure.
MST 3045	Advanced Functional Materials	CO1: Describe the functional materials on the basis of their physical properties. CO2: Represent the various functional materials to the appropriate application area, based on the function which they perform. CO3: Analyse the needs of the present day world and hence design and apply devices making use of the suitable functional material so as to solve real world problems. CO4: Compare perovskite, double-perovskite structures with the classes of materials and illustrate their applications. CO5: Explain different features, classification, applications of newer materials like smart polymers, multiferroic materials.
MST 3076	Numerical Tools & Data Analysis	CO1: Identify common mathematical / statistical as well as numerical tools. CO2: Estimate the accuracy as well as efficacy of common numerical methods. CO3: Compute appropriate numerical methods / techniques for handling various mathematical / statistical operations. CO4: Apply various tools, such as, ANOVA, Fourier Transformation, Wavelet Transformation, GLM etc. in solving problems related to respective domain of specialization. CO5: Design efficient, well-documented computational codes in R / Python and present numerical results, connecting with the real world problem being handled.
MST-3203	Lab 3 (Materials Synthesis and Characterization - II)	CO1: Identify material characterization. CO2: Classify material fabrication. CO3: Apply methods learnt in CO1 to obtain approximate solutions to physical problems. CO4: Apply methods learnt in CO2 to obtain solutions to physical problems. CO5: Organise a presentation for the material synthesis and characterization processes
MST40120	Project Major	CO1: Identify and review literature for the research project. CO2: Formulate and develop complex scientific problems for material fabrication. CO3: Design prototype models and use simulation for materials. CO4: Compare different analytical techniques. CO5: Organise a presentation for the project work.

<b>Department:</b>	Physics	
<b>Programme:</b>	M. Sc. In Physics	
<b>PSOs</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>

PHY1015	Mathematical Physics	<p>CO 1: Outline the concepts of linear vector spaces.</p> <p>CO 2: Use of Laplace and Fourier transforms to solve differential equations.</p> <p>CO 3: Solve physical problems using special function and partial differential equations.</p> <p>CO 4: Apply group theories to understand physical problems.</p> <p>CO 5: Utilize tensor calculus in problems involving special relativity and electrodynamics.</p>
PHY1025	Classical Mechanics	<p>CO 1: Reproduce the basics results in classical mechanics through general formalism.</p> <p>CO 2: Demonstrate the utility of Lagrangian and Hamiltonian methods of mechanics in understanding orbital motion.</p> <p>CO 3: Apply the Lagrangian and Hamiltonian mechanics in astronomical problems.</p> <p>CO 4: Develop the methods to address various periodic motion in physics.</p> <p>CO 5: Assess the power of generalized formalism of classical mechanics in understanding foundation of physics.</p>
PHY1035	Quantum Mechanics-I	<p>CO 1: Recognize the basic principles of Quantum Mechanics.</p> <p>CO 2: Interpret wave mechanics and matrix mechanics.</p> <p>CO 3: Apply quantum mechanical ideas to symmetry and conservation.</p> <p>CO 4: Determine conditions of applying approximation methods.</p> <p>CO 5: Justify the applicability of quantum mechanical framework to physical situations.</p>
PHY1045	Electrodynamics	<p>CO 1: Describe behaviour of charged particles using Maxwell's equations.</p> <p>CO 2: Solve electrostatics problems using Laplace's and Poisson's equations.</p> <p>CO 3: Illustrate propagation and scattering of electromagnetic waves in unbounded and bounded media.</p> <p>CO 4: Examine the collective behaviour of charged particles and their dynamics.</p> <p>CO 5: Develop the theories of electrodynamics to understand the power radiated by charged particles.</p>
PHY1056	General Lab-I	<p>CO 1: Describe the laboratory methods for the experiments as listed in the content.</p> <p>CO 2: Demonstrate use of OPAMPs and ICs in electronic circuits.</p> <p>CO 3: Analyze methods to evaluate properties of metals, semiconductors and magnetic materials.</p> <p>CO 4: Measure physical quantities using optical methods.</p> <p>CO 5: Determine the characteristics of GM counter and study nuclear processes.</p>
PHY2015	Atomic, Molecular & Laser Physics	<p>CO 1: Explain atomic principles like the Pauli exclusion principle and spectral terms, and analyze phenomena like Zeeman, Paschen Back and Stark effects.</p> <p>CO 2: Apply principles of quantum mechanics to analyze atomic and molecular phenomena, evaluating their spectral characteristics and broadening mechanisms.</p> <p>CO 3: Analyze IR, electronic, and Raman spectra of molecules, interpreting vibrational structures and selection rules.</p>

		<p>CO4: Explain amplification and oscillation of light and, understanding rate equations, describe different lasers.</p> <p>CO 5: Assess laser properties and applications in holography and optical communication.</p>
PHY2025	Nuclear Physics	<p>CO 1: Describe nucleus and its various properties.</p> <p>CO 2: Demonstrate the structure of nucleus and nature of interactions that keeps it in a bound state.</p> <p>CO 3: Illustrate various nuclear models and their applications, reaction dynamics with kinematic calculation, energy loss in matters, instrumentation and detection to enhance knowledge of applied nuclear physics, introduce weak decays and the world of elementary particles.</p> <p>CO 4: Assess the detection of radiation in laboratory by means of charged particle detectors.</p> <p>CO 5: Create a clear picture of the subatomic world and its possible applications</p>
PHY2035	Condensed Matter Physics	<p>CO 1: Describe the fundamental concepts of matter in condensed state, crystalline structure and lattice dynamics.</p> <p>CO 2: Illustrate the structural, electrical, and magnetic properties such as band theory in solids, superconductivity, dielectric and ferroelectric Properties</p> <p>CO 3: Apply the mathematical and theoretical concepts to analyze and solve problems related to crystalline solids, lattice dynamics, semiconductor, and magnetic properties.</p> <p>CO 4: Analyze theoretical models to interpret physical phenomena such as phonons, dielectric relaxation, energy band structures, and magnetic behavior.</p> <p>CO 5: Determine parameters related to crystallinity, electrical, magnetic and other properties of condensed matter.</p>
PHY2045	Electronics	<p>CO 1: Recall the basic principle of electronics.</p> <p>CO 2: Explain the working of different electronic circuits and components of basic electronics.</p> <p>CO 3: Operate on the various electronic circuits and components.</p> <p>CO 4: Relate different components of electronic systems.</p> <p>CO 5: Summarize the use of electronic circuits for various applications.</p>
PHY2056	General Lab-II	<p>CO 1: Demonstrate experiments related to optics, electricity, nuclear physics and electronics.</p> <p>CO 2: Interrelate the concepts and theories underlying each experiment.</p> <p>CO 3: Apply mathematical formulae, experimental techniques, and principles to perform calculations and analyze data collected from experiments.</p> <p>CO 4: Determine the effectiveness of experimental methods, assess the accuracy of results, and compare theoretical predictions with experimental outcomes.</p> <p>CO 5: Analyze the experimental data, interpret results, and draw conclusions based on observations and measurements.</p>
PHY3015	Computational Physics	<p>CO 1: Outline of basic computer programming and O/S. Need for computational physics.</p> <p>CO 2: Illustrate FORTRAN 90 and Python programming examples.</p> <p>CO 3: Discuss fundamental techniques of computation of solution of transcendental equations, solution of algebraic equations, solution of differential equations, concept of numerical integration, partial differential equations.</p> <p>CO 4: Manipulate matrix, solution of linear equations.</p> <p>CO 5: Construct advanced computational techniques like generating pseudo random numbers. Monte-Carlo integration.</p>



PHY3025	Advanced Nuclear Physics-I	<p>CO 1: Outline advanced scope of nuclear model, nuclear reaction dynamics and detected mechanism in connection with photon, neutron and charged particles.</p> <p>CO 2: Discuss about the advanced models of nuclear structure and nuclear reaction dynamics and their interpretation in accelerator experiments.</p> <p>CO 3: Distinguish the various modes of excitations and deformations in nuclei and develop a detail theory of the compound nucleus and resonance scattering phenomena.</p> <p>CO 4: Develop the various types of advanced detection of nuclear particles for photons, charged particles and neutrons.</p> <p>CO 5: Develop new ideas of signal processing and data acquisition system in laboratory in terms of energy, timing, resolution etc.</p>
PHY3035	Advanced Nuclear Physics Lab	<p>CO 1: Demonstrate use of components such as HVPS, Pre-Amp, Main Amp, Oscilloscope, SCA/MCA, Signal generator of data acquisition system in the laboratory.</p> <p>CO 2: Develop hands-on practice on various nuclear detectors such as GM Counters, Scintillation detector, Si Surface Barrier detector, Nuclear emulsion and Solid State Nuclear Track Detector (SSNTD).</p> <p>CO 3: Develop experience of working with thermal neutron source, alpha, beta and gamma sources.</p> <p>CO 4: Develop a facility how the low pressure inside a chamber is generated using rotary pump and can measure using Pirani gauges and in turn calibrate for actual measurement.</p> <p>CO 5: Generate alpha energy spectrum, gamma energy spectrum in lab and estimate the various energies of unknown radioactive sources.</p>
PHY3045	Advanced Condensed Matter Physics-I	<p>CO 1: Illustrate the principles underlying phonon scattering, optical properties of solids, superconductivity, semiconductor devices, and magnetic phenomena in solids.</p> <p>CO 2: Apply the theoretical knowledge and principles to analyze and solve problems related to phonon-phonon scattering, optical absorption, superconductivity theories, semiconductor device characteristics, and magnetic phenomena.</p> <p>CO 3: Develop ideas for some semiconductor device fabrication.</p> <p>CO 4: Analyze experimental data, theoretical models, and complex phenomena such as inelastic scattering, optical emission processes, superconducting behaviors, semiconductor device characteristics, and magnetic phenomena in solids.</p> <p>CO 5: Transform the ideas and critically assess the implications and applications of these concepts in research application.</p>
PHY3055	Advanced Condensed Matter Physics Lab	<p>CO 1: Demonstrate the experiments in the field of electrical and optical transport, transport in magnetic field, dielectric phenomena and spin resonance.</p> <p>CO 2: Interrelate the experiments with theoretical advanced topic of condensed matter physics.</p> <p>CO 3: Develop the skill to solve the experimental problems.</p> <p>CO 4: Analyze the experimental data collected from each experiment and interpret the results.</p> <p>CO 5: Rearrange and design research grade device on the basis of experience of handling advanced equipment in context of Advanced Condensed Matter Physics.</p>
PHY3065	Astronomy & Astrophysics-I	<p>CO 1: Define basic concepts in astronomy and astrophysics for understanding the scale and structure of the universe.</p> <p>CO 2: Explain the working of various observing instruments used for measuring the stellar properties.</p> <p>CO 3: Apply the principles of stellar astrophysics to construct general models of stellar structure and evolution.</p>

