

GOVT. SERCHHIP COLLEGE
Estd. 1973
NAAC accredited B+
Affiliated to Mizoram University

COURSE OUTCOME

Website: gsc.edu.in

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| Department of BCA | | |
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| Course Code | Course Name | Course Outcome |
| BCA/1/CC/01 | English Language & Communication Skills | CO1. Explain the art of a professional business presentation. CO2. Evaluate different communication process and its practical application. CO3. Describe the concept of effective communication in a corporate world. CO4. Improves their grammatical skills. CO5. Develop confidence in all walks of life. |
| BCA/1/CC/02 | Basic Mathematics | CO1. Describe determinants and matrices. CO2. Recall various arithmetic and algebraic expressions method. CO3. Implement sequence and series mathematics in real life. |
| BCA/1/CC/03 | Introduction to Information Technology | Classify different types of data which are processed by computers. Select a storage unit appropriate for a given application. Describe how a CPU is interconnected with other units of a computer and cooperates with them to solve problems. Choose output devices for various typing/printing applications. Explain why programming languages are required. Explain the need to back up- databases to recover data resources lost or damaged due to accidents. Trace the evolution of the Internet and explain how it works. Select a search engine appropriate for searching requirements. Calculate the time required to download audio and video files. Protecting data stored in computer from vandals and thieves. Explore opportunities of employment in information technology. |
| BCA/1/CC/04 | Digital Computer Fundamentals | CO1. Demonstrate knowledge of different number systems and perform inter-conversions among them. CO2. Explain the basics of different binary codes and complements of numbers and solve associated problems. CO3. Solve problems relating to Boolean Algebra. |

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| | | <p>CO4. Design digital circuits with the help of Boolean algebra.</p> <p>CO5. Solve problems relating to binary arithmetic.</p> <p>CO6. Explain the concept of digital logic gates and implement Boolean functions using logic gates.</p> <p>CO7. Design basic circuits in combinational logic.</p> <p>CO8. Design basic circuits in sequential logic.</p> |
| BCA/1/CC/05 | PC Applications & Internet Technology Lab | <p>CO1. Perform various windows basic commands.</p> <p>CO2. Construct their own website.</p> <p>CO3. Incorporate various windows basic and scripting commands in real life situation.</p> |
| BCA/1/CC/06 | Office Automation Lab | <p>CO1. Design documentation template.</p> <p>CO2. Describe accounting operations.</p> <p>CO3. Create and design a spread-sheet</p> <p>CO4. Explain the steps to perform presentation skills.</p> <p>CO5. Categorize a different database operations.</p> <p>CO6. Explain the concept of data & files management.</p> |
| BCA/2/CC/07 | Personality and Soft Skills Development | <p>CO1. Formulate problem solving skills.</p> <p>CO2. Make appropriate and responsible decisions</p> <p>CO3. Construct effective communication skills (spoken and written) presentation skills.</p> <p>CO4. Differentiate effective business correspondence and prepare business reports which produce results.</p> <p>CO5. Plan a strategy to become self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills.</p> <p>CO6. Design a broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.</p> |
| BCA/2/CC/08 | Discrete Mathematics | <p>CO1. Describe the basic discrete structures such as numbers, sets, used in computer science.</p> <p>CO2. Describe the uses of determinant and matrices.</p> <p>CO3. Relate number system for real life project.</p> <p>CO4. Demonstrate a working knowledge definite and indefinite integrals.</p> |
| BCA/2/CC/09 | Programming Language through C | <p>Demonstrate an understanding of computer programming language concepts.</p> <p>Design and develop computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.</p> |

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| | | <p>Differentiate data types and use them in simple data processing applications. Explain union and enumeration user defined data types. Develop confidence for self-education and ability for life-long learning needed for computer language.</p> |
| BCA/2/CC/10 | Accounting and Financial Management | <p>CO1. Explain the fundamental accounting concepts, conventions & terminologies. CO2. Describe the importance, functions & objectives of books of entry, subsidiary books, bank reconciliation statement and final accounts. CO3. Construct a step to prepare books of entry, subsidiary books, bank reconciliation statement and final accounts using double entry book keeping. CO4. Invent the errors located in books of entry & subsidiary books.</p> |
| BCA/2/CC/11 | Programming in C Lab | <p>Write the C program for a given task or algorithm. Read, understand and trace the execution of programs written in C language. Implementing C programs using arrays, pointers, decision making statements and looping statements. Write programs that perform operations using derived data types.</p> |
| BCA/2/CC/12 | Tally ERP 9.0 Lab | <p>CO1. Describe the need of tally software in private or government organization. CO2. Design a method to backup and restore a company data. CO3. Solve the required tax and GST for a company.</p> |
| BCA/3/CC/13 | Operating Systems | <p>CO1. Describe different types of operating systems along with concept of file systems and CPU scheduling algorithms. CO2. Explain memory management and deadlock handling algorithms. CO3. Implement algorithms required for management, scheduling, allocation & communication used in operating system. CO4. Justify the key mechanisms in design of operating systems modules. CO5. Explain process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks.</p> |
| BCA/3/CC/14 | Data Structure using C | <p>Understand the major techniques for implementing the fundamental data types (linked lists, binary search trees, hashing, heaps, etc.) and implement several of them. Know the strength and weakness of different data structures. Use the appropriate data structure in context of solution of given problem. Develop programming skills which require solving given problem. Describe common applications for arrays, records, linked structures, stacks, queues, trees</p> |

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| | | <p>and graphs. Write programs that use arrays, records, linked structures, stacks, queues, trees and graphs. Demonstrate different methods for traversing trees. Apply algorithm for solving problems like sorting, searching, insertion and deletion of data.</p> |
| BCA/3/CC/15 | Database Management Systems | <p>CO1. Identify scenarios where the use of file system will be more profitable over database management system and vice versa. CO2. Design database systems using E-R model. CO3. Perform normalization operations on tables. CO4. Query a database using relational algebra. CO5. Use SQL with proper understanding of its characteristics and advantages. CO6. Describe the importance of security and integrity in DBMS and the corresponding steps to ensure them. CO7. Identify the possible causes of database failure and rectify them. CO8. Solve back -up related problems.</p> |
| BCA/3/CC/16 | Computer Organization and Architecture | <p>CO1. Explain different micro-operations, the concept of register transfer language and memory transfer. CO2. Design a simple bus using multiplexers or three-state buffer. CO3. Write simple computer instructions . CO4. Explain the design of a basic computer CO5: Describe the organization and architecture of the CPU with an emphasis on the user's view of the computer. CO6. Explain the techniques that computers use to communicate with input and output devices. CO7. Compare the different modes of data transfer. CO8. Describe the memory hierarchy. CO9. Explain the organization and operation of associative memories.</p> |
| BCA/3/CC/17 | Oracle Lab | <p>CO1. Explain the steps to handling large database. CO2. Create his/her own database and practice various database commands. CO3. Write a method to implement basic DDL, DML and DCL commands. CO4. Describe data selection method and functions of operators used in queries and restrict data retrieval and control the display order.</p> |

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| | | CO5. Write sub queries, aggregate and understand their purpose. CO6. Join multiple tables using different types of joins. |
| BCA/3/CC/18 | Data Structure using C Lab | CO1. Design and analyse the time and space efficiency of the data structure. CO2. Identify the appropriate data structure for given problem. CO3. Describe the practical needs of applications of data structures. |
| BCA/4/CC/19 | Environment and Ecology | CO1. Describe the fundamental physical and biological principles that govern natural processes. CO2. Relate the natural environment as a system and how human activities affect the system CO3. Predicts the benefits of environment. CO4. Design environmental resource management process and describe sustainability conflicts from multiple perspectives. CO5. Analyze and integrate the social and natural sciences to understand diverse environmental. |
| BCA/4/CC/20 | Web Programming | CO1. Explain the history of the internet and related internet concepts that are vital in understanding web development. CO2. Describe the insights of internet programming and implement complete application over the web. CO3. Design a web site by using PHP, MySQL, JavaScript and Java. |
| BCA/4/CC/21 | Computer Networking- I | CO1. Identify the different components in a communication system and their respective roles. CO2. Explain the technical issues related to different types of network and configuration of the network devices. CO3. Design the common technologies available in establishing LAN infrastructure. CO4. Explain different layers and protocols, master IP –addressing and about network security issues. |
| BCA/4/CC/22 | Object Oriented Programming in C++/Java | Describe the structure and model of the Java programming language. Explain the use of Java programming language for various programming technologies. Develop software in the Java programming language. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements. Design the use of certain technologies by implementing them in the Java programming |

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| | | <p>language to solve the given problem.</p> <p>Design an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems.</p> |
| BCA/4/CC/23 | Web Programming using PHP Lab | <p>CO1. Describe the function of a server.</p> <p>CO2. Explain the various steps in designing creative and dynamic website.</p> <p>CO3. Write HTML, JavaScript, CSS and PHP.</p> <p>CO4. Write the scripting language using PHP, JavaScript and Java.</p> <p>CO5. Describe the hierarchy of object oriented programming.</p> |
| BCA/4/CC/24 | C++/Java Programming Lab | <p>CO1. Explain the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.</p> <p>CO2. Solve, compile, test and run Java programs comprising more than one class, to address a particular software problem.</p> <p>CO3. Describe the principles of object oriented programming.</p> |
| BCA/5/CC/25 | Software Engineering-I | <p>CO1. Describe the software product and process, lifecycle models, software characteristics, components and applications, methods and tools.</p> <p>CO2. Classify the software development paradigms.</p> <p>CO3. Extract and analyse software requirements specifications for different projects.</p> <p>CO4. Design some basic level of software architecture/design and apply standard coding practices.</p> <p>CO5. Describe management concepts like cost estimation, scheduling and reviewing the progress and identify and implement of the software metrics.</p> <p>CO6. Apply different testing and debugging techniques and analysing their effectiveness.</p> |
| BCA/5/CC/26 | Computer Graphics | <p>CO1. Explain the real graphics programming language.</p> <p>CO2. Describe a number of problems and topics drawn from computer graphics, and explores them through the lens of dynamic geometry software.</p> <p>CO3. Differentiate between the 2D and 3D computer graphics.</p> <p>CO4. Use geometric transformations on graphics objects and their application in composite form.</p> <p>CO5. Justify a number of problems and topics drawn from computer graphics.</p> <p>CO6. Extract scene with different clipping methods and its transformation to graphics display device.</p> |
| BCA/5/CC/27 | GUI Programming | <p>CO1. Describe the working environment of visual basics using a control structure.</p> |

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| | | <p>CO2. Relate the module, components and menu editor and its concept in a simple manner.</p> <p>CO3. Describe the functions of controls such text box, rich text box and etc...write coding easily.</p> <p>CO4. Develop the project with database using ODBC, DAO, ADO and visual data manager include the active controls and other control to perform particular task.</p> |
| BCA/5/EC/28 | Elective-I (a) Cloud Computing | <p>CO1. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.</p> <p>CO2. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.</p> <p>CO3. Explain the core issues of cloud computing such as security, privacy and interoperability.</p> <p>CO4. Synthesize the appropriate cloud computing solutions and recommendations according to the applications used.</p> <p>CO5. Generate new ideas and innovations in cloud computing.</p> <p>CO6. Describe the underlying principle of cloud virtualization, cloud storage, data management and data visualization.</p> <p>CO7. Explain different cloud programming platforms and tools to generate new ideas and innovations in cloud computing.</p> |
| | (b) E-commerce and E-governance | <p>CO1. Describe the basic scope and concepts, terminology and technology of e-commerce/e-government.</p> <p>CO2. Describe electronic market and market place and understand business models.</p> <p>CO3. Prioritize legal issues, threats of e-commerce, the policy and social issues facing agencies in implementing e-government initiatives.</p> <p>CO4. Explain the concepts of preparing e-government proposals, plans or strategies.</p> |
| | (c) IT Act and Cyber Laws | <p>CO1. Analyse and evaluate the cyber security needs of an organization.</p> <p>CO2. Determine and analyse software vulnerabilities and security solutions to reduce the risk of exploitation.</p> <p>CO3. Examine the performance and troubleshoot cyber security systems.</p> <p>CO4. Describe cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.</p> <p>CO5. Execute risk management processes, risk treatment methods, and key risk and performance indicators.</p> |

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| | | CO6. Design and develop a security architecture for an organization, operational and strategic cyber security strategies and policies. |
| BCA/5/CC/29 | Minor Project | CO1. Explain acquired knowledge within the chosen area of technology for project development. CO2. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. CO3. Reproduce, improve and refine technical aspects for engineering projects. CO4. Work as an individual or in a team in development of technical projects. CO5. Communicate and report effectively project related activities and findings. |
| BCA/5/CC/30 | Programming with VB.NET Lab | CO1. Describe .NET framework and some of the major enhancements to the new version of visual basic. CO2. Explain the basic structure of a visual basic.NET project and use main features of the integrated development environment (IDE). CO3. Create applications using Microsoft Windows® Forms. CO4. Create applications that use ADO. NET. CO5. Work with XML documents, crystal reports. |
| BCA/6/EC/31 | Elective-II (a) Software Engineering-II | CO1. Choose the appropriate method according to the project objectives. CO2. Describe the importance of object orientation in software engineering. CO3. Explain the techniques of object oriented analysis, design and testing. CO4. Schedule the project life time. CO5. Utilize necessary diagram for software project. |
| | (b) Software Project Management | CO1. Describe the SDLC and basic architecture SRS documents. CO2. Restate the software design and coding techniques. CO3. Describe the software testing principles. CO4. Describe the concept of project management, management and organization of a team. |
| | c) Management Information System | CO1. Explain complex software within the context of business user needs through training presentation and written documentation. CO2. Distinguish relationships between programming language and information system. CO3. Describe the concept of data processing and decision making. CO4. Plan and manage project implementation. |
| BCA/6/EC/32 | Elective III | CO1. Explain the fundamental concepts, benefits and problem areas associated with data |

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| | (a) Data Warehousing | <p>warehousing.</p> <p>CO2. Explain the various architectures , infrastructures and main components of a data warehouse.</p> <p>CO3. Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.</p> <p>CO4. Compare and contrast OLAP and data mining as techniques for extracting knowledge from a data warehouse.</p> <p>CO5. Implement data mining techniques like clustering, association rule and decision tree etc on the real data set.</p> |
| | (b) Computer Networking –II | <p>CO1. Explain how communication works in computer networks and to understand the basic terminology of computer networks.</p> <p>CO2. Describe the role of protocols in networking and to analyse the services and features of the various layers in the protocol stack.</p> <p>CO3. Design issues in network security and understand security threats, security services and mechanisms to counter.</p> |
| | (c) Mobile Computing | <p>CO1. Relate the students with the buzz words and technology of mobile communication.</p> <p>CO2. Explain the GSM architecture.</p> <p>CO3. Describe the issues relating to wireless applications.</p> <p>CO4. Describe the concept of mobile payment system.</p> |
| BCA/6/CC/33 | Major Project | <p>Undertake problem identification, formulation and solution.</p> <p>Demonstrate skills, abilities and specialization.</p> <p>Solve real life problems related to industry, academic institutions and research.</p> |

Department of BOTANY

| Course Code | CourseName | Course Outcome |
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| BOT/I/EC/01 | Cryptogams | <p>CO1. Classify various groups of cryptogams-Algae, Fungi, Bryophytes and Pteridophytes.</p> <p>CO2. Differentiate various types of algae belonging to the family- Chlorophyceae, Xanthophyceae, Rhodophyceae, Phaeophyceae and Cyanophyceae.</p> <p>CO3. Explain the structure, reproduction and life history of algae such as Volvox, Oedogonium, Ectocarpus, Polysiphonia and Nostoc .</p> <p>CO4. Discuss the characteristics of different classes of the fungi- Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina.</p> <p>CO5. Explain the structure, reproduction and life history of Rhizopus, Peziza, Puccinia, Alternaria.</p> <p>CO6. Classify the different classes of Bryophytes- Hepaticopsida, Anthocerotopsida, Bryopsida.</p> <p>CO7. Discuss the different thallus structure, reproduction and life history of Marchantia, Anthoceros, Funaria.</p> <p>CO8. Explain the general characteristics of various classes of Pteridophytes and different types of stele.</p> <p>CO9. Explain the morphology, reproduction and life history of Psilotum, Selaginella and Pteris.</p> |
| BOT/I/EC/02 | Cryptogams (Practical) | <p>CO1. Dissect and explain the vegetative and reproductive structures of different classes of Algae.</p> <p>CO2. Dissect and explain the vegetative and reproductive structures of different classes of fungi.</p> <p>CO3. Dissect and explain the vegetative and reproductive structures of Marchantia, Anthoceros and Funaria.</p> <p>CO4. Dissect and explain the vegetative and reproductive structures of Psilotum, Selaginella and Pteris.</p> |
| BOT/II/EC/03 | Phanerogams | <p>CO1. Discuss the general characteristics of gymnosperms and classify them.</p> <p>CO2. Explain the morphology and reproduction in different genus of gymnosperms such as – Cycas, Pinus and Gnetum.</p> <p>CO3. Classify angiosperms using Bentham and Hooker's system of classification.</p> <p>CO4. Distinguish the different taxonomic characters of plants belonging to angiospermic families.</p> <p>CO5. Explain the anatomical structure of stem, leaf and roots.</p> <p>CO6. Explain the anomalous secondary growth in Mirabilis, Bignonia and Draceana.</p> <p>CO7. Explain the embryology of angiospermic plants.</p> <p>CO8. Discuss the important relationship between plants and humans. i.e., the ways humans use plants for</p> |

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| | | food, medicines, and commerce. |
| BOT/II/EC/04 | Phanerogams (Practical) | CO1. Dissect and explain the vegetative and reproductive structures of Cycas, Pinus, Gnetum. CO2. Dissect and explain the taxonomic characters of plants belonging to angiospermic families. CO3. Discuss clear observation on dicot and monocot embryo. CO4. Dissect and explain the anatomy of stem, root and leaf. CO5. Dissect and explain the anomalous secondary growth in plants. |
| BOT/III/EC/05 | Plant Physiology, Biochemistry, Ecology | CO1. Discuss important topics under plant physiology such as water potential, transport of solutes and photosynthetic reactions. CO2. Explain the topics involving plant respiration and nitrogen metabolism. CO3. Explain the topics regarding enzymes and plant growth hormones. CO4. Discuss the very important basic topics of life science i.e., amino acids, protein synthesis, DNA and lipids. CO5. Explain the various topics under ecology such as environments and environment factors, population characteristics, community characteristics, ecosystem structure, ecosystem function, types and pattern of ecological succession, causes and control of air and water pollution. |
| BOT/III/EC/06 | Plant Physiology, Biochemistry, Ecology (Practical) | CO1. Determine the osmotic potential of cell sap by plasmolytic method and estimate the respiratory quotients (R.Q) by Ganong's respirometer. CO2. Know about root nodules with reference to biological nitrogen fixation. CO3. Determine soil pH, moisture and temperature. CO4. Explain the structure of plant community by determining frequency, density and abundance by quadrat method. |
| BOT/IV/EC/07 | Microbiology, Cytology, Genetics, Evolution | CO1. Know the history and scope of microbiology, explain the structure of a bacterial cell on account of genetic recombination and classify them. CO2. Explain the structure of bacteriophages and life cycles such as Lysogenic and lytic cycles. CO3. Interpret the role of microorganisms in cycling of carbon and nitrogen, in the production of alcoholic beverages, antibiotics, fermented foods, production of enzymes and as biofertilizers. CO4. Explain the complete ultrastructure of plant cell, cell cycle, Mendel's laws of inheritance and deviations from Mendel's laws (Neo-Mendelism). CO5. Discuss the interaction of genes such as intragenic and intergenic interactions, incomplete dominance, lethal genes, complementary genes, duplicate genes and epistatic genes. CO6. Explain the topics under genetics involving interrelationships and importance of linkage and crossing over, connect crossing over and meiosis, understand the cytological basis of crossing over, crossing over and |