		CO 4: Combine the principles to understand evolution of stars. CO 5: Assess various observing techniques and theoretical principles discussed.
PHY3075	Astro Lab	CO 1: Recall the basic principles of Astronomy and Astrophysics CO 2: Interpret them using real observational data. CO 3: Use different astronomical databases/archives and astronomical softwares/tools. CO 4: Operate telescopes and CCDs for photometric observation of celestial objects. CO 5: Analyze observational data and summarize.
PHY 3085	Advanced Mathematical Physics	CO 1: Recognize and describe spacetime structures, and introductory quantum gravity concepts. CO 2: Apply techniques for solving integral equations to address various physical problems in Quantum mechanics. CO 3: Analyze symmetry principles using principles of group theory and their practical applications especially in the context of High Energy Physics. CO 4: Interpret the derivation of fundamental equations in quantum mechanics and Quantum Field Theory using path integral techniques. CO 5: Compose the knowledge of advanced mathematical techniques to create and design new theoretical frameworks.
PHY3095	Nanophysics-I	CO 1: Identify the various phenomena occurring at nanoscale. CO 2: Demonstrate techniques to produce nanostructures and gather information about them. CO 3: Discuss synthesis and properties of carbon nanostructures, graphene and 2D metal chalcogenides. CO 4: Explain the growth of nanocrystals through theoretical framework. CO 5: Develop quantum mechanical theories to understand nanoscale phenomena.
PHY3105	Nanophysics Lab	CO 1: Prepare nanostructures using chemical and physical methods. CO 2: Develop handling experience in techniques such as ball mill, magnetron sputtering, UV-Visible spectrophotometer and spectrofluorometer. CO 3: Analyze X-ray diffraction pattern to gather microstructural information of nanocrystals. CO 4: Interpret experimental results to understand phenomena such as quantum confinement and surface plasmon resonance. CO 5: Organize experimental data to co-relate with physical properties of nanostructures.
PHY3115	Advanced Electronics-I	CO 1: Recognize various aspects of advanced electronics. CO 2: Generalize the various components of communication, filters, microprocessors, microcontrollers, and Nano-electronics. CO 3: Use knowledge of the components of advanced electronics. CO 4: Design an electronic system that correlates different components of advanced electronics. CO 5: Develop an electronic system to meet any needs of any experimental physics.
PHY3125	Advanced Electronics Lab	CO 1: Recognize different measuring devices and hardware used in electronics laboratory CO 2: Distinguish the measuring devices, and different software used in the electronic laboratory. CO 3: Operate the measuring devices and different hardware used in the electronics laboratory.

		CO 4: Utilize the various components of electronics laboratory CO 5: Formulate new electronic experiments to solve the associated problem of experimental physics
PHY3135	High Energy Physics-I	CO 1: Recall the fundamentals of Relativistic Quantum Mechanics and foundational concepts of Quantum Field Theory. CO 2: Discuss the scalar, vector and spinor fields and the transformation properties of the Fields. CO 3: Apply the Covariant Perturbation Theory and Feynman rules to calculate the cross-sections of scattering processes. CO 4: Analyze the implications of Global and local gauge symmetries, spontaneous symmetry breaking and Higgs mechanism in particle physics. CO 5: Develop innovative strategies to address challenges related to the mass generation in gauge theories.
PHY3145	Lasers & Spectroscopy-I	CO 1: Describe Zeeman and Paschen-Back effects, and X-ray spectra in atomic systems. CO 2: Interpret fine structure in electronic transitions, interpret NMR and ESR spectra, and understand spin interactions. CO 3: Apply knowledge of laser resonators, Gaussian beams, Q-switching, and mode locking in laser systems. CO 4: Analyze fluorescence and phosphorescence phenomena, analyze fluorescence characteristics, and derive molecular information from fluorescence. CO 5: Summarize various laser types and their applications, including laser-induced fluorescence in biological materials.
PHY3155	Lasers & Spectroscopy Lab	CO 1: Illustrate high-resolution spectroscopy by determining vibrational frequencies of Aluminium oxide. CO 2: Apply interferometry and Zeeman effect to measure material length variation with magnetic field. CO 3: Apply spectroscopy to determine heat of dissociation of iodine molecule. CO 4: Analyze frequency response of defocused optical systems. CO 5: Explain quantum defects in sodium sources.
PHY4015	Statistical Mechanics	CO 1: Describe microscopic details of thermodynamic systems. CO 2: Classify ensembles and express ensemble theory. CO 3: Differentiate between approaches of classical and quantum statistics. CO 4: Examine the nature of classical, Bose, and Fermi systems with examples. CO 5: Determine the importance of fluctuations and phases transitions in physical and chemical systems.
PHY4025	Quantum Mechanics-II	CO 1: Recall key principles of Relativistic Quantum Mechanics. CO 2: Interrelate Scattering Theory concepts and Born approximation. CO 3: Apply Interaction of Radiation with Matter principles to solve certain physical problems. CO 4: Evaluate the Path Integral Approach concepts as another approach to Quantum Mechanics. CO 5: Assess the implications of Measurement Problem in Quantum Mechanics.
PHY4034	Advanced Nuclear Physics-II	CO 1: Outline advanced topics of Nuclear Physics. CO 2: Describe the nuclear fission and fusion mechanism, reactor physics, radioactivity and biological effects of radiation, and advance knowledge on particle physics.

		<p>CO 3: Apply gained knowledge to estimate energy released in fission and fusion reactions and the damage produced by radiation on biological samples.</p> <p>CO 4: Differentiate between challenges in production of energy in the lab using subatomic processes.</p> <p>CO 5: Transform the knowledge gained in various applications of nuclear physics</p>
PHY4044	Advanced Condensed Matter Physics-II	<p>CO 1: Define the properties of matter at microscopic level with reduction in size (thin films and nanomaterials).</p> <p>CO 2: Recognize some unconventional condensed matter (soft matter) and their unusual properties.</p> <p>CO 3: Apply knowledge of thin film preparation methods, analytical techniques, and nanomaterial properties to design and fabricate nanomaterial-based devices.</p> <p>CO 4: Analyze the correlation between the size and the properties of matter in thin films and nanomaterials.</p> <p>CO 5: Reorganize the significance of size effects and unusual phenomena of nanomaterials and soft matter and reconstruct the ideas for potential applications in research in condensed matter physics and material science.</p>
PHY4054	Astronomy and Astrophysics-II	<p>CO 1: Outline the basic principles of general relativity and cosmology.</p> <p>CO 2: Illustrate the techniques of multi-messenger astronomy to understand the exotic objects in the universe.</p> <p>CO 3: Calculate various observable parameters associated with predictions of general relativity and cosmological models.</p> <p>CO 4: Classify galactic and extragalactic objects based on the multi-messenger astronomy.</p> <p>CO 5: Assess the application of general relativity in understanding structure and evolution of the universe.</p>
PHY4064	Nanophysics-II	<p>CO 1: Recall ideas of electrodynamics and quantum mechanics to explain properties of semiconductor and metallic nanostructures.</p> <p>CO 2: Discuss concepts of quantum confinement, plasmonics, nanomagnetism and transport at nanoscale.</p> <p>CO 3: Develop theories of Coulomb blockade and Ballistic transport, and explore their experimental evidences.</p> <p>CO 4: Examine phenomena such as superparamagnetism, quantization of electrical/thermal conductivity and surface plasmon resonance.</p> <p>CO 5: Produce advanced materials using nanostructures for applications in various fields.</p>
PHY4074	Advanced Electronics-II	<p>CO 1: Recall advanced topics of electronics</p> <p>CO 2: Explain various advanced topics of electronics related to the design, and analysis of electronic systems and signals.</p> <p>CO 3: Apply knowledge to solve the specific problem of the topic</p> <p>CO 4: Design a comprehensive system using the areas included.</p> <p>CO 5: Develop a new system using the knowledge gained that requires electronic tools in any real-world problem.</p>

PHY4084	High Energy Physics-II	<p>CO 1: Recall elementary particle properties, fundamental interactions and conservation principles.</p> <p>CO 2: Discuss quark model principles to interpret hadron structure and properties.</p> <p>CO 3: Apply Standard Model and quantum chromodynamics concepts to understand particles and their interactions.</p> <p>CO 4: Assess predictions of theories beyond the Standard Model based on experimental evidences.</p> <p>CO 5: Develop theoretical models in Neutrino Physics to contribute to ongoing research.</p>
PHY4094	Lasers & Spectroscopy-II	<p>CO 1: Explain electronic states, rotational levels, and selection rules. Analyze continuous and diffuse spectra phenomena.</p> <p>CO 2: Apply molecular orbital theory to correlate molecular orbitals and determine terms and multiplicities.</p> <p>CO 3: Analyze symmetry elements, representations, and interpret infrared and Raman spectra.</p> <p>CO 4: Illustrate applications of Molecular Spectroscopy in nuclear physics and astrophysics, including spin and absorption/emission phenomena.</p> <p>CO 5: Interpret concepts of nonlinear optics and laser spectroscopy techniques. Explore laser applications in various scientific and technological fields.</p>
PHY4106	Atmospheric Physics	<p>CO 1: Identify the various dynamical and thermodynamical processes of the atmosphere in association with the related weather phenomena.</p> <p>CO 2: Demonstrate the dynamics of the atmosphere in relation to the imbalance of atmospheric forces.</p> <p>CO 3: Explain the physics of cloud and aerosol to study their effect on weather and climate.</p> <p>CO 4: Apply the concept of atmospheric motion due to energy imbalance of the Earth's atmosphere, to analyze the different scales of the atmospheric circulation.</p> <p>CO 5: Measure atmospheric characteristics via ground based and space borne in-situ and remote sensing techniques to estimate atmospheric alterations.</p>
PHY4116	Nano Fabrication	<p>CO 1: Discuss the Clean room and basic steps of IC fabrication.</p> <p>CO 2: Explain various steps of the lithography technique with a focus on photolithography</p> <p>CO 3: Compare various lithography techniques with their advantages and disadvantages.</p> <p>CO 4: Illustrate various applications where lithography plays a crucial role.</p> <p>CO 5: Determine the dimension, surface wettability, and transport properties of various micro and nano devices.</p>
PHY4126	Plasma Physics	<p>CO 1: Describe and review of the preliminary ideas.</p> <p>CO 2: Explain linear theory of plasma waves &amp; instability.</p> <p>CO 3: Develop and apply kinetic theory of plasma waves.</p> <p>CO 4: Develop nonlinear theory of plasma waves.</p> <p>CO 5: Integrate theoretical concepts (developed so far) into creating laboratory techniques for application in plasmas.</p>
PHY4136	Project / Dissertation	<p>CO 1: Recall the basic principles of Physics.</p> <p>CO 2: Discuss recent scientific literature.</p> <p>CO 3: Design research problem.</p> <p>CO 4: Utilize different experimental techniques or/and theoretical approach to realize their research problem.</p>

		CO 5: Interpret experimental data or/and theoretical results, respectively and summarize
PHY4146	Fundamentals of Lasers & Photonics	CO 1: Outline the concepts of Laser light. CO 2: Describe the principles of pulsed, and working principles of different continuous wave lasers. CO 3: Explain the propagation of the Gaussian beam through optical components. CO 4: Illustrate the propagation of light through a lens and nonlinear optics. CO 5: Summarize the different effects like electro-optic effect, magneto-optic effect, acousto-optic effect

<b>Department:</b>	<b>Arabic</b>	
<b>Programme:</b>	M.A. in Arabic	
<b>PSOs</b>	PSO1. Demonstrate the knowledge of the discipline of Arabic language and literature, including the current practices and development of linguistics and literary studies, rhetoric, grammar, translation, and literary history  PSO2. Design study materials and assessment tools for different learners groups of Arabic language and literature  PSO3. Train the teachers of Arabic language and literature regarding different aspects of language learning viz. pedagogy, methodology, etc.  PSO4. Produce quality research through critical thinking, contributing to new knowledge and practices in Arabic language teaching	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
ARA-1016	CLASSICAL ARABIC LITERATURE	CO1. Describe Classical Arabic prose and poetry CO2. Explain features of nomadic Arabs and their lives CO3. Classify classical Arabic poetry in terms of genres CO4. Analyze socio-political and cultural conditions of the nomadic Arabs CO5. Compare and contrast the classical Arabic literature with modern Arabic literature
ARA-1026	POLITICAL HISTORY OF THE ARABS (UMAYYAD PERIOD)	CO1. Outline political history of the Umayyads CO2. Discuss the rise and fall of the Umayyads

		<p>CO3. Analyze the administration of the Umayyads</p> <p>CO4. Describe the military and naval power of the Umayyads</p> <p>CO5. Compare and contrast between Pious Caliphate with the Umayyads administration</p>
ARA-1036	PHILOLOGY AND LINGUISTICS	<p>CO1. Identify Arabic Philology</p> <p>CO2. Illustrate the basics of Linguistics</p> <p>CO3. Apply Phonology and Phonetics ...</p> <p>CO4. Examine Morphology, Syntax, Semantics and Pragmatics in Arabic</p> <p>CO5. Explain the development of Arabic grammar</p>
ARA-1046	APPLIED GRAMMAR-I	<p>CO1. Identify the derivation of Verbs</p> <p>CO2. Demonstrate the conjugation of feil e Muzara</p> <p>CO3. Apply Arabic Grammar in practice</p> <p>CO4. Illustrate Ism Tafzil</p> <p>CO5. Interpret Sifat e Mushabbah</p>
ARA-1054	SPOKEN ARABIC-I	<p>CO1. Recognize Arabic alphabet</p> <p>CO2. Demonstrate listening skill in regards to Arabic phonetic symbols</p> <p>CO3. Apply Arabic vocabulary in composing texts in Arabic</p> <p>CO4. Illustrate conversation practices using demonstrating pronouns</p> <p>CO5. Construct simple passages in Arabic</p>
ARA-2016	MODERN ARABIC LITERATURE	<p>CO1. Describe modern Arabic prose and poetry</p> <p>CO2. Explain Arab renaissance</p> <p>CO3. Classify modern Arabic prose and poetry in terms of genres</p> <p>CO4. Compare and contrast modern Arabic literature with classical Arabic literature</p> <p>CO5. Illustrate Modern Literary Trends</p>
ARA-2026	POLITICAL HISTORY OF THE ARABS (ABBASID PERIOD)	<p>CO1. Identify political history of the Abbasids</p> <p>CO2. Interpret the rise and fall of the Abbasids</p> <p>CO3. Analyze the administrative policies of the Abbasids</p> <p>CO4. Highlight the literary and scientific developments during the Abbasids</p> <p>CO5. Compare and contrast the policies of Abbasids and Umayyads</p>

ARA-2036	ARABIC RHETORIC	CO1. Describe fundamentals of Arabic Rhetoric CO2. Identify Arabic metaphors CO3. Demonstrate <i>Al-Kinaya</i> CO4. Assess <i>Ilm al-Bayan</i> CO5. Demonstrate acquaintance with rhetorical comprehensions
ARA-2046	APPLIED GRAMMAR-II	CO1. Identify <i>Asma al-Isharah</i> CO2. Demonstrate Al-Dhamaer CO3. Apply Jumla Ismia and Fe'lia in practice CO4. Develop practising <i>Al-Adad</i> and <i>Al-Madud</i> CO5. Interpret Al-Ism in terms of origin, gender and number
ARA-2054	SPOKEN ARABIC-II	CO1. Recognize pronouns and possessives with their usage CO2. Demonstrate typing skill in Arabic CO3. Illustrate vocabulary enrichment in Arabic CO4. Show conversation practices at different places and occasions CO5. Construct comprehension passages in Arabic
ARA-3016	ARAB-AMERICAN & ARAB-ANDALUSIAN LITERATURE	CO1. Classify the features of Arab-American literature CO2. Classify the features of Arab-Andalusian literature CO3. Describe Arab-American literature CO4. Explain Arab-Andalusian literature CO5. Compare and contrast Arab-American and Arab-Andalusian literature
ARA-3026	HISTORY OF CLASSICAL ARABIC LITERATURE (UMAYYAD & ABBASID)	CO1. Identify the growth and development of Arabic literature during the Umayyads CO2. Describe the growth and development of Arabic literature during the Abbasids CO3. Distinguish Abbasid prose from Umayyad prose CO4. Explain the characteristics of Abbasid poetry CO5. Assess ornate prose during the Abbasid period
ARA-3036	FUNCTIONAL ARABIC-I	CO1. Describe the need of Functional Arabic in day to day life CO2. Develop vocabulary related to advertising, including phrases and short captions CO3. Demonstrate the way to handle interviews, exams, challenges, etc. CO4. Assess modern Standard Arabic CO5. Justify learning communicative skills for diverse applications of Arabic
(ELECTIVE) ARA-3046	TRANSLATION, COMPREHENSION & COMPOSITION	CO1. Describe methods of translation in Arabic CO2. Illustrate the skill of content writing CO3. Solve the problem of translation from Arabic to English and vice versa CO4. Hypothesize terminological problems in practical translation in Arabic CO5. Demonstrate translation skills in Arabic for various careers
(ELECTIVE) ARA-3056	APPLIED GRAMMAR-III	CO1. Identify <i>Al-Mubtedah</i> and <i>al-Khabar</i> CO2. Demonstrate <i>Huruf al-Istefaham</i> CO3. Apply various kinds of al-Juma' in practice



		CO4. Develop practising <i>Inna wa Akhwatuha</i> CO5. Interpret <i>Kana wa Akhwatuha</i>
ELECTIVE & OPEN ARA-3066	CONTEMPORARY ARAB WORLD-I	CO1. Demonstrate knowledge and understanding of social and cultural forces in the contemporary Arab world CO2. Analyse and interpret major forms of culture, expression, and human thought CO3. Discuss contemporary political development in the Arab world CO4. Argue Indo-Arab relations in different fields CO5. Explain the functions of the Arab League
ARA-3074	SPOKEN ARABIC-III	CO1. Reproduce vocabulary enrichment procedures CO2. Recognize <i>al-Huruf al-Jarrah</i> CO3. Demonstrate <i>al-Nakirah wa al-Ma'rifa</i> CO4. Illustrate vocabulary enrichment in Arabic CO5. Conduct conversation practices in the class room
ARA-4016	INDO-ARABIC LITERATURE	CO1. State the development of Indo-Arabic literature CO2. Demonstrate an analytical aspect of Arabic writings in India CO3. Compare the differences and commonness between Middle Eastern literature and Indian Arabic literature CO4. Illustrate Indo-Arabic literature CO5. Compile Indo-Arabic writers and their writings
ARA-4026	HISTORY OF MODERN ARABIC LITERATURE	CO1. Describe Arab renaissance CO2. Demonstrate European influence on modern Arabic literature CO3. Examine modern literary movements CO4. Interpret Mahjar literature CO5. Compile prominent contributors of modern Arabic literature
(ELECTIVE) ARA-4036	ARABIC LITERARY CRITICISM	CO1. Identify Arabic literature in its social and cultural contexts CO2. Interpret the ideologies of great writers in Arabic literature CO3. Analyse the theories from classical, modern, and post-modern perspectives CO4. Interpret the objectives and principles in literary criticism CO5. Revise Arabic literary criticism throughout the ages
ELECTIVE ARA-4046	APPLIED GRAMMAR-IV	CO1. Identify <i>al-Muarab wal Mabni</i> CO2. Demonstrate <i>Mafail e Khamasa</i> CO3. Apply various kinds of <i>al-Mustathna</i> in practice CO4. Develop practising <i>Afaal al-Muqaraba</i> CO5. Interpret <i>al-Asma' al-afaal</i>
(ELECTIVE) ARA-4056	FUNCTIONAL ARABIC –II	CO1. Illustrate the need of Functional Arabic in day to day life CO2. Assess <i>al-Arabiyya al-Wadhifiyya</i> CO3. Justify learning communicative skills for diverse applications of Arabic CO4. Develop vocabulary related to advertising, including phrases and short captions

		CO5. Enhance the ability to translate from Arabic texts to English and vice versa
ELECTIVE & OPEN ARA-4066	CONTEMPORARY ARAB WORLD-II	CO1. Demonstrate knowledge and understanding of social and cultural forces in the contemporary Arab world CO2. Interpret major forms of culture, expression, and human thought CO3. Discuss contemporary political developments in the KSA and the UAE CO4. Assess the geography and economy of KSA and UAE CO5. Explain the education and culture of KSA and UAE
ARA-4074	SPOKEN ARABIC-IV	CO1. Describe conjugation of verbs CO2. Demonstrate vocabulary enrichment in Arabic CO3. Illustrate reading comprehension (journalistic) CO4. Assess conversation practices in profession and occupation CO5. Prescribe the usage of audio visual tools in learning Arabic