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| | | linkage maps. CO7. Explain sex determination involving topics such as chromosome theory of sex determination. CO8. Clarify the theories of organic evolution such as Lamarckism, Darwinism and de Vries mutation theory. |
| BOT/IV/EC/08 | Microbiology, Cytology, Genetics, Evolution (Practical) | CO1. Explain the different stages of cell division under mitosis and meiosis using onion root tip cultures and permanent slides respectively. CO2. Separate amino acids by paper chromatography. CO3. Demonstrate monohybrid using seed samples. CO4. Interpret the different types of bacteria by viewing permanent slides. CO5. Explain the chromosome structure and aberrations from permanent slides. |
| BOT/V/CC/09 | Fungi, Plant pathology, Biostatistics | CO1. Classify fungi- using Ainsworth's system and their general features, structure, reproduction and types of spores and liberation. CO2. Explain the fungi- nutrition, evolutionary trends, heterothallism and para-sexuality and economic importance. CO3. Tell the history, scope, interaction, transmission and control of plant pathology. CO4. Differentiate diseases: symptoms, cycle and control measures of various plant pathogens. CO5. Analyse statistically - mean, median, mode, standard deviation and error, co-relation, coefficient of variation and test of significance: t-test and chi-square test. |
| BOT/V/CC/10 | Fungi, Plant pathology, Biostatistics (Practical) | CO1. Classify the vegetative and reproductive structure of each class of fungi. CO2. Prepare disease specimen by temporary preparations and permanent slides. CO3. Analyse biostatistics of t- test and chi- square test. CO4. Prepare fungal media (PDA) and sterilize the process. CO5. Isolate the pathogens from diseased leaf. |
| BOT/V/CC/11 | Algae, Lichen, Bryophytes | CO1. Classify algae using Fritsch's system and explain the general characteristics, pigmentation, storage products, spores, resting phases and flagellation. CO2. Differentiate the reproduction, life history, alternation of generation and explain the economic importance of Chlorophyceae, Phaeophyceae, Rhodophyceae and Cyanophyceae. CO3. Explain distribution, general characteristics, types, reproduction and economic importance of lichens. CO4. Discuss the general features and classification of Bryophyta (Smith's system) and a comparative study of life histories of Riccia, Peltia, Sphagnum and Polytrichum. CO5. Discuss bryophytes: origin, evolution of sporophyte and a comparative structure of antheridia and archegonia. |

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| BOT/V/CC/12 | Algae, Lichen, Bryophytes (Practical) | CO1. Differentiate the vegetative and reproductive structure of Anabaena, Volvox, Oedogonium, Chara, Ectocarpus, Polysiphonia. CO2. Differentiate the vegetative and reproductive structure of Riccia, Pellia, Sphagnum and Polytrichum. CO3. Differentiate the vegetative and reproductive structure of Lichens. CO4. Identify bryophytes permanent fossil slides. |
| BOT/VI/CC/13 | Cytogenetics, Plant Breeding, Bioinformatics | CO1. Learn the Structure and chemical composition of chromosome; Cytoskeleton; Chromosome structural aberrations: Deletion, duplication, inversion, translocation, cytological and genetical consequences. CO2. Gain the knowledge of Numerical changes in chromosome: Aneuploidy: monosomics, trisomics, nullisomics, polyploidy: utopolyploidy, allopolyploidy, segmental allopolyploidy, autoallopolyploidy, sources and consequences of chromosomal anomalies CO3. Gain ideas on Concept and components of karyotype, karyotype in systematics and evolution of species; Mapping of genes on chromosomes: Physical and Genetic maps, multiple allelism, Self sterility in plants, quantitative inheritance: enhancer and suppresser genes; Non-Mendelian inheritance and organellar genetics: plastid inheritance in Mirabilis jalapa, kappa particles in Paramecium. Cytoplasmic male sterility. CO4. Differentiate the types of mutation, molecular basis of mutation, physical and chemical mutagens and mechanism of their action; Heterosis, theories of hybrid vigour; Plant breeding: principles; pureline and mass selection; Technique and procedure of Hybridization CO5. Learn Bioinformatics: Basic concept about data and information (binary, bits and bytes); Biological data base (DNA and protein data); Introduction to BLAST, search tools; DNA sequence, alignment and analysis. |
| BOT/V/CC/14 | Cytogenetics, Plant Breeding, Bioinformatics (Practical) | CO1. Learn the dihybrid ratio using seed samples. CO2. Estimate RNA and DNA using Calorimeter. CO3. Study the general techniques in plant breeding, emasculation and bagging. CO4. Study of polyploidy in onion root tip by colchicine treatment. CO5. Gain information on Internet browsing for scientific repositories |
| BOT/V/CC/15 | Environmental Biology, Ethnobotany | CO1. Learn the `concept of biosphere; Dynamic nature of environment and interactions among various environmental factors; Renewable and Non renewable natural resources; Biogeochemical cycles; Biological diversity – Concept of level and Indices (Shannons,Shimson dominance index). CO2. Acquire knowledge about Greenhouse effect; Acid rain; Ozone layer depletion; Photochemical smog Non biodegradable pollutants and biomagnification; Radioactive waste management CO3. Gain the awareness for the need of conservation of soil and water resources; Biodiversity loss and ex- |

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| | | situ and in-situ conservation; Environmental Laws and Acts; IPR and Patent. CO4. Thorough with Endemism; Hotspots; Phytogeographical division of India; Vegetation types of India. CO5. Learn the Ethno botany: Scope in India; Ethno botany with special reference to food, fruit, fodder, fiber and medicinal plants. |
| BOT/V/CC/16 | Environmental Biology Ethnobotany (Practical) | CO1. Explore the National Park/Sanctuary. CO2. Determine the B.O.D of different water samples. CO3. Determine the soil organic matter content by Walkley and Black's rapid titration method. CO4. Learn the ethno botanically important specimens. CO5. Submit a project report based on any topic mentioned in the theory paper. |
| BOT/VI/CC/17 | Pteridophytes, Gymnosperms, Palaeobotany, Palynology | CO1. Compare the morphology, anatomy, reproduction, and life histories of Adiantum, Ophioglossum, Marselia. characteristics, distribution of Rhynia, Lepidodendron and Calamites. CO2. Classify gymnosperms and learn the general account of morphology and reproduction of the following: Ginkgoales (Ginkgo), Coniferales (Taxus) and Gnetales (Ephedra). CO3. Learn the distribution of living gymnosperms in India; phylogenetic trends in gymnosperms; structure and evolution of ovule; general account of archegonia (without development); economic importance of gymnosperms. CO4. Gain knowledge on Paleobotany: fossil: formation and types; geological time scale; main characters of Pteridospermales; Gondwana flora; features of Lyginopteris; Cordaites. CO5. Learn Palynology: pollen production; dispersal in time and space; pollen/spore morphology and its role in taxonomy; pollen allergy. |
| BOT/VI/CC/18 | Pteridophytes, Gymnosperms, Palaeobotany, Palynology (Practical) | CO1. Learn morphology and reproductive structure of Adiantum, Ophioglossum, Marselia. CO2. Study of permanent fossil slides of Rhynia, Lepidodendron, Calamites. CO3. Differentiate the morphology and reproductive structure of Ginkgo, Cedrus and Gnetum. CO4. Familiar with permanent fossil slides of Lyginopteris, and Cordaites. CO5. Study the permanent slides of pollen. |
| BOT/VI/CC/19 | Angiosperm taxonomy, Anatomy, Embryology | CO1. Recognized the major groups of vascular plants and their phylogenetic relationships. CO2. Gain proficiency in the use of key and identification manuals for identifying any unknown plants species. CO3. Gain knowledge about plant cells, tissue and their function. CO4. Make connection between plant anatomy and the other major disciplines of biology CO5. Know the structure and development of monocot and dicot embryos. |