<b>Department:</b>	<b>Department of Sanskrit</b>	
<b>Programme:</b>	<b>M.Sc.</b>	
<b>PSOs</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
Skt 1016	Sruti and Smrti Literature	<ol style="list-style-type: none"> <li>1. Give an account of the fundamental concepts of the Vedas.</li> <li>2. Identify the procedure of accentuation of Vedic words.</li> <li>3. Discuss the Vedic concept of God.</li> <li>4. Explain the Vedic concept of Religion.</li> <li>5. Discuss the idea of the ancient Indian Legal system.</li> </ol>
Skt 1026	Paninian Grammar	<ol style="list-style-type: none"> <li>1. Outline the basic ideas of Sanskrit Grammar.</li> <li>2. Discuss the Paninian School of Grammar.</li> <li>3. Analyse Sanskrit compounds.</li> <li>4. Interpret the technical terms of the Paninian School of Grammar.</li> <li>5. Develop the knowledge of Sanskrit syntax.</li> </ol>
Skt 1036	Nyaya-Vaisesika and Vedanta Philosophy	<ol style="list-style-type: none"> <li>1. Outline the general knowledge of Indian Philosophy.</li> <li>2. State the characteristic features of Indian Philosophy.</li> <li>3. Explain the salient features of the Advaita Vedanta system.</li> <li>4. Sketch the Upanishadic Literature from the Advaita Vedantic standpoint.</li> <li>5. Analyse the epistemology and metaphysics of Nyaya-Vaishesika Philosophy.</li> </ol>
Skt 1046	Khandakavya and Nataka	<ol style="list-style-type: none"> <li>1. Draw the general ideas of Khandakavya and Nataka.</li> <li>2. Associate with the ideas of Kalidasa's work.</li> <li>3. Analyse the lyrical poetry of Kalidasa.</li> <li>4. Interpret the poetic acumen of Bhavabhuti.</li> <li>5. Assess the Sanskrit dramas of Bhavabhuti with the special reference to Uttararamacharitam.</li> </ol>
Skt 2016	Brahmana and Vedanga Texts	<ol style="list-style-type: none"> <li>1. Draw the knowledge of the Brahmana literature.</li> <li>2. Outline the ideas of Vedanga Literature.</li> <li>3. Illustrate the concept of Vedic sacrifices with special reference to Shatapatabrahmana and Aitareya Brahmana.</li> <li>4. Develop the knowledge of Vedic divinities.</li> <li>5. Interpret the Vedic etymologies.</li> </ol>
Skt 2026	Sanskrit Poetics	<ol style="list-style-type: none"> <li>1. State the general idea of Sanskrit Poetics.</li> <li>2. Illustrate the Origin of Sanskrit dramaturgy.</li> <li>3. Discuss the characteristics of Sanskrit Dramas.</li> <li>4. Distinguish between various functions of words, viz Abhidha, Laksana and Vyanjana.</li> <li>5. CO5. Justify the evolution of different theories of poetics and literary criticisms.</li> </ol>
Skt 2036	Grammar and Philology	<ol style="list-style-type: none"> <li>1. Discuss the basic idea of Prakrit Language.</li> <li>2. Generalise the knowledge of Commentary literature of Sanskrit Grammar.</li> <li>3. Explain the formation and Sanskrit rendering of Prakrit words.</li> </ol>

		4. Sketch the purposes of studying Sanskrit Grammar. CO5. Produce elementary knowledge of Sanskrit linguistics.
Skt 2046	Srimadbhagavadgita and Philosophies of Sankhya and Yoga	<ol style="list-style-type: none"> <li>1. Associate with the intrinsic knowledge of Shrimadbhagavadgita.</li> <li>2. Explain the history and basic concepts of Yoga Philosophy.</li> <li>3. Examine the metaphysics and epistemology of Samkhya Philosophy</li> <li>4. Interpret the relationship between the Samkhya and Yoga Philosophy.</li> <li>5. Assess the philosophical precepts (Nishkama Karma, Atma etc.) of Shrimadbhagavadgita.</li> </ol>
Skt 2054	Functional Sanskrit	<ol style="list-style-type: none"> <li>1. State the basic knowledge of Sanskrit Grammar.</li> <li>2. Develop the knowledge of Sanskrit Vocabularies.</li> <li>3. Make Sanskrit sentences.</li> <li>4. Formulate the writing skills of Sanskrit letters.</li> <li>5. Generate expertise in Sanskrit translation.</li> </ol>
Skt 3016 A	Sanskrit Poetics	<ol style="list-style-type: none"> <li>1. Outline the general idea of Sanskrit Poetics.</li> <li>2. Explain the detailed idea about different categories of Sanskrit Drama.</li> <li>3. Associate with the knowledge of different Sanskrit Rhetoricians.</li> <li>4. Interpret the idea of Poetics according to Dandin.</li> <li>5. Analyse the traditional views on the origin of Sanskrit Poetics and Poetry.</li> </ol>
Skt 3026A	Sanskrit Drama	<ol style="list-style-type: none"> <li>1. Draw the general features of Sanskrit Drama.</li> <li>2. Associate with the plays of Bhasa and his style.</li> <li>3. Discuss the salient features of the drama of Bhattanarayana.</li> <li>4. Sketch the significance of the drama of Shudraka.</li> <li>5. Analyse the socialistic views recorded in the earlier Sanskrit Dramas. (up to 7th century AD)</li> </ol>
Skt 3036A	Bhagavata-Purana and Mahakavya	<ol style="list-style-type: none"> <li>1. Draw the characteristics of Mahakavya</li> <li>2. Interpret the concept of ornate poetry in Sanskrit Literature.</li> <li>3. Analyse the philosophical concepts of Sisulila and Rasalila of Sri Krishna.</li> <li>4. Assess the knowledge of the poetic excellence of Magha. CO5. Justify the position of Shriharsha and his Naishadhacharitam in Sanskrit Literature.</li> </ol>
Skt 3046B	Samhita and Vedanga Literature	<ol style="list-style-type: none"> <li>1. Outline the general idea of Vedic Literature.</li> <li>2. Interpret the salient features of Rgvedic pantheism.</li> <li>3. Associate with the Vedic Metres.</li> <li>4. Identify the procedure of accentuation of Vedic words.</li> <li>5. Analyse the fundamental concepts of Vedic etymologies.</li> </ol>
Skt 3056B	Brahmana, Upanishads and Vedic Grammar	<ol style="list-style-type: none"> <li>1. Draw the idea of Brahmana Literature.</li> <li>2. Identify the significance of Upanishadic Literature.</li> <li>3. Interpret the concept of Ancient Indian Polity.</li> <li>4. Illustrate various aspects of Upanishadic knowledge as delineated in the Mundakopanisad.</li> <li>5. Examine the essentials of Vedic Grammar and Vedic Metres.</li> </ol>
Skt 3066B	History of Vedic Literature and Allied Texts	<ol style="list-style-type: none"> <li>1. Identify the history of Vedic Literature.</li> <li>2. Illustrate the significance of the four parts of Vedic Literature.</li> <li>3. Estimate the important features of the allied Vedic Texts.</li> <li>4. Justify the special features of the Vedanga Literature.</li> <li>5. Generate detailed knowledge of Vedic sacrifices.</li> </ol>
Skt 3086C	Upanisadic Literature	<ol style="list-style-type: none"> <li>1. Describe the general knowledge of Upanishadic Literature.</li> </ol>

		<ol style="list-style-type: none"> <li>2. Discuss the special features of Chandogya Upanishad.</li> <li>3. Associate with Shankaracharya's commentary on Upanishadic Literature.</li> <li>4. Estimate the Upanishadic Philosophy depicted in the Mundakopanisad.</li> <li>5. Develop an idea of principal Upanishads.</li> </ol>
Skt 3086C	Advaita Vedanta Philosophy	<ol style="list-style-type: none"> <li>1. Outline the knowledge of orthodox schools of Indian Philosophy.</li> <li>2. Associate with the idea of Vedanta Philosophy with special reference to Advaita Vedanta.</li> <li>3. Sketch the criticism of different Philosophical systems from Advaita Vedanta standpoint.</li> <li>4. Analyse the key details of the texts of Brahmasutra along with the commentary.</li> <li>5. Illustrate the salient features of the Bhamati, a Commentary on Shankaracharya's work.</li> </ol>
Skt3096C	Nastika Philosophy	<ol style="list-style-type: none"> <li>1. Outline the characteristics of Nastika Schools of Indian Philosophy.</li> <li>2. Identify the contextual features of Buddhist Philosophy.</li> <li>3. Discuss the history of Nastika Schools of Indian Philosophy.</li> <li>4. Produce an idea of Sarva-Darshana-Sangraha along with its author.</li> <li>5. Estimate the philosophical concepts of Jaina System as depicted in Sarva-Darshana-Sangraha.</li> </ol>
Skt 3106	Epics & Puranas	<ol style="list-style-type: none"> <li>1. Outline the basic theoretical foundation to study the Epic Literature.</li> <li>2. Demonstrate the importance of the Ramayana and Mahabharata.</li> <li>3. Produce the general introduction to the Puranas.</li> <li>4. Estimate the importance of Kalikapurana.</li> <li>5. Summarise the contents of the Puranas with an in-depth study of Puranic Cosmology.</li> </ol>
Skt 3116	Fundamentals of Sanskrit Language and Literature	<ol style="list-style-type: none"> <li>1. Discuss the Origin and Development of Sanskrit language.</li> <li>2. Demonstrate the basics of Sanskrit Grammar.</li> <li>3. Explain the characteristic features of Vedic Literature.</li> <li>4. Illustrate the characteristic features of Classical Literature.</li> <li>5. Estimate the characteristic features of Modern Sanskrit Literature.</li> </ol>
Skt4016A	Sanskrit Poetics	<ol style="list-style-type: none"> <li>1. Outline the History of Sanskrit Poetics.</li> <li>2. Estimate the contributions of Anandavardhana &amp; Mammatabhatta in the field of Sanskrit Poetics.</li> <li>3. Discuss the Dhvani theory of Sanskrit Poetics.</li> <li>4. Analyse the Rasadhvani Theory of later Poetists.</li> <li>5. Develop the knowledge of the new concepts of Sanskrit Poetics.</li> </ol>
Skt 4026A	Sanskrit Literature and Arthasastra	<ol style="list-style-type: none"> <li>1. Discuss the characteristic features of Sanskrit prose romances.</li> <li>2. Illustrate Indian polity after Kautilya.</li> <li>3. Express the main ideas and details of Inscriptional writings.</li> <li>4. Assess the contributions of Banabhatta to Sanskrit prose literature.</li> <li>5. Estimate the historical importance of Nidhanpur Copper Plate.</li> </ol>
Skt 4036A	Modern Sanskrit Poems	<ol style="list-style-type: none"> <li>1. Draw the details of modern Sanskrit Poems.</li> <li>2. Develop the knowledge of Modern Sanskrit Kavyas of Assamese writers.</li> <li>3. Discuss the ideas of Sanskrit Eulogical Literature.</li> <li>4. Assess the writing Style of Abhiraja Rajendra Mishra, Harshdev Madhav and Radhavallabh Tripathi.</li> <li>5. Estimate the contributions of Bhavadeva Bhagavati and Mukunda Madhava Sarma to Sanskrit literature.</li> </ol>
Skt 4046B	Vajasaneyisamhita, Chandogyopanisad and Brhaddevata	<ol style="list-style-type: none"> <li>1. Outline the knowledge of Vedic Samhita and Upanishads.</li> <li>2. Discuss the importance of Brihaddevata.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Analyse the concept of Vedic God Rudra after Vajasaneyisamhita.</li> <li>4. Illustrate the Upanishadic concept of Brahman and Atman.</li> <li>5. Interpret the concept of Vedic Gods after Brihaddevata.</li> </ol>
Skt 4056B	Atharvaveda and Sutra Literature	<ol style="list-style-type: none"> <li>1. Discuss the idea of Sutra Literature.</li> <li>2. Explain the technical terms of Grhya-rites of Atharvavedic Tradition.</li> <li>3. Point out the importance of Atharvaveda.</li> <li>4. Analyse the interpretations of Atharvavedic text.</li> <li>5. Explain the basics of household rites after Gautamadharmasutra.</li> </ol>
Skt 4066B	Satapatha Brahmana and Ritualistic Texts	<ol style="list-style-type: none"> <li>1. Describe the importance of Brahmana literature.</li> <li>2. Illustrate the ideas of Kalpasutras.</li> <li>3. Summarise the knowledge of Ancient royal ceremonies.</li> <li>4. Generate the knowledge of technical terms of Vedic sacrifices.</li> <li>5. Produce the idea of the ritualistic applications of Vedic Sacrifices.</li> </ol>
Skt 4076 C	Samkhya-Yoga Philosophy	<ol style="list-style-type: none"> <li>1. Outline the history of Samkhya Philosophy.</li> <li>2. Describe the special features of Patanjali's Yoga Philosophy.</li> <li>3. Estimate the relation of Samkhya and Yoga philosophy.</li> <li>4. Develop philosophical concepts of Samkhya Philosophy after the text Samkhyatattvakaumudi.</li> <li>5. Interpret Yoga Sutra in the light of Vyasabhashya.</li> </ol>
Skt 4086 C	Nyaya-Vaisesika and Mimamsa Philosophy	<ol style="list-style-type: none"> <li>1. Draw the history of Nyaya-Vaisesika Philosophy.</li> <li>2. Demonstrate the importance of Mimamsa Philosophy among the Astika schools of Indian Philosophy.</li> <li>3. Analyse epistemological theory of Nyaya-Vaisesika Philosophy.</li> <li>4. Estimate the Pratyaksha Pramana and the Shabda Pramana as depicted in the Bhashaparincheda.</li> <li>5. Assess the concepts of Mimamsa Philosophy along with the prescribed texts.</li> </ol>
Skt 4096C	Advaitavedantic Epistemology and Contemporary Indian Philosophy	<ol style="list-style-type: none"> <li>1. Describe the characteristics of Advaita Vedanta Philosophy.</li> <li>2. Draw a general knowledge of Contemporary Indian Philosophy.</li> <li>3. Illustrate the knowledge of Advaita-vedantic epistemology as discussed in Vedantaparibhasha.</li> <li>4. Discuss the importance of Vedantaparibhasha in the field of Advaita Vedanta Philosophy.</li> <li>5. Estimate the Philosophy of Contemporary Indian Philosophers.</li> </ol>
Skt 4106	Contemporary Works on Sanskrit Literature	<ol style="list-style-type: none"> <li>1. Locate the differences between traditional and contemporary works of Sanskrit literature.</li> <li>2. Discuss the importance of Contemporary works of Sanskrit Literature.</li> <li>3. Explain contemporary works on Vedic Literature.</li> <li>4. Develop an idea on the contemporary works on Indian Philosophy.</li> <li>5. Estimate Modern Sanskrit Literature.</li> </ol>
Skt 4116	Sanskrit and Various Branches of Learning	<ol style="list-style-type: none"> <li>1. Discuss polity in Sanskrit Texts.</li> <li>2. Explain value-based teachings in the light of Upanishads.</li> <li>3. Demonstrate the Ethical and Didactic teachings of Srimadbhagavadgita.</li> <li>4. Give examples of Scientific ideas found in Sanskrit texts.</li> <li>5. Demonstrate the different branches of Science in Ancient Indian texts.</li> </ol>

<b>Department:</b>	<b>Department of Women's Studies</b>	
<b>Programme:</b>	<b>M.A.</b>	
<b>PSOs</b>	<p>PSO 1: Demonstrate an understanding of key concepts, issues, debates and the theoretical aspects of Women's Studies</p> <p>PSO 2: Examine how knowledge is constructed and deployed in existing knowledge system and explore feminist intervention by applying critical thinking</p> <p>PSO 3: Create interdisciplinary, multidisciplinary and intersectional understanding of various knowledge and social norms while shaping the identity of women, their oppression and emancipation</p> <p>PSO 4: Analyse the established theories, analytic concepts and methodology of various disciplines by bringing women's perspective in them</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
WOM1016	Introduction to Women's Studies	<ol style="list-style-type: none"> <li>1. Describe Women's Studies as an academic discipline</li> <li>2. Identify issues and approaches of Women's Studies.</li> <li>3. Illustrate the institutionalisation of Women's Studies.</li> <li>4. Analyse the debates associated with Women's Studies.</li> <li>5. Compare the challenges and prospects of Women's Studies from global to local</li> </ol>
WOM1026	Feminist Theory-I	<ol style="list-style-type: none"> <li>1. Describe feminism and its unfolding</li> <li>2. Demonstrate the chronology of theoretical positions of feminism</li> <li>3. Explain the different schools of feminist thought and key figures of these theoretical traditions</li> <li>4. Illustrate the issues that paramount each theoretical positions of feminism</li> <li>5. Appraise the contributions of feminist theory as well as assess its shortcomings</li> </ol>
WOM1036	Women's Movement-I	<ol style="list-style-type: none"> <li>1. Identify the trajectory and the history of the women's movement in the west.</li> <li>2. Outline the cross-cultural analysis of women's uprisings in the global context.</li> <li>3. Sketch the resurgence of feminism</li> <li>4. Analyse the cross-cultural experiences of women in movements across the globe.</li> <li>5. Infer the feminist paradigms emerging from women's movements</li> </ol>
WOM1046	Women in Indian Society	<ol style="list-style-type: none"> <li>1. Describe the agents of socialisation and social construction of gender in Indian Society</li> <li>2. Identify the socio-cultural and economic traditions and practices of gender roles in Indian society</li> <li>3. Interrelate women and social institutions of Indian society</li> <li>4. Analyse the changing position of women in Indian society</li> <li>5. Argue the contemporary debates associated with women in Indian society</li> </ol>
WOM1054	Concepts in Feminism	<ol style="list-style-type: none"> <li>1. Describe key issues of gender and women's studies</li> <li>2. Demonstrate the questions and debates in feminist scholarship</li> <li>3. Recognize the negative stereotypes associated with 'Feminism'</li> <li>4. Apply learning, critical reading and engaging in practical application of the concepts</li> <li>5. Use feminist concepts to analyse existing content in popular media.</li> </ol>
WOM2016	Feminist Theory-II	<ol style="list-style-type: none"> <li>1. Demonstrate the chronology of theoretical positions of feminism</li> <li>2. Explain the concerns of feminist thought in contemporary times</li> <li>3. Classify and categorize the issues that are paramount to these theoretical positions of feminism</li> <li>4. Compare the multiplicity of voices within feminism</li> </ol>

		5. Appraise the contributions of feminist theory as well as assess its shortcoming
WOM2026	Women's Movement-II	<ol style="list-style-type: none"> <li>1. Outline the history of the Women's Movement in India</li> <li>2. Locate the 'women's question' in the colonial period of India</li> <li>3. Discuss the re-birth of the women's movement and challenges in post-colonial India</li> <li>4. Illustrate the contemporary women's movement in India</li> <li>5. Assess the impact of globalization, militarization and political representation of women in India</li> </ol>
WOM2036	Eco-feminism, Environment and Sustainable Development	<ol style="list-style-type: none"> <li>1. Identify the roots of eco-feminism</li> <li>2. Describe the genesis of environmental movements in the global and local context</li> <li>3. Associate the changing relations of men, women and nature</li> <li>4. Analyse the use of technologies and their impacts on women and nature</li> <li>5. Critique gender and environmental rights and practices</li> </ol>
WOM2046	Feminist Economics/ Women, Work and Labour	<ol style="list-style-type: none"> <li>1. Describe feminist economics and its scope</li> <li>2. Demonstrate women's role and contributions in various economic sectors, the effects on women's life and the structure of gender relations</li> <li>3. Explain economic theories from feminist perspective.</li> <li>4. Analyse engendering of the planning process</li> <li>5. Assess economic empowerment through strategies, policies and programs</li> </ol>
WOM2054	Gender and Development	<ol style="list-style-type: none"> <li>1. Describe the approaches to development from gender perspective</li> <li>2. Demonstrate visibility of women in development discourses</li> <li>3. Compare approaches in gender and development</li> <li>4. Analyse the tools of Gender and Development and their applications</li> <li>5. Critique economic doctrines by disclosing their sociological and political premises</li> </ol>
WOM3016	Research Methodology	<ol style="list-style-type: none"> <li>1. Describe the basic and essential knowledge of research</li> <li>2. Describe feminist research methodology</li> <li>3. Explain the research process and the various steps involved, from selection of the problem to report writing.</li> <li>4. Utilise quantitative and qualitative research methodology in social science research</li> <li>5. Construct research methodology for research projects.</li> </ol>
WOM3026	Women, Science and Technology	<ol style="list-style-type: none"> <li>1. Describe the relevance of science and technology in the lives of women</li> <li>2. Recognize the development of new technologies and their effects on gender relations.</li> <li>3. Associate sexism in science</li> <li>4. Apply feminist perspectives in science and technology</li> <li>5. Interpret feminist reconstruction of science.</li> </ol>
WOM3036	Engendering Governance	<ol style="list-style-type: none"> <li>1. Describe the concepts and agents of governance</li> <li>2. Demonstrate the debates on governance and women's participation</li> <li>3. Explain the approaches to empowerment</li> <li>4. Sketch women's participation in the governance process, with a focus on India</li> <li>5. Analyse theoretical and factual dimensions of women's presence in governance process.</li> </ol>
WOM3046	Women and Work	<ol style="list-style-type: none"> <li>1. Define concepts and definitions of women and work</li> <li>2. Discuss Feminist Characterizations of Women's Work</li> <li>3. Explain subordination and controls on women's labour</li> <li>4. Illustrate women's response to globalization</li> <li>5. Argue undervaluation of women's work from a feminist perspective</li> </ol>