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| | | CO6. Understand megasporogenesis, fertilization, endosperm and embrogeny. |
| BOT/VI/CC/20 | Angiosperm taxonomy, Anatomy, Embryology (Practical) | CO1. Know how to prepare herbarium. CO2. Know the morphology and reproductive structure of angiospermic plants belonging to the different families. CO3. Understand the anomalous secondary growth in some species. CO4. Know the ecological adaptations in hydrophytes and xerophytes. CO5. Dissect the endosperm, embryo and understand the germination of pollen grains. |
| BOT/VI/CC/21 | Plant Metabolism, Biochemistry, Thermodynamics | CO1. Understand the processes and or steps involved in the biosynthesis of starch, cellulose and lipids. CO2. Understand the concept and the various steps involved in nitrogen metabolism from Nitrogen fixation (including the different types of N ₂ fixation) to the synthesis of amino acids and associated terminologies and concepts such as nitrification, ammonification and nitrogen assimilation will also be understood. CO3. Students will also gain knowledge on the biosynthesis of purine and pyrimidines and learn the mechanism of DNA replication. CO4. Achieve knowledge on the basics of protein structure and its biosynthesis, Enzymes and the mechanism of action, types and enzyme kinetics. CO5. Distinguish Plant Growth Hormones and Plant Growth Regulators and also understand the biosynthesis and mode of action of Auxins, Gibberellins, Cytokinins, Abscisic acid and Ethylene CO6. Explain the mechanisms of photosynthesis, photosynthetic apparatus, harvestation of light energy, reaction centers, cyclic and non-cyclic electron transport in photosynthesis, ATPase and its mode of action, chemo-osmotic theory of ATP synthesis, C ₂ cycle and pentose phosphate pathway. CO7. Have the knowledge on the first, second and third laws of thermodynamics and understand the concept of internal and free energy, enthalpy and entropy change. |
| BOT/VI/CC/22 | Plant Metabolism, Biochemistry, Thermodynamics (Practical) | CO1. Have acquired the knowledge and skills in the preparation of protein standard curve and estimation of soluble protein in plant material by Bradford test. CO2. Independently handle and conduct a study of transpiration rate in dorsiventral leaves by Garreau's potometer. CO3. To study on his/ her own, the effect of light and carbon dioxide concentration on the rate of photosynthesis using bubble count method. CO4. Learn the principles of extraction and chromatography and perform the extraction and separation of plant pigments by classical paper chromatographic method. CO5. To learn and conduct an experiment on the effect of temperature and substrate concentration on urease |

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| | | activity. |
| BOT/VI/CC/23 | Plant Biotechnology, Experimental Embryology | <p>CO1. Have acquired the knowledge on the various tools and techniques employed in biotechnology such as cloning vectors, restriction enzymes, ligases, methylase; recombinant DNA techniques.</p> <p>CO2. The basic principles and applications of polymerase chain reaction will also be understood by the students.</p> <p>CO3. Have the knowledge on the enzymes used in molecular cloning and reporter gene in plants.</p> <p>CO4. Learn the working principles and applications of gene gun method and the technique agro bacterium mediated transformation and the methodologies and principles employed in transgenic plant production.</p> <p>CO5. Understand the technique of plant cell culture, tissue and organ culture.</p> <p>CO6. Have the knowledge on the various aspects of synthetic seeds and cryo-preservation.</p> <p>CO7. Know what nutrient media is including the types and composition of nutrient media. The various sterilization techniques and knowledge on development of protocols, concept of ex-plants and Totipotency will be understood by student.</p> <p>CO8. The scope and importance of Biotechnology in agriculture especially in the production of transgenic cotton, tomato, golden rice, plantibodies will be learned by students.</p> <p>CO9. Achieved knowledge on the principles and techniques of micropropagation; somatic embryogenesis, isolation and culture of protoplast, protoplast fusion, cybrid, embryo culture.</p> |
| BOT/VI/CC/24 | Plant Biotechnology, Experimental Embryology (Practical) | <p>CO1. Learn tissue culture techniques and able to prepare, independently, MS (1962) and Nistch (1969) media.</p> <p>CO2. Learn the various genetic engineering techniques through photographs.</p> <p>CO3. Be able to demonstration and practically perform Southern, Northern and Western blotting technique.</p> <p>CO4. Acquire the knowledge through photographic images, the steps and or processes in the production Bt cotton, golden rice.</p> <p>CO5. Be able to submit a project report based on any topic mentioned in the theory paper.</p> |
| Programme Outcome | | <p>PO1. Core Competency: Students will acquire core competency in the subject Botany. The students are expected to know the fundamental concept and knowledge of Botany, which will reflect the clear understanding in the field of Plant Physiology, Biochemistry, Ecology, Microbiology, Cytology, Genetics, Evolution, Plant pathology, Biostatistics, Cryptogams, Cytogenetics, Plant Breeding, Bioinformatics, Environmental Biology, Ethnobotany, Paleobotany, Palynology, Angiosperm taxonomy, Anatomy, Embryology, Plant Biotechnology and Experimental Embryology.</p> <p>PO2. Intellectual skills: Students will acquire knowledge and ideas, will be able to develop, plan, conduct and write on the course topics.</p> |

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| | <p>PO3. Practical Skills: Students learn to carry out work in the field as well as in the laboratory. They will be able to:</p> <p>Interpret plant morphology, anatomy and taxonomy.</p> <p>Analyze Bioinformatics and Statistical data using statistical method and computer technology.</p> <p>Analyze Physiochemical, Physiology, Molecular Biology, Biotechnology and Biochemical experiments.</p> <p>Identify and isolate the plant pathogens.</p> <p>PO4. Scientific Knowledge: Apply knowledge of basic science, plant science and fundamentals of plant process and analysis.</p> <p>PO5. Problem Analysis: Students will be able to identify and classify the plants taxonomically under methods of nomenclature system.</p> <p>PO6. Modern Tool Usage: Students will be able to use modern equipment's and instruments for Biochemical Estimation, Molecular Biology, Plant biotechnology, and Bioinformatics.</p> <p>PO7. Environment and Sustainability: They will be able to give importance and take action in the field of biological diversity and sustainable development.</p> <p>PO8. Life Long Learning: Students will recognize the need and importance of education and enable to have live long learning and confidence.</p> |
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| Course Code | Course Name | Course Outcome |
| CHEM/I/EC/01 | Inorganic Chemistry-I | <p>CO1. Describe the basics of atomic structures using de-Broglie's relation and Heisenberg uncertainty principle.</p> <p>CO2. Explain Schrodinger wave equation, probability distribution curve & atomic orbitals in terms of quantum numbers.</p> <p>CO3. State Aufbau Principle, Pauli's Exclusion Principle & Hund's rule of maximum multiplicity.</p> <p>CO4. Explain effective nuclear charge and shielding effect & the shape of s, p and d-orbitals.</p> <p>CO5. Summarize the general features and properties of the long form of periodic table.</p> <p>CO6. Interpret periodic trends and their logical connections with reference to s and p-block elements based on the knowledge of atomic radii, ionization energy, electron affinity & electronegativity.</p> <p>CO7. Implement the electronic concept of oxidation, reduction and oxidation number to solve its related problems and apply ion-electron methods to solve simple redox reactions.</p> <p>CO8. Describe basic concept of ionic bond, covalent bond, coordinate bond & identify ionic character, polarity in covalent compounds and explain bond moment and dipole moment.</p> <p>CO9. Apply the concepts of hybridization and predict the orientation of hybrid orbitals.</p> <p>CO10. Apply the knowledge of VSEPR theory to simple molecules and ions.</p> <p>CO11. Explain hydrogen bonding and its effect on melting points and boiling points.</p> <p>CO12. Define different terms involved in coordination chemistry and explain the important postulates of Werner's theory and IUPAC nomenclature of coordination compounds.</p> <p>CO13. Describe EAN, chelate and its effect, ligands and its classification.</p> <p>CO14. Interpret stereochemistry of complex compounds with coordination number 4 & 6 based on the knowledge of isomerism.</p> <p>CO15. Define units of radioactivity and state group displacement law.</p> <p>CO16. Explain radioactive disintegration theory, radioactive equilibrium, artificial radioactivity, half-life and average-life period and solve its related problem.</p> <p>CO17. Explain neutron-proton ratio in a nucleus and their implications.</p> <p>CO18. Discuss the comparison and relationship between packing fraction, mass defect and nuclear binding energy.</p> |

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| | | CO19. Explain magic number concept and the elementary ideas of fission, fusion, controlled fission reactions and nuclear reactors. |
| CHEM/I/EC/02 | Inorganic Chemistry – I (Practical) | CO1. Identify the unknown radicals/ions from a mixture of inorganic compounds. CO2. Prepare standard solutions of different molarity/normality of titrants. CO3. Estimate carbonate and hydroxide present together in mixture. CO4. Estimate carbonate and bicarbonate present together in a mixture. |
| CHEM/II/EC/03 | Organic Chemistry – I | CO1. Explain the importance of electron-displacement effects in reaction mechanisms, the terms involved in it and compare electrophiles and nucleophiles. CO2. Describe the stability of reactive intermediates in relation with energy considerations. CO3. Explain hydrogen bonding and its effect on melting points and boiling points CO4. Describe the structure, molecular orbital picture, stability of benzene ring, its resonance energy, Huckel rule and its application. CO5. Explain nuclear and side-chain halogenation, the electrophilic and nucleophilic substitution in aromatic halogen compounds. CO6. Analyze the structure and chemical reactivity of carbonyl group and describe the nucleophilic additions and addition-elimination reaction mechanism of carbonyl compound. CO7. Explain the acidic character and physical properties of phenol and the chemical reactions. CO8. Analyze the substituent effects on acidity, chemical reactivity and methods of preparation of carboxylic acids and their derivatives. CO9. Describe the basicity, substituent effects on basicity, chemical reactivity of aliphatic and aromatic amines & distinguish between of 1O, 2O and 3O amines. CO10. Define base, nucleophile, ambident nucleophile, SN1, SN2 and SNi. CO11. Describe the factors affecting substitution reactions, mechanism and stereochemistry of substitution reactions. CO12. Explain the orientation in elimination reactions by applying Saytzeff's and Hofmann's rule. |
| CHEM/II/EC/04 | Organic Chemistry – I (Practical) | CO1. Analyzed the unknown organic compounds containing functional group quantitatively. CO2. Detect different elements (N, Cl, Br, I, S). CO3. Detect different functional group (COOH, NH2, NO2, OH (phenolic) & CO (carbonyl group) and amide). CO4. Prepare different derivatives. |
| CHEM/III/EC/05 | Physical Chemistry – I | CO1. Explain the kinetic molecular model of a gas and deviation from Ideal behaviour (causes). CO2. Derive and explain kinetic gas equation (KGE) and its variation with pressure for different |

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| | | <p>gases.</p> <p>CO3. Derive Van der Waal's equation of state and evaluate critical constant from Van der Waal's equation.</p> <p>CO4. Describe compressibility factor (Z), the critical compressibility factor (Z_c), Law of Corresponding states & Boyle temperature.</p> <p>CO5. Explain the elementary structure and types of liquid crystals, the vacancy theory of liquid & free volume in liquid.</p> <p>CO6. Discuss physical properties of liquids viz., surface tension, viscosity & refraction, the effect of temperature on surface tension & viscosity.</p> <p>CO7. Define refraction index, specific refraction & molar refraction .</p> <p>CO8. Prepare colloids and classify them & explain Peptization, Bredig's and condensation methods.</p> <p>CO9. Explain the optical properties of colloids-Tyndall effect, the origin of charge on colloidal particles, protective colloids and gold number.</p> <p>CO10. Distinguish between physisorption & chemisorptions; and explain molar enthalpy of adsorption.</p> <p>CO11. Differentiate Langmuir, Freundlich & Gibbs adsorption isotherms.</p> <p>CO12. Explain the dissociation equilibria of weak electrolytes, dissociation constant of weak acids (K_a), ionic product of water(K_w) and hydrolysis constant (K_h).</p> <p>CO13. Explain hydrogen ion concentration and pH scale, buffer solutions & buffer activity, Henderson- Hasselbach equations for acidic & basic buffers.</p> <p>CO14. Derive the hydrolysis between K_a, K_w and K_h, the hydrolysis constant for salts of –i) strong acid and weak base, ii) weak acid and strong base and iii) weak acid and weak base.</p> <p>CO15. State the 2nd law of thermodynamics & explain the limitations of the first law and the need of the second law.</p> <p>CO16. Explain Carnot's cycle and the efficiency of Carnot's engine.</p> <p>CO17. Explain the concept of entropy, entropy change for an ideal gas with (i) T & V (ii) T & P & (iii) Entropy change for reversible and irreversible processes.</p> <p>CO18. Discuss the relationship between entropy (S), probability (W) and solve the related problem.</p> |
| CHEM/III/EC/06 | Physical Chemistry – I (Practical) | <p>CO1. Determination of surface tension of a field liquid by Drop number method.</p> <p>CO2. Determination of coefficient of viscosity by Oswald's viscometer of ethanol – water system.</p> <p>CO3. Determination of water equivalent of a calorimeter.</p> <p>CO4. Determination of heat of neutralization of a strong acid with strong base.</p> |

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| | | CO5. Explain the heat of dilution of H ₂ SO ₄ and determine the strength of the unknown acid. |
| CHEM/IV/EC/07 | Analytical Chemistry – I | <p>CO1. Explain the storage and handling of chemicals and acids, ethers, toxic and poisonous chemicals.</p> <p>CO2. Explain antidotes, threshold vapour concentration and first aid procedure.</p> <p>CO3. Illustrate different methods and techniques of heating, stirring and filtration.</p> <p>CO4. Define common ion effect and apply solubility product and common ion effect in analytical chemistry.</p> <p>CO5. Determine the interfering anions, their removal and group separation.</p> <p>CO6. Explain different classical theories of distillation, fractional distillation, steam distillation, sublimation, zone refining, the separation of mixtures by Craig method.</p> <p>CO7. Describe solvent extraction, recovery and enrichment factors including liquid-liquid extraction, successive extractions, application of high molecular mass amines, dithiocarbamates and crown ethers in extraction.</p> <p>CO8. Evaluate significant figures, rounding off of numerical expressions and explain different types of errors, minimization of errors, propagation of determinate errors.</p> <p>CO9. Distinguish between accuracy and precision and determine the methods of their expression and rejection of data.</p> <p>CO10. Provide statistical treatment of analytical data, uncertainties involve in addition, subtraction, multiplication and division.</p> <p>CO11. Determine the confidence limits and intervals, test of significance like F-test and t-test.</p> <p>CO12. Define different terms commonly used in volumetric titrimetry (analyte, titrant, titration, equivalence point, end point, indicator), primary standard, secondary standard & concentrations of standard solutions (normality, molarity, ppm).</p> <p>CO13. Conduct acid-base titration, redox titration, iodimetric and iodometric titration.</p> <p>CO14. Explain the theory of acid-base indicators, the theory of precipitation and purification of precipitates, co-precipitation, post-precipitation, fractional-precipitation.</p> <p>CO15. Describe the chemistry of separation and estimation of ions (iron-calcium, calcium-barium and iron-copper).</p> <p>CO16. Demonstrate inorganic analysis by applying the following organic reagents like Oxine, 1-nitroso-2-naphthol, cupferron, dithiazone, dimethylglyoxime and rhodamine-B.</p> |
| CHEM/IV/EC/08 | Analytical Chemistry – I | <p>CO1. Determine the indicator constant - colorimetry.</p> <p>CO2. Apply Beer's Law – To determine the concentration of solution by colorimetry.</p> |

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| | (Practical) | <p>CO3. Determine the pH of a given solution using glass electrode.</p> <p>CO4. Determine dissociation constants of weak acid, base.</p> <p>CO5. Determine the pH of a given buffer.</p> <p>CO6. Titrate the HCl solution against NaOH solution potentiometrically and to determine the concentration of HCl in a solution.</p> <p>CO7. Titrate the solution of Fe²⁺ salt against Cr₂O₇²⁻ and to determine the formal redox potential of Fe²⁺ reversible to Fe³⁺ system.</p> <p>CO8. Estimate the strength of I₂ solution using sodium thiosulphate solution (Iodimetrically).</p> <p>CO9. Estimate Cu(II) or K₂Cr₂O₇ using sodium thiosulphate (Iodometrically).</p> <p>CO10. Estimate the percentage of available chlorine in bleaching powder (Iodometrically).</p> |
| CHEM/V/CC/09 | Inorganic Chemistry – II | <p>CO1. Summarize the general characteristics and packing of ions in ionic crystals.</p> <p>CO2. Explain different types of interstitial sites, limiting radius ratio values for different interstitial sites, radius ratio rules to determine the shape the of ionic crystals.</p> <p>CO3. Describe the lattice energy and factors affecting the magnitude of lattice energy.</p> <p>CO4. Elucidate Born-Haber cycle and its application.</p> <p>CO5. Define solvation energy and determine the solubility of ionic solids.</p> <p>CO6. Discuss different types of defects in crystals and their consequences and explain n-type and p-type semiconductors.</p> <p>CO7. Explain the conditions required for combination of atomic orbitals and illustrate pictorial presentation of atomic orbital to form various molecular orbital.</p> <p>CO8. Draw molecular orbital diagrams of simple homonuclear (H₂, He₂, O₂ and N₂) and heteronuclear (CO and NO) diatomic molecules and their ions.</p> <p>CO9. Explain different weak chemical forces and its effect on melting and boiling points.</p> <p>CO10. Describe the preparation, properties, structure and uses of hydrides and carbides (ionic and covalent) of s- and p-block elements.</p> <p>CO11. Explain catenation, inert pair effect and relative stability of different oxidation states of p-block elements.</p> <p>CO12. Describe oxides and oxoacids of nitrogen and peroxy-acids of sulphur.</p> <p>CO13. Discuss different types, structures and bonding of interhalogen & pseudohalogens compounds.</p> <p>CO14. Describe fractionation of liquid air for isolation and separation of the noble gases, the preparation, structure and bonding of XeF₂, XeF₄ and XeF₆, clathrates.</p> <p>CO15. Explain brief review of Bronsted – Lowry concept, Lewis concept and solvent system concept</p> |

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| | | <p>of acids and bases.</p> <p>CO16. Classify solvents and explain the importance of non-aqueous solvents.</p> <p>CO17. Explain different reaction in liquid ammonia, the action of liquid ammonia on alkali metals and alkaline earth metals.</p> <p>CO18. Describe symmetry operations, symmetry elements and symmetry point groups of different compound and specify rules and conditions for a molecule to form group, group multiplication table, sub-group, class and order of a group.</p> <p>CO19. Generalize the group trends of transition metals with special reference to the electronic configuration, colour, oxidation states, reducing properties, magnetic properties and ability to form complexes.</p> <p>CO20. Differentiate between the first, second and third transition series.</p> <p>CO21. Apply valence bond theory in inner and outer orbital complexes of coordination compounds.</p> <p>CO22. Explain crystal field theory, CFSE in weak and strong fields & summarize the factors influencing the magnitude of crystal field splitting.</p> <p>CO23. Apply CFS in octahedral, tetrahedral and square planar geometry.</p> |
| CHEM/V/CC/10 | Inorganic Chemistry – II (Practical) | <p>CO1. Prepare different inorganic compounds.</p> <p>CO2. Quantitatively estimate Nickel (II) using Dimethylglyoxime as the precipitant (Gravimetrically).</p> <p>CO3. Quantitatively estimate Sulphate as Barium sulphate or Barium as Barium sulphate (Gravimetrically).</p> <p>CO4. Quantitatively estimate Iron as Fe₂O₃ by precipitating iron as Fe(OH)₃ (Gravimetrically).</p> |
| CHEM/V/CC/11 | Organic Chemistry – II | <p>CO1. Explain the concept and types of isomerism, illustrate E & Z system of nomenclature, geometrical isomerism in oximes and alicyclic compounds.</p> <p>CO2. Discuss elements of symmetry, molecular chirality, enantiomers and its properties and resolution, stereogenic centre, optical activity, chiral and achiral molecules with two stereogenic centres, diastereo isomers, meso-compounds.</p> <p>CO3. Explain inversion & retention of configurations, racemization, relative & absolute configuration, sequence rules, D & L and R & S system of nomenclature.</p> <p>CO4. Explain conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds, mono-substituted and di-substituted cyclohexane.</p> <p>CO5. Distinguish between configuration & conformation, Newman projection and sawhorse formulae, Fischer and flying wedge formulae.</p> <p>CO6. Describe the preparation and electrophilic substitution reactions of heterocyclic-I compound.</p> |