WOM3056	Women's Rights and Legal advocacy	<ol style="list-style-type: none"> <li>1. Outline the concepts and debates of legal advocacy</li> <li>2. Illustrate international law framework and women's rights issues</li> <li>3. Discuss legal frameworks related to women in India</li> <li>4. Explain institutional mechanisms in India for legal redress for women</li> <li>5. Argue factual and analytical understanding of laws pertaining to women in India.</li> </ol>
WOM3066	Gender and Violence	<ol style="list-style-type: none"> <li>1. Describe gender and violence from feminist perspective</li> <li>2. Explain different forms of gender-based violence</li> <li>3. Interrelate gender-based violence with state agencies, class, caste, religion and everyday life</li> <li>4. Analyse the role of the state and non-state actors in perpetuating violence against women</li> <li>5. Appraise gender intersection with structural inequalities and causes of violence against women</li> </ol>
WOM3074	Academic Writing	<ol style="list-style-type: none"> <li>1. Describe the significance of academic writing in research</li> <li>2. Prepare citation styles and referencing, review of literature, bibliography and paraphrasing</li> <li>3. Apply graphical representation and interpretation of data.</li> <li>4. Utilize knowledge of plagiarism and research ethics</li> <li>5. Design research reports, papers, dissertation and seminar presentations for present and future research endeavours.</li> </ol>
WOM4016	Women, Health and Rights	<ol style="list-style-type: none"> <li>1. Describe the social, economic and political determinants of women's health</li> <li>2. Illustrate gender inequalities and gender biases in health research</li> <li>3. Show the various issues concerning women's reproductive health rights.</li> <li>4. Assess the alternative forms of knowledge with regard to healing and health</li> <li>5. Argue gender inequalities in public health policy and population policy.</li> </ol>
WOM4026	Dissertation	<ol style="list-style-type: none"> <li>1. Demonstrate knowledge of research methodology and the theoretical understanding</li> <li>2. Develop academic writing skills and research aptitude</li> <li>3. Create original research work on areas of social relevance</li> <li>4. Construct objectives, research questions and articulated findings as per feminist research methodology</li> <li>5. Defend the research findings and arguments to showcase the research skills.</li> </ol>
WOM4036	Women in North-East India	<ol style="list-style-type: none"> <li>1. Describe the status and position of women of North East India</li> <li>2. Illustrate women in social movement in North East India</li> <li>3. Demonstrate issues and debates of women and human security in North East India</li> <li>4. Illustrate traditional tribal societies, gender and social differences of North East India</li> <li>5. Examine changing phases of women in North East India</li> </ol>
WOM4046	Gender and Education	<ol style="list-style-type: none"> <li>1. Locate the theoretical perspective of paradigms in education and its application to gender.</li> <li>2. Describe the approaches of education in enhancing women's capabilities</li> <li>3. Illustrate the history of women's education and proponents of women's rights</li> <li>4. Compare the contribution of different liberal reformers and radical theorists on women's education</li> <li>5. Determine the scope of gender-just pedagogies</li> </ol>
WOM4056	Gender, State and Citizenship	<ol style="list-style-type: none"> <li>1. Describe the concepts of citizenship</li> <li>2. Demonstrate the discourses on citizenship located at multiple sites in the context of the Indian State</li> <li>3. Illustrate the inter-linkages between the conceptual framework of citizenship and gender</li> <li>4. Analyse women's citizenship in the context of the Indian state and its Laws</li> </ol>

WOM4066	Women and Literature	<ol style="list-style-type: none"> <li>5. Criticize citizenship and exclusions in the context of women in India</li> <li>1. Identify the concerns of feminist literary criticism</li> <li>2. Represent selected gender issues - stereotypes, oppressions, patriarchy, power - in literature by men</li> <li>3. Illustrate the representation of gender issues in literature by women</li> <li>4. Represent the genre of autobiography or self-writing to express women's experiences</li> <li>5. Illustrate writings by women as a source of empowerment</li> </ol>
WOM4076	Gender and Geography	<ol style="list-style-type: none"> <li>1. Describe the significance and importance of gender geography</li> <li>2. Demonstrate how people organise their everyday spaces and relate to it in terms of gender.</li> <li>3. Interrelate the material and symbolic lives of women and men with space and place</li> <li>4. Assess the role played by space and place in the making of gender</li> <li>5. Compile data of gender issues for spatial analysis through mapping</li> </ol>
WOM4084	Professional Skill Development	<ol style="list-style-type: none"> <li>1. Identify strategies to crack competitive exams in state and national level</li> <li>2. Prepare for future interviews while seeking employment as well as higher education.</li> <li>3. Develop skills in writing Curriculum Vita, academic writing and presentations.</li> <li>4. Utilize personality development and practical experiences from coursework</li> <li>5. Create future career opportunities after course completion</li> </ol>
<b>Department:</b>	<b>Department of Women's Studies</b>	
<b>Programme:</b>	<b>B.A.</b>	
<b>PSOs</b>	<p>PSO 1: Demonstrate an understanding of the existing socialisation process and pattern, gender identities and feminist theories to integrate knowledge and skills to address gender issues</p> <p>PSO 2: Illustrate the significance of critical thinking, analytical skills, interdisciplinary and multidisciplinary perspectives to assess gendered knowledge of education, history, public policies, human rights &amp; law, health, science &amp; technology, etc. and its implication in the society.</p> <p>PSO 3: Develop deeper understandings of the local, regional, national and global gender issues to effectively assess multicultural perspectives and socio-cultural diversity.</p> <p>PSO 4: Exhibit the ability to critically analyse data, provide arguments and employ feminist theories and feminist research methodology to create new insights and contribution to the knowledge of Gender and Women's Studies.</p>	
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>
GWS010104	Understanding Gender	<ol style="list-style-type: none"> <li>1. Define the basic concepts of sex, gender and sexuality.</li> <li>2. Determine the use of gender as an analytical category.</li> <li>3. Develop a comprehensive understanding of gender fluidity and gender as a social construct.</li> <li>4. Outline an understanding of the intersectionality of gender, class, caste, religion, race and ethnicity.</li> <li>5. Critique the biological assumptions behind the understanding of the body.</li> </ol>
GWS020104	Gender Issues I	<ol style="list-style-type: none"> <li>1. Identify gendered language in textbooks and media</li> <li>2. Locate 'women' in the sphere of economy and work.</li> <li>3. Explain the concepts and types of gender based violence</li> <li>4. Describe the paradigm of gender sensitivity within the constitution of India.</li> <li>5. Determine the legal and constitutional provisions for gender and violence.</li> </ol>
GWS030104	Gender Issues II	<ol style="list-style-type: none"> <li>1. Explain the emerging issues of gender and health.</li> <li>2. Outline the role of education in promoting gender equality and gender equity.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Explain the concepts of politics and power as agencies of gender equality.</li> <li>4. Discuss the role of media as agents of socialization and empowerment.</li> <li>5. Show socio-cultural determinants of gender issues</li> </ol>
GWS040104	Women's Movement and Women's and Gender Studies	<ol style="list-style-type: none"> <li>1. Identify the trajectory and the history of the women's movement in the West.</li> <li>2. Explain the women's uprisings at different points of history, time and region in India.</li> <li>3. Discuss the meaning and the history of gender and women's studies.</li> <li>4. Locate the emergence of Women Studies Research Centers in India.</li> <li>5. Sketch the history and debates of feminism in India and across the globe.</li> </ol>
GWS040204	Gender and Education (Elective 01)	<ol style="list-style-type: none"> <li>1. Explain the role of education in gendering of individuals.</li> <li>2. Illustrate the approaches to women's education.</li> <li>3. Discuss the government and non-government policies and programmes related to Women's Education.</li> <li>4. Demonstrate the role of education as an instrument for women's empowerment</li> <li>5. Explain education as an agent for social change.</li> </ol>
GWS040304	Women, Science and Technology (Elective 01)	<ol style="list-style-type: none"> <li>1. Explain the basic concepts and issues of gender, science and technology.</li> <li>2. Examine data and trends on the gender gaps in STEM and strategies for improvement</li> <li>3. Discuss the leadership issues of women in Science and Technology.</li> <li>4. Illustrate the life stories of Women Scientists in the global and national levels</li> <li>5. Demonstrate the socio-cultural determinants of women's role in science and technology.</li> </ol>
GWS040404	Gender, Society and Culture (Elective 02)	<ol style="list-style-type: none"> <li>1. Illustrate social construction of gender in societies</li> <li>2. Interpret the gendered understanding of family.</li> <li>3. Indicate the relationship between gender and social institutions.</li> <li>4. Explain the female body as a site of gender-based oppression.</li> <li>5. Paraphrase the basic concepts, structures, institutions and processes in constructing gender identities.</li> </ol>
GWS040504	Public Policy and Gender (Elective 02)	<ol style="list-style-type: none"> <li>1. Explain the nature, origin and significance of public policy and its implementation.</li> <li>2. Explain gender exclusion through intersectionality in framing gender welfare policies.</li> <li>3. Demonstrate the significance of gender mainstreaming in public policies.</li> <li>4. Assess the major gender-based schemes and policies.</li> <li>5. Assess the major gender-based schemes and policies in India.</li> </ol>
GWS040604	Gender, Rights and Law (Elective 03)	<ol style="list-style-type: none"> <li>1. Describe the basic concepts of law, justice, and human rights.</li> <li>2. Discuss the Indian constitutional laws and women's rights.</li> <li>3. Illustrate the legal provisions in the Indian constitution for women.</li> <li>4. Illustrate the rights and legal provisions for persons with disabilities and non-binary individuals in India.</li> <li>5. Interpret the major legislations from a feminist lens.</li> </ol>
GWS040704	Women and Entrepreneurship (Elective 03)	<ol style="list-style-type: none"> <li>1. Describe the concepts related to women and entrepreneurship.</li> <li>2. Discuss the importance of resource mobilization for women's entrepreneurship.</li> <li>3. Explain the role of technology in women's entrepreneurship.</li> <li>4. Illustrate stories of successful female entrepreneurs.</li> <li>5. Examine the alternative models of entrepreneurship.</li> </ol>
GWS050104	Feminist Theory-I	<ol style="list-style-type: none"> <li>1. Discuss the meaning and definition of feminism.</li> <li>2. Describe the origin, concepts and criticisms of liberal feminism.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Illustrate the origin, concepts and criticisms of marxist feminism.</li> <li>4. Explain the origin, concepts and criticisms of marxist feminism.</li> <li>5. Sketch different dimensions of women's subordination and oppression.</li> </ol>
GWS050204	Gender, Work and Livelihood (Elective 01)	<ol style="list-style-type: none"> <li>1. Outline concepts of work and related gender issues.</li> <li>2. Explain globalisation and contemporary debates on gender and work.</li> <li>3. Examine globalisation and its impact on women's work.</li> <li>4. Illustrate the meaning, issues and challenges on gender and livelihood in India.</li> <li>5. Discuss the gendered policies and programmes of livelihood in India.</li> </ol>
GWS050304	Gender in North-East India (Elective 01)	<ol style="list-style-type: none"> <li>1. Describe the geo-political, cultural and ethnical significances of gender and North-east India.</li> <li>2. Demonstrate gender issues in the context of Northeast India.</li> <li>3. Demonstrate women's agency for change and development in NEI.</li> <li>4. Outline queer activism in NEI.</li> <li>5. Illustrate the formation of gender identities and relations in the context of NEI.</li> </ol>
GWS050404	Gender, Empowerment and Governance (Elective 02)	<ol style="list-style-type: none"> <li>1. Describe the concepts and agents of governance.</li> <li>2. Demonstrate gender and governance in India and South Asia.</li> <li>3. Illustrate the approaches of women's empowerment in development and governance.</li> <li>4. Explain gender budgeting, gender auditing and gender mainstreaming in policies and planning process.</li> <li>5. Outline women's participation in the governance process, with a special focus on India.</li> </ol>
GWS050504	Gender, Environment (Climate Change) and Sustainability (Elective 02)	<ol style="list-style-type: none"> <li>1. Describe the relationship between gender and environment.</li> <li>2. Discuss the relationship between gender and sustainability.</li> <li>3. Explain the issues of gender, climate change and resource management.</li> <li>4. Assess case studies and make poster presentations on gender, climate change and sustainable development.</li> <li>5. Develop competence to discuss gender, environment and the issues involved from global to local level.</li> </ol>
GWS050604	Gender and Human Rights (Elective 03)	<ol style="list-style-type: none"> <li>1. Discuss the concepts of human rights and its evolution.</li> <li>2. Illustrate international conventions and mechanisms on women's rights.</li> <li>3. Explain global movements on women's rights.</li> <li>4. Examine international legal principles and human rights of non-binaries.</li> <li>5. Interpret movies on human rights from gender and women's perspectives.</li> </ol>
GWS050704	Women and Finance (Elective 03)	<ol style="list-style-type: none"> <li>1. Describe finance and financial system.</li> <li>2. Describe features of banks and non-banking financial institutions.</li> <li>3. Demonstrate types and features of negotiable instruments of finance.</li> <li>4. Identify tools and resources for financial literacy and financial planning for women.</li> <li>5. Sketch unique financial needs and goals of women at different life stages.</li> </ol>
GWS060104	Feminist Theory-II	<ol style="list-style-type: none"> <li>1. Discuss the thoughts and ideas of psychoanalytic and socialist feminism.</li> <li>2. Illustrate the significance of intersectionality in feminist discourses</li> <li>3. Sketch the history and challenges of queer feminism.</li> <li>4. Explain the relevant theories and contemporary developments in feminism</li> <li>5. Examine the different ideological affiliations within feminist movements.</li> </ol>
GWS060204	Feminist Traditions in India (Elective 01)	<ol style="list-style-type: none"> <li>1. Describe the making of Indian feminism.</li> <li>2. Recognize the contributions of Indian feminists.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Explain the colonial interventions in the construction of 'nation' and 'woman'.</li> <li>4. Interrelate class, caste, land and gender in India.</li> <li>5. Outline the alternative forms of feminism in India.</li> </ol>
GWS060304	Gender in Popular Writing (Elective 01)	<ol style="list-style-type: none"> <li>1. Describe popular writings and literature on gender.</li> <li>2. Locate women's voices in colonial and post-colonial India.</li> <li>3. Discuss popular culture and writings in Assamese.</li> <li>4. Illustrate life writings by popular feminists in India and the west.</li> <li>5. Interrelate popular fictions and its engagement with the questions of identity, gender, race, etc.</li> </ol>
GWS060404	Introduction to the Atlas of Women of the World (Elective 02)	<ol style="list-style-type: none"> <li>1. Describe map, components of map and fundamentals of map reading.</li> <li>2. Demonstrate social elements of the map and relate them with the gendered space</li> <li>3. Sketch global gender disparities associated with the socio- cultural and economic attributes in the creation of gendered space.</li> <li>4. Spatial analyses of gender issues across the world.</li> <li>5. Assess gender issues across the countries of the world through map work.</li> </ol>
GWS060504	Gender and Development (Elective 02)	<ol style="list-style-type: none"> <li>1. Explain concepts and approaches to gender and development.</li> <li>2. Demonstrate indexes to measure gender and development.</li> <li>3. Illustrate sustainable approaches towards gender and development.</li> <li>4. Show various approaches to women's empowerment.</li> <li>5. Examine development policies and practices from a gender lens.</li> </ol>
GWS060604	Quantitative and Qualitative Research	<ol style="list-style-type: none"> <li>1. Define the characteristics, objectives and types of research.</li> <li>2. Demonstrate the steps in planning and conducting research.</li> <li>3. Explain qualitative, quantitative and feminist research.</li> <li>4. Prepare qualitative and quantitative research tools.</li> <li>5. Demonstrate and apply knowledge fo academic research.</li> </ol>