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| | | <p>CO7. Describe the structure, synthesis and reactions of pyridine, compare the basicity of pyrrole/pyridine, pyrrole/pyrrolidine and pyridine/piperidine.</p> <p>CO8. Describe the preparation of heterocyclic-II compound with special reference to Fischer indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis.</p> <p>CO9. Explain active methylene compounds with examples, tautomerism and distinguish between tauto-merism and resonance (Keto-enol tautomerism).</p> <p>CO10. Explain Cannizzaro's reaction, the formation of enolates, aldol condensation, Perkin-reaction, benzoin condensation, Clemmensen and Wolff-Kishner reductions.</p> <p>CO11. Discuss acidity of α-hydrogen in carbonyl compounds, the formation of carbon-carbon bond, electrophilic and nucleophilic carbon species.</p> <p>CO12. Explain the formation and acid-assisted cleavage of acetals and ketals, acid-assisted reaction and base- assisted condensation reactions.</p> <p>CO13. Describe the mechanisms of formation and hydrolysis of esters and amides (acyclic and cyclic).</p> <p>CO14. Explain different reaction involving carbocation rearrangement.</p> |
| CHEM/V/CC/12 | Organic Chemistry – II (Practical) | <p>CO1. Organic preparation of –</p> <ul style="list-style-type: none"> i) Phthalimide ii) m-Dinitro benzene iii) Picric acid iv) Benzoic acid v) Aspirin from methyl salicylate <p>CO2. Separation of Binary organic mixtures based on acid-base concept</p> <p>CO3. Determination of melting points.</p> |
| CHEM/V/CC/13 | Physical Chemistry – II | <p>CO1. Derive Maxwell's distribution law of molecular velocities & evaluate the average, root mean square (rms), most probable velocities & average kinetic energy (KE) from Maxwell's law.</p> <p>CO2. Describe KE as a function of temperature, degrees of freedom and the law of equipartition of energy.</p> <p>CO3. Define space lattice, unit cell, laws of crystallography, laws of constancy of interfacial angles, rational indices & miller indices, laws of symmetry, symmetry elements in crystals, seven crystal systems, Bravais lattices & X-ray diffraction by crystals.</p> <p>CO4. Derive Bragg's equation & analyse the experimental method of crystal by Bragg's X-ray spectrometer and the Debye-Scherrer powder method.</p> |

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| | | <p>CO5. Explain the concepts of rate, order & molecularity of reaction, the effect of temperature on reaction rate and the temperature coefficient of a reaction.</p> <p>CO6. Derive Arrhenius equation & explain the concept of activation energy, collision theory & absolute reaction rate theory.</p> <p>CO7. Explain turn over number, the types and characteristics of catalysis, enzyme catalysis & derive Michaelis–Menten equation.</p> <p>CO8. State the third law of thermodynamics & the Nernst Heat Theorem.</p> <p>CO9. Explain the concept of residual entropy & calculate absolute entropy from heat capacity data (up to Debye T³ Law).</p> <p>CO10. Describe Gibb’s (G) and Helmholtz (A) energy, the variation of G & A with P, V, & T, derive Gibb’s - Helmholtz equation.</p> <p>CO11. Explain the concept of partial molar properties and partial molar energy (chemical potential).</p> <p>CO12. Derive Gibbs – Duhem equation & illustrate the variation of chemical potential with T & P.</p> <p>CO13. Explain electrical conductance, specific, equivalent and molar conductivity, variation of conductance with dilution for weak and strong electrolytes</p> <p>CO14. Describe Kohlrausch’s law of independent migration of ions, Arrhenius theory of electrolytic dissociation, Ostwald’s dilution law & ionic strength, Debye – Huckel – Onsager equation for strong electrolytes.</p> <p>CO15. Explicate asymmetry effect, electrophoretic effect, drift velocity, ionic mobility & transport number.</p> <p>CO16. Determine transports number by Hittorf’s and moving boundary method.</p> |
| CHEM/V/CC/14 | Physical Chemistry – II (Practical) | <p>CO1. Determine the solubility of a given salt (BaCl₂) at two temperatures (60oC and 40oC) and to determine the heat of solution.</p> <p>CO2. Determine the solubility of benzoic acid (an organic acid) at two temperatures (50oC and room temperature); and then to determine the heat of solution of that solute.</p> <p>CO3. Determine the strength of the given ferrous sulphate solution potentiometrically.</p> <p>CO4. Determine the velocity constant of the hydrolysis of methyl acetate, catalysed by an acid.</p> <p>CO5. Determine the strength of hydrochloric acid solution (approx. N/10) by titration against standard sodium hydroxide solution conductometrically (use oxalic acid for the standardization of sodium hydroxide conductometrically).</p> <p>CO6. Titrate acid-alkali using potentiometer.</p> <p>CO7. Determine the strength of a halide solution potentiometrically using silver nitrate.</p> |

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| | | <p>CO8. Titrate a weak acid and a strong base conductometrically.</p> <p>CO9. Titrate a strong acid and a weak base conductometrically.</p> |
| CHEM/V/CC/15B | Industrial Chemistry (Optional Paper) | <p>CO1. Define and explain essential nutrients (N, P, K), their role in plants, the important properties and uses of nitrogenous fertilizers, phosphatic fertilizers, potash fertilizers & mixed fertilizers like biofertilizers.</p> <p>CO2. List the composition of Portland cements, essential raw materials used for the manufacture (through wet process) and setting of cement.</p> <p>CO3. Explain the raw materials for glass manufacture, the manufacture of ordinary glass & characterize various glasses.</p> <p>CO4. Explain fermentation process & mode of operation fermentation process, the application of fermentation-microbial biomass, microbial enzyme.</p> <p>CO5. Explain transformation process, recombinant products, the genetic improvement of product formation-mutation.</p> <p>CO6. Illustrate assurance of food safety, food chemistry-carbohydrates, proteins, lipids, minor components of foods, water in foods, food processing-fundamental of fluid flow, food preservation, food process and flowcharts, refrigerated transport of fruits and vegetables.</p> <p>CO7. Explain curing, preservation and tanning of hides and skins, process of dehairing and dyeing, treatment of tannery effluents.</p> <p>CO8. Give detail about the origin of explosive, the preparation and chemistry of lead azide, nitroglycerine, nitrocellulose, TNT, Dynamite, cordite, picric acid, gunpowder & rocket propellants.</p> <p>CO9. Give detail about the origin, different types and economics importance of coal, analyse the composition of coal.</p> <p>CO10. Explain coal gasification, carbonisation, coal-tar based chemicals manufacture & coal mines in India.</p> <p>CO11. Give detail about the origin of petroleum, refining, cracking, reforming, knocking, octane number, synthetic gas, synthetic petrol, large scale production of fuel gases, storage & hazards.</p> <p>CO12. Explain the uses of coal gas, water gas, producer gas and oil gas.</p> <p>CO13. Explain the important industrial polymers, preparation and its application.</p> <p>CO14. Assess the role of textile designers, timing in the textile industry, designer's projection & adhesives.</p> <p>CO15. Discuss colour-considerations in textile design techniques of forming colour combinations, changing colour looks, presenting of colour combinations.</p> |

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| CHEM/VI/CC/16 | Inorganic Chemistry – III | <p>CO1. Define organometallic compounds & explain the preparation of organometallic compounds, the properties, applications & its classification.</p> <p>CO2. Give a brief account of bonding in π-metal-alkenyl complexes, the preparation, structure and bonding of mononuclear and dinuclear metal carbonyls, the π-acceptor property of CO and back bonding in metal carbonyls.</p> <p>CO3. Give details about structural aspects of myoglobin and haemoglobin and their role in biological systems.</p> <p>CO4. Describe metalloenzymes of zinc, their characteristics and functions.</p> <p>CO5. Explain the role of alkali metals (Na^+ and K^+) and alkaline earth metals (Mg^{2+} and Ca^{2+}) in biological process.</p> <p>CO6. Summarize the general properties and types of inorganic polymers, compare inorganic polymers with organic polymers.</p> <p>CO7. Explain the synthesis, structural aspects and application of Silicones and polyphosphonitrilic chlorides.</p> <p>CO8. Explain the electronic configuration, oxidation states, separation of lanthanides by ion exchange method and lanthanide contraction.</p> <p>CO9. Characterize the colour and magnetic properties of M^{3+} ions and explain its ability of complex formation.</p> <p>CO10. Explain the electronic configuration, oxidation states, colour of actinides, its ability of complex formation & compare lanthanides and actinides.</p> <p>CO11. Explain different terms and meaning involved in magneto-chemistry, the magnetic behaviour of simple inorganic complexes.</p> <p>CO12. State Curie's law, Curie-Weiss law and Bohr magneton.</p> <p>CO13. Determine the variation of magnetic susceptibility with temperature for paramagnetic, ferromagnetic and antiferromagnetic substances.</p> <p>CO14. Explain Infrared spectroscopy and its application in metal-halogen bonds (terminal and bridged) and metal-amine complexes.</p> <p>CO15. Determine the structure of different chemical compounds using Raman spectroscopy.</p> |
| CHEM/VI/CC/17 | Inorganic Chemistry – III (Practical) | <p>CO1. Estimate (complexometric titration) Mg^{2+} using EDTA.</p> <p>CO2. Estimate (complexometric titration) Ca^{2+} using EDTA.</p> <p>CO3. Estimate (complexometric titration) the temporary, permanent and total hardness of water samples.</p> |

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| | | <p>CO4. Estimate (Argentometry) Cl⁻ by Mohr's method.</p> <p>CO5. Estimate (Argentometry) Cl⁻ by Vohlard's method.</p> <p>CO6. Estimate (Oxidation-reduction titrimetry) Fe(II) and oxalic acid using standardized KMnO₄ solution.</p> <p>CO7. Estimate (Oxidation-reduction titrimetry) Fe(II) with K₂Cr₂O₇ using internal (diphenylamine/anthranilic acid) and external (potassium ferricyanide) indicator.</p> |
| CHEM/VI/CC/18 | Organic Chemistry – III | <p>CO1. Explain molecular and photochemical energy, excitation of molecules, Franck-Condon Principle, dissipation of energy and Jablonski-diagram.</p> <p>CO2. Depict various processes occurring in the excited state, singlet-triplet states & explain photosensitization, quenching and quantum yield.</p> <p>CO3. Give qualitative description of fluorescence, phosphorescence, non-radiative processes (Internal conversion & inter system crossing).</p> <p>CO4. Explain the photochemical reactions of carbonyl compounds, photoreduction, paterno-Buchi reaction, Norrish type-I and Norrish type-II cleavages.</p> <p>CO5. Define pericyclic reactions & explain the stereochemistry of electrocyclic reaction, conrotatory – dis-rotatory ring closure and ring opening.</p> <p>CO6. Describe Woodward-Hofmann's rule for electrocyclic reactions, Frontier molecular orbital theory.</p> <p>CO7. Explain dienes and dienophiles, supra-supra, antara-antara modes of cycloadditions.</p> <p>CO8. Discuss the nomenclature, structural features, formation and chemical reactions of organo-zinc compounds, organo-lithium compounds & organo-sulphur compounds</p> <p>CO9. Give detail about synthetic applications of Grignard's reagent in the synthesis of alkanes, alcohols, acids, aldehydes, ketones and amines with mechanism.</p> <p>CO10. Explain the principles of green chemistry, green preparation (Sonication Reaction): Butyraldehyde, 2-Chloro-N-aryl anthranilic acid, green reactions with mechanism in Aldol condensation, Baeyer – Villager oxidation with migratory aptitude, Michael addition, Diels-Alder reaction & Wittig reaction.</p> <p>CO11. Explain microwave assisted organic reactions in water: Mannich reaction, Hofmann elimination.</p> <p>CO12. Explain organic synthesis using biocatalysts: biochemical (Microbial) oxidation and reduction.</p> <p>CO13. Explain the basic principle of Mass spectrometry, types of ion produced in mass spectrometer, molecular ion peak, base-peak and metastable ion.</p> |

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| | | <p>CO14. Determine the molecular weight of organic compounds with Mass spectrometry.</p> <p>CO15. Give detail about the basic principle of NMR spectroscopy, chemical shifts, shielding & deshielding of protons, chemically and magnetically equivalent protons, NMR peak area and proton coupling.</p> <p>CO16. Give details about chemical shifts and coupling constants for ethyl bromide, ethanol, acetaldehyde, 1,1,2 – tribromo ethane, ethyl acetate, toluene and acetophenone.</p> |
| CHEM/VI/CC/19 | Organic Chemistry – III (Practical) | <p>CO1. Determination of λ_{max} values for 200-500 nm absorbance spectra of KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ (in 0.1 M H_2SO_4)</p> <p>CO2. The pH-dependence of the UV-Vis spectrum (200-500 nm) of $\text{K}_2\text{Cr}_2\text{O}_7$</p> <p>CO3. Determine the concentration of the given organic compound using UV-Vis spectrophotometer.</p> <p>CO4. Biginelli condensation: Synthesis of 3, 4-dihydropyrimidin-2-ones using acid catalysts.</p> <p>CO5. Hantzsch ester synthesis: synthesis of 1, 4-dihydropyridine.</p> <p>CO6. Extraction of essential oils from plants (eucalyptus, Ageratina adenophora, etc.) using Clevenger apparatus.</p> <p>CO7. Extraction and isolation of casein and lactose from milk</p> <p>CO8. Extraction of caffeine from tea leaves.</p> |
| CHEM/VI/CC/20 | Physical Chemistry – III | <p>CO1. Differentiate between thermal & photochemical reactions, explain photochemical reactions involving dissociation of HI, CH_3CHO, photo-sensitized reaction involving photosensitizers.</p> <p>CO2. State Grothaus-Draper law, Beer-Lambert's Law; Stark-Einstein law of photochemical equivalence, quantum yield, quenching & chemiluminescence.</p> <p>CO3. Explain black body radiation, Planck's radiation law, Photoelectric effect & heat capacity of solids.</p> <p>CO4. State and explain postulates of quantum mechanics.</p> <p>CO5. Derive Schrodinger wave-equation and apply the equation to i) free particles ii) particle in a one dimensional (1D) box & explain Schrodinger wave-equation for H-atom and its separation to three equations.</p> <p>CO6. Explain quantization of energy levels and zero point energy.</p> <p>CO7. Point out the limitations of classical thermodynamics.</p> <p>CO8. Explain the concept of distribution of energy & thermodynamic probability, Boltzmann distribution law, molecular partition function and its physical significance.</p> <p>CO9. Describe the relationship between thermodynamic functions and partition functions and calculate the translational, rotational, vibrational and electronic partition functions.</p> |

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| | | <p>CO10. Describe the interaction of electromagnetic radiation with molecules and various types of spectra.</p> <p>CO11. State and explain Born – Oppenheimer approximation and Frank-Condon Principle.</p> <p>CO12. Illustrate qualitative σ, π & n MOs (molecular orbitals), their relative energy levels and respective transitions & give the examples of conjugated molecules.</p> <p>CO13. Explain the fate of electronically excited states-radiative and non-radiative decay, compare fluorescence and phosphorescence.</p> <p>CO14. Describe rotational energy levels of diatomic molecules (rigid rotor) and its selection rule.</p> <p>CO15. Determine the relative intensity of rotational spectral lines, bond-length, vibrational energy levels of diatomic molecules (one dimensional harmonic oscillator) and its selection rules.</p> <p>CO16. Evaluate force constant from fundamental frequencies, anharmonicity and Morse potential, dissociation energy, overtones, and hot bands.</p> <p>CO17. Describe classical theory of Raman effect and its selection rules, the effect of nuclear spins, stokes and anti-stokes lines, mutual exclusion rule.</p> <p>CO18. Define chemical cells, reversible and irreversible cells with examples, electromotive force of a cell and its measurement.</p> <p>CO19. Derive Nernst equation.</p> <p>CO20. Describe standard electrode (reduction) potential and its application to different kinds of half-cells.</p> <p>CO21. Determine, by applying EMF measurements in (i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone and glass electrodes.</p> <p>CO22. Describe concentration cells with and without transference, liquid junction potential, the activity coefficients and transference numbers.</p> <p>CO23. Discuss potentiometric titrations (acid-base, redox titrations) quantitatively.</p> |
| CHEM/VI/CC/21 | Physical Chemistry – III (Practical) | <p>CO1. Determine of the partition coefficient of Iodine between CCl_4 and water.</p> <p>CO2. Determine of the partition coefficient of Iodine between Kerosene and water.</p> <p>CO3. Determine of the partition coefficient of benzoic acid between benzene and water.</p> <p>CO4. Verify Beer-Lambert's law using copper sulphate or $\text{K}_2\text{Cr}_2\text{O}_7$ solution Colorimetrically or Spectrometrically and determination of the concentration of the above solution.</p> <p>CO5. Determine the adsorption of oxalic acid on activated charcoal and verify Freundlich's adsorption isotherm.</p> |

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| | | CO6. Prepare colloidal sols of Arsenious sulphide, Fe(OH) ₃ , and Prussian blue sols. |
| CHEM/VI/CC/22B | Natural Products (Optional paper) | <p>CO1. Explain biosynthesis of different terpenes & classify them.</p> <p>CO2. Give detail about isolation and detection alkaloids.</p> <p>CO3. Explain Hoffmann degradation.</p> <p>CO4. Give detail about survey of different methods - Ultraviolet – Visible spectroscopy, Infrared Spectroscopy, NMR Spectroscopy, Mass Spectroscopy for structure determination.</p> <p>CO5. Explain the absolute stereochemistry of morphine, benzyl isoquinoline alkaloids, rotenoids, abietic acid, menthol and vinblastine, the conformation of naturally occurring germacranolides.</p> <p>CO6. Discuss the rearrangement reaction of morphine, The Wesley – Moser rearrangement, molecular yoga, reactions of papverine and Nametkin rearrangement.</p> <p>CO7. Explain insect pheromones, plant - insect interactions and defensive secretion of insects.</p> <p>CO8. Give detail about the synthesis of a semiochemical and a chiral marine natural product.</p> <p>CO9. Explain the stereoselective synthesis of reserpine and a paraconic acid.</p> <p>CO10. Explain biosynthesis of some benzylisoquinoline alkaloids, isoflavones and its transformation and reticuline to morphine.</p> |
| Programme Outcome | | <p>PO1. Students acquire knowledge on the central concepts, principles and methods underlying the academic field of chemistry; employing critical thinking and scientific method to design and conduct chemical experiment, record and analyse the results in a systematic way.</p> <p>PO2. Learners understand the role of chemistry as a multi-disciplinary and its linkages with related disciplinary areas/subjects; also get an awareness of the role of chemistry on the environment and the society.</p> <p>PO3. Students acquire knowledge and skill to undertake further studies in chemistry in related areas or multidisciplinary areas that can be helpful for self-employment/entrepreneurship.</p> |