<b>Department:</b>	<b>Department of Zoology</b>		Supporting Document Criterion 1.1.1 Gauhati University
<b>Programme:</b>	M.Sc.		
<b>PSOs</b>	<p><b>PSO1.</b> Describe and demonstrate the principles of organismal biology, including classification, evolution, physiology, and ecology.</p> <p><b>PSO2.</b> Apply knowledge of organismal biology to analyze and interpret real-world scenarios, such as ecological interactions, animal behavior, population dynamics, and species conservation efforts using experimental techniques and methods of analysis.</p> <p><b>PSO3.</b> Critically analyze complex biological systems and processes, identifying patterns, relationships, and causal mechanisms underlying organismal diversity, adaptation, and ecological dynamics.</p> <p><b>PSO4.</b> Design and implement research projects that integrate multiple disciplines within biology, such as genetics, physiology, and ecology, to address multifaceted questions in organismal biology.</p>		
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcomes</b>	
<b>Z- 1014</b>	<b>Biosystematics and Biostatistics</b>	<p><b>CO1. Identify and classify</b> the major groups of organisms based on standard taxonomic framework.</p> <p><b>CO2. Demonstrate</b> the characteristics of animals that differentiate them from other forms of life.</p> <p><b>CO3. Apply</b> the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth.</p> <p><b>CO4. Explain</b> how organisms' interaction at the level of gene, genome, cell, tissue, organs and organ-systems.</p> <p><b>CO5. Develop</b> proficiency in the experimental techniques and analytical methods in the areas of specialization within biology.</p>	
<b>Z-1024</b>	<b>Bioinformatics and Instrumentation</b>	<p><b>CO1. Identify</b> the available data from the most common protein sequence and structure databases (UniProt, GenBank, Protein Data Bank, CATH).</p> <p><b>CO2. Choose</b> the theories underlying the most common methods for sequence searches and sequence alignments.</p> <p><b>CO3. Compute</b> the main steps of dynamic programming for simple alignments of short sequences.</p> <p><b>CO4. Select and apply</b> the most appropriate method for aligning sequences, visualizing protein structures, predicting secondary structure elements and modeling protein structures from sequence.</p> <p><b>CO5. Implement</b> the principles and uses of the instrument in the analysis of different biological samples</p>	
<b>Z-10134</b>	<b>Evolution and chronobiology</b>	<p>CO1. <b>Identify</b> the biological evolution theories of the organisms that inhabit the Earth today are different from those that inhabited it in the past.</p> <p>CO2. <b>Discuss</b> propositions underlying Darwin's theory of evolution and understand the conditions for natural selection to occur.</p> <p>CO3. <b>Relate</b> the factors and forces of evolution in speciation.</p> <p>CO4 <b>Organize and summarize</b> chronobiological terminology, information, and publications.</p> <p>CO5. <b>Apply</b> chronobiological principles in biological and medical-biological science.</p>	
<b>Z-1044</b>	<b>Genetics and Cytogenetics</b>	<p>CO1. <b>Describe</b> the core molecular genetics concepts.</p> <p>CO2. <b>Develop</b> working knowledge in a defined skill set of molecular biology and biotechnology protocols.</p> <p>CO3. <b>Explain</b> the different chromosomal anomalies and <b>interpret</b> the concept of gene therapy.</p> <p>CO4. <b>Determine</b> key concepts of genome organization and manipulation.</p> <p>CO5. <b>Discuss and analyze</b> the different sex determination system.</p>	
<b>Z-1054</b>	<b>Ecology and Environment Biology</b>	<p>CO1. <b>Explain</b> how individuals interact with members of their own species and with organisms of another species.</p>	

		<p>CO2. <b>Determine</b> how populations of a species grow, change and are distributed across the range of their suitable habitats</p> <p>CO3. <b>Explain</b> how communities of species are assembled and interact on an ecosystem level, across short and geological time-scales</p> <p>CO4. <b>Apply</b> the basic principles and theories relating to anthropogenic activity.</p> <p>Co5. <b>Demonstrate</b> and <b>implement</b> the ecological concept and principles in animal population dynamics and species conservation .</p>
<b>Z-1064</b>	<b>Biochemistry</b>	<p>CO1. <b>Analyze and interpret</b> the biochemical synthesis of proteins, lipids, nucleic acids, and carbohydrates.</p> <p>CO2. <b>Explain</b> the role of biochemical molecules in metabolic pathways along with their regulation at the epigenetic, transcriptional, translational, and post-translational levels.</p> <p>CO3. <b>Discuss</b> the regulation of non-coding RNAs in the developmental and physiological functioning of the organism.</p> <p>CO4. <b>Analyze</b> the mechanism of enzyme action and their regulation in biochemical pathway.</p> <p>CO5. <b>Explain and demonstrate</b> the thermodynamic principles of biological systems and bioenergetics.</p>
<b>Z-1072</b>	<b>Biosystematics, Biostatistics and Biochemistry (Practical)</b>	CO1. Acquire practical knowledge and get the hands on practice in the subject of biosystematics, biostatistics and bioinformatics
<b>Z-1082</b>	<b>Genetics, Cytogenetics, Evolution and Chronobiology (Practical)</b>	CO1. Acquire practical knowledge and get the hands on practice in the subject of genetics, cytogenetics, bioinformatics
<b>Z-2014</b>	<b>Biodiversity</b>	<p><b>CO1. Explain</b> the concepts and theory in biodiversity science and management from interdisciplinary perspectives and at an advanced level.</p> <p><b>CO2. Describe</b> role of ethics, values and norms in producing culturally attuned and effective conservation interventions.</p> <p><b>CO3. Assess</b> the modes through which conservation builds and extends power and describe in detail the factors that explain the emergence and performance of different governance modes.</p> <p><b>CO4. Apply</b> new technological forces for the future of biodiversity science and management.</p> <p><b>CO5. Identify and develop</b> advanced research questions and design dissertation research that is identifiable with a professional research approach.</p>
<b>Z-2024</b>	<b>Endocrinology</b>	<p><b>CO1. Define</b> the role, metabolic function of various endocrine glands.</p> <p><b>CO2. List</b> specific secretions of endocrine glands, associated disorders.</p> <p><b>CO3. Determine</b> pathophysiology for different endocrine disorders.</p> <p><b>CO4. Demonstrate</b> the mechanism of hormone action, signal transduction system.</p> <p><b>CO5. Define</b> the role and function of neurosecretory hormones of insects and crustacean.</p>
<b>Z-2034</b>	<b>Developmental biology</b>	<b>CO1. Describe</b> basic concepts of developmental biology.

		<p><b>CO2. Demonstrate</b> how fertilization and cleavage occur.</p> <p><b>CO3. Analyze</b> the process and consequence of gastrulation.</p> <p><b>CO4. Demonstrate</b> mesoderm induction and neural induction in the light of concepts of organogenesis.</p> <p><b>CO5. Describe</b> and demonstrate basic concepts of growth, regeneration, aging, gene expression and regulation.</p>
<b>Z-2044</b>	<b>Animal cell culture and Genetic engineering</b>	<p><b>CO1. Describe</b> theoretical concept to maintain cultures of animal cells and established cell lines with good viability, minimal contamination, and appropriate documentation.</p> <p><b>CO2. Outline</b> the episodic tasks relevant to cell culture, including preparation and evaluation of media, cryopreservation and recovery, and assessment of cell growth/health.</p> <p><b>CO3. Analyze</b> and troubleshoot problems common to routine cell culture.</p> <p><b>CO4. Describe</b> the importance of plasmids and viruses to genetic engineering and differentiate between the techniques of selection and screening of clones. .</p> <p><b>CO5. Summarize</b> the value of and the processes involved with DNA extractions, the polymerase chain reaction (PCR).</p>
<b>Z-2054</b>	<b>Animal Behavior</b>	<p><b>CO1. Define</b> the animal behavior with the help of examples and tools of measurements.</p> <p><b>CO2. Demonstrate</b> the proximate controls of behavior including the role of hormones, the animal's genotype and the animal's environment in the development of behavior.</p> <p><b>CO3. Draw</b> an evolutionary approach, in learning the adaptive significance of behavior.</p> <p><b>CO4. Interpret</b> animal communication, social behavior, territoriality, sexual selection, and mating systems comparing examples.</p> <p><b>CO5. Apply</b> behavioral measurement techniques in assessing social animals.</p>
<b>Z-2064</b>	<b>Animal Physiology</b>	<p><b>CO1. Describe</b> the cellular mechanisms of solute and water transport used by animals living in different environments.</p> <p><b>CO2. Demonstrate</b> different energy requirements of an animal at rest and during exercise, and how this is reflected in the functioning of the oxygen transporting systems.</p> <p><b>CO3. Describe</b> the cardiovascular and respiratory systems emphasizing on integration and control methods.</p> <p><b>CO4. Describe and demonstrate</b> different metabolic functions of human/mammalian body including metabolism for ATP production, control processes of the nervous and endocrine systems and excretion of nitrogen wastes and water.</p> <p><b>CO5. Apply and critically interpret</b> concepts of physiology to carry out physiological studies in the laboratory.</p>
<b>Z-2072</b>	<b>Biodiversity, Animal behavior, Developmental Biology-Practical Paper</b>	<p><b>CO1. Identify</b> developmental processes in animals, ranging from embryogenesis to postnatal development, through hands-on experimentation and analysis of various model organisms.</p>



		<p><b>CO2. Apply</b> a range of laboratory techniques commonly used in developmental biology, including specimen collection, dissection, microscopy, staining, and data analysis, by performing experiments on different animal models.</p> <p><b>CO3. Evaluate</b> the impact of toxicants on animal development and behavior, demonstrating the ability to design and execute experiments to assess toxicant effects on different developmental stages and physiological processes.</p> <p><b>CO4. Integrate</b> concepts from biology, toxicology, and physiology to investigate complex biological phenomena such as cell differentiation, organogenesis, and responses to environmental stressors, fostering a holistic understanding of developmental biology.</p> <p><b>CO5. Develop</b> abilities to communicate their experimental findings and interpretations through written reports, oral presentations, and scientific posters.</p>
Z-2082	<b>Endocrinology, Animal Physiology, Animal Cell Culture and Genetic Engineering</b>	<p><b>CO1. Identify and demonstrate</b> the neuroendocrine system in invertebrates, such as cockroaches, through hands-on dissection and display of key structures.</p> <p><b>CO2. Interpret</b> the microscopic anatomy of endocrine glands in vertebrates and invertebrates using histological techniques, including tissue dissection, slide preparation, and staining.</p> <p><b>CO3. Apply and analyze</b> tools and techniques related biochemical assays, such as ELISA, for the quantification of steroid and thyroid hormones, fostering skills in experimental design, sample preparation, data analysis, and interpretation.</p> <p><b>CO4. Apply and interpret</b> molecular techniques in endocrinology with enhanced understanding of genetic analysis in endocrine research.</p> <p><b>CO5. Assess</b> cell proliferation and viability using assays such as the MTT cell proliferation assay, developing skills in experimental design, cell culture techniques, data interpretation, and the evaluation of cellular responses to stimuli.</p>
Z-3014	<b>Cell Biology</b>	<p><b>CO1. Describe</b> the biology of cells of prokaryote and higher organisms.</p> <p><b>CO2. Describe and demonstrate</b> the structure, function, and biosynthesis of cellular membranes and organelles.</p> <p><b>CO3. Describe and outline</b> theories and principles of cell growth and oncogenic transformation; transport, receptors, and cell signaling.</p> <p><b>CO4. Describe</b> the cytoskeleton, the extracellular matrix, and cell movements, chromatin structure, cell cycle, regulation of cell cycle, apoptosis.</p> <p><b>CO5. Describe and interpret</b> processes of regulation of gene expression in prokaryotes and eukaryotes and RNA editing.</p>
Z-3024	<b>Immunology, Microbiology and Parasitology</b>	<p><b>CO1. Describe</b> the structural features of the components of the immune system as well as their functions, lymphoid organs, monoclonal antibody, structure of antibody, antigen antibody interaction.</p> <p><b>CO2. Define</b> the microbial diversity, microbial pathogenesis and</p> <p><b>CO3. Outline</b> different applications of microbiology.</p>

		<p><b>CO4. Describe</b> the concept of parasitism.</p> <p><b>CO5. Demonstrate</b> life cycle of economically important parasites of man and domestic animals with chart and specimens.</p>
Z-3034	<b>Reproductive biology</b>	<p><b>CO1. Describe and compare</b> structure and function of the male and female reproductive systems.</p> <p><b>CO2. Demonstrate</b> physiology of gametogenesis, embryogenesis, pregnancy, parturition and Lactation through theoretical and diagrammatic presentations.</p> <p><b>CO3. Define and describe</b> the endocrine, neuro-endocrine, and environmental factors that regulate reproduction.</p> <p><b>CO4. Formulate strategies</b> for the management of reproduction and fertility in animals.</p> <p><b>CO5. Assess</b> different assisted reproductive technologies.</p>
Z-3044	<b>Entomology and Aquatic Biology</b>	<p><b>CO1. Outline and describe</b> the economic importance of insects.</p> <p><b>CO2. Assess</b> different roles of insect as vectors, pest etc.</p> <p><b>CO3. Evaluate</b> the functional role of insects in ecosystem.</p> <p><b>CO4. Illustrate</b> concept of pest management with various applications.</p> <p><b>CO5. Describe</b> limnology, aquatic resources of Northeast India and outline major threats of freshwater ecosystem in Northeast India.</p>
Z-3056	<b>Integrative Biology (Open Programme)</b>	<p><b>CO1. Develop</b> a deep understanding of the molecular structures of atoms, molecules, and chemical bonds, as well as the stabilizing interactions involved in biological systems.</p> <p><b>CO2. Describe</b> the principles of catalysis, enzyme structure, kinetics, regulation, and mechanisms of enzyme catalysis.</p> <p><b>CO3. Explain</b> the conformational dynamics of nucleic acids, including different DNA structures (A-, B-, Z-DNA), tRNA, and microRNA.</p> <p><b>CO4. Describe</b> microbial growth, yield, characteristics, and strategies of cell division, as well as stress response mechanisms.</p> <p><b>CO5. Explain</b> cell signaling mechanisms, including hormone-receptor interactions, G protein-coupled receptor signaling, signal transduction pathways, second messengers, and regulation of signaling cascades.</p>
Z-3063	<b>Cell biology, Histology, Histochemistry, Immunology and Reproductive Biology-Practical Paper</b>	<p><b>CO1. Illustrate</b> techniques such as isolation of organelles (e.g., mitochondria) by differential centrifugation, staining, and observation using microscopy.</p> <p><b>CO2. Demonstrate</b> and explain the role of microtubules in vesicle transport, using fish chromatophores as a model system.</p> <p><b>CO3. Identify</b> DNA fragmentation in apoptotic cells, with enhanced understanding of the cellular and molecular events associated with programmed cell death.</p> <p><b>CO4. Apply</b> techniques for detecting apoptotic markers and interpreting the results in the context of cell biology and pathology.</p> <p><b>CO5. Analyze</b> of Blood Components including differential white blood cell count in mammalian blood samples.</p>