| Department of ZOOLOGY | | |
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| Course Code | Course Name | Course Outcome |
| ZOO/I/EC/01 | Biosystematics and Non chordate Biology | <p>CO1. Explain the principles of classification, binomial nomenclature and species concept.</p> <p>CO2. Describe taxonomic hierarchy, classify the five and six kingdom as well as the principles of the three domain system.</p> <p>CO3. Classify non-chordates with the salient features.</p> <p>CO4. Describe the different types of locomotion and reproduction in protozoa groups & conjugation in Paramecium.</p> <p>CO5. Discuss the origin of Metazoa, metamerism and symmetry in animals.</p> <p>CO6. Explain the types and structure of coelom, coral reefs, canal system and polymorphism in Hydrozoa.</p> <p>CO7: Write the characteristics and affinities of Ctenophora and Onychophora.</p> <p>CO8. Discuss the reproductive system and excretory system of Platyhelminthes, Nematoda and Annelida.</p> <p>CO9. Explain the process of torsion and detorsion in Gastropoda.</p> <p>CO10. Discuss the physiology of Arthropoda, insect metamorphosis and water vascular system in Echinodermata.</p> |
| ZOO/I/EC/02 | Practical | <p>CO1. Give comment on the museum specimen from each major phyla of non-chordate group.</p> <p>CO2. Multimedia demonstration/dissection of digestive system of earthworm.</p> <p>CO3. Multimedia demonstration/dissection of the nervous system of prawn/cockroach.</p> <p>CO4. Prepare and compare the temporary slides on the mouthparts of insects.</p> <p>CO5. Describe the spicules of sponges and statocyst of prawn from slide/models.</p> |
| ZOO/II/EC/03 | Chordate Biology and Anatomy | <p>CO1. Classify chordata with salient features.</p> <p>CO2. Write the salient features and affinities of Protochordates as well as embryonic development of Branchiostoma.</p> <p>CO3. Explain the types of fish scales, locomotion and migration, sense organ in Scoliodon.</p> <p>CO4. Discuss neoteny and paedogenesis in amphibian, respiratory system in Rana</p> |

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| | | <p>tigrina. CO5. Discuss snake venom, poison apparatus and biting mechanism. CO6. Explain the structure, types, uses and development of feathers in Columba livia; principle and modes of flight. CO7. Write the structure of brain, eye and digestive system of Rabbit. CO8. Discuss receptor organs, structure of integuments and their derivatives. CO9. Describe the structure and composition of cartilage, bone and ligaments. Dentition in mammals and modification of heart. CO10. Discuss the structure and types of gill, lung and air ducts.</p> |
| ZOO/II/EC/04 | Practical | <p>CO1. Give comments on museum specimens form representative of protochordates & chordates. CO2. Explain the osteology of pigeon and rabbit. CO3. Prepare and describe the temporary mounting of filoplume feather and scales of fish. CO4. Demonstrate and describe the internal ear of Scoliodon and Hyoid apparatus of frog. CO5. Give comments on the circulatory and reproductive system in rat/ mouse and flight muscles.</p> |
| ZOO/III/EC/05 | Evolution and Ethology | <p>CO1. Discuss the theory of natural selection; beak variation in Darwin fishes and industrial melanism in peppered moth. CO2. Explain the concept of speciation and high altitude adaptation in humans, sickle cell trait and resistant to malaria. CO3. Explain the concept of prebiotic soup theory and Miller's experiment, RNA world hypothesis. CO4. Describe the concept of Symbiogenesis, Geological time scale, Cambrian explosion, Dinosaurs and major fauna. CO5. Discuss the major hominid fossil, Mitochondrial Eve, Y- chromosomal Adam, out of Africa theory and Zoogeographical realms. CO6. Describe the different types of mimicry; colouration, aposematism and camouflaging. CO7. Explain the concept of ethology, types of behaviour; innate, imprinting and learned. CO8. Distinguish between Altruism and reciprocal Altruism and discuss Communication;</p> |

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| | | <p>infrasound, echolocation and dancing in bees.</p> <p>CO9. Discuss the parental investment and territoriality in vertebrates and evolutionary arms race.</p> <p>CO10. Describe the hormonal control of bee society, role of hormone in behaviour of bees and hormonal basis of sex change.</p> |
| ZOO/III/EC/06 | Practical | <p>CO1. Explain the important invertebrate fossils from specimen/models and pictures.</p> <p>CO2. Explain the important vertebrate fossils from specimen/models and pictures.</p> <p>CO3. Explain the technique of paper chromatography with emphasis on Miller's experiment.</p> <p>CO4. Explain the caste system in insects.</p> <p>CO5. Explain the important morphological adaptations among vertebrates.</p> |
| ZOO/IV/EC/07 | Endocrinology and Reproduction Biology | <p>CO1. Discuss the different types of endocrine glands and their hormones: hypothalamus, pituitary, thyroid, pancreas, adrenal, testis and ovary.</p> <p>CO2. Explain the endocrine disorders: diabetes mellitus, gigantism, dwarfism, and cretinism, hormones classification and its transport.</p> <p>CO3. Describe the hormonal receptors: G- protein coupled, steroid and insulin.</p> <p>CO4. Explain the mechanism of action of steroid hormones, peptide hormones and insulin.</p> <p>CO5. Summarize the Biological rhythms: circadian and circannual.</p> <p>CO6. Explain the hormonal regulation of calcium homeostasis, glucose homeostasis and parturition.</p> <p>CO7. Describe the process of spermatogenesis and oogenesis and the hormonal regulation of gametogenesis.</p> <p>CO8. List the different types of pheromones and their effects.</p> <p>CO9. Discuss the different phases and hormonal control of estrous and menstrual cycles.</p> <p>CO10. Describe the process and hormonal basis of contraception. Nature, uses and effects of anabolic steroid.</p> |
| ZOO/IV/EC/08 | Practical | <p>CO1. Explain the important endocrine glands from permanent slides.</p> <p>CO2. Dissect/display/demonstrate endocrine glands in rat/mouse.</p> <p>CO3. Explain surgical techniques and effects of castration/vasectomy/ovariectomy in rat/mouse.</p> <p>CO4. Dissect and demonstrate the process of reproductive system in rat/mouse.</p> |

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| | | CO5. Dissect and describe the reproductive organs and endocrine glands from cockroach. |
| ZOO/V/CC/09 | Cell Biology | <p>CO1. Explain the cell theory, tenets and limitations as well as structure of prokaryotic and eukaryotic cell.</p> <p>CO2. Discuss the cell membrane and membrane transport system.</p> <p>CO3. Write the structure, composition and functions of cell organelles: ribosomes, endoplasmic reticulum, golgi complex and peroxisomes.</p> <p>CO4. Describe the structure and functions of mitochondria, cytoskeletons.</p> <p>CO6. Explain the process of endocytosis and phagocytosis.</p> <p>CO5. Describe the process of cell to cell interactions and extra cellular matrix.</p> <p>CO7. Explain the concept of nuclear envelope, structure and transport of molecules.</p> <p>CO8. Write the structure of chromosome, karyotype and nucleolus.</p> <p>CO9. Describe the different stages of cell cycle through cyclin-CDK complexes.</p> <p>CO10. Explain the process of meiosis, types and characteristics of cancer and carcinogens.</p> |
| ZOO/V/CC/09 | Practical | <p>CO1. Explain the different types of cell organelles from slides/models.</p> <p>CO2. Explain the different stages of mitosis from permanent slides.</p> <p>CO3. Explain the process of squash preparation from onion root tip.</p> <p>CO4. Explain the different stages of meiosis from permanent slides.</p> <p>CO5. Explain the process of microtomy and slide preparation.</p> |
| ZOO/V/CC/11 | Physiology | <p>CO1. Describe the process of digestion and absorption of carbohydrates, proteins and fats. Extracellular and intracellular digestion</p> <p>CO2. Describe the mechanism of respiration in gills and lungs. Types of respiration: internal, external and cutaneous.</p> <p>CO3. Describe the structure of heart, open and closed circulation, pacemaker and cardiac cycle.</p> <p>CO4. Discuss the blood groups and blood coagulation, structure and function of haemoglobin.</p> <p>CO5. Write the structure and function of kidney, process of urine formation and micturition.</p> <p>CO6. Describe the process of osmoregulation in marine and terrestrial vertebrates. Types of nitrogenous waste: ammonotelic, uricotelic and ureotelic.</p> <p>CO7. Summarize the types of muscles and ultrastructure, muscle proteins and mechanism</p> |

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| | | <p>of muscle contraction.</p> <p>CO8. Explain the process of isotonic and isometric contractions, muscle fatigue.</p> <p>CO9. Discuss the types and structure of neuron, resting and action potentials.</p> <p>CO10. Describe the process of major neurotransmitters, structure of synapse and synaptic transmission.</p> |
| ZOO/V/CC/12 | Practical | <p>CO1. Give comments on the histological slides of stomach, intestine, lung, kidney and gonads of mammals.</p> <p>CO2. Explain the process of R.B.C and W.B.C total count.</p> <p>CO3. Estimate the process of haemoglobin and determine blood groups.</p> <p>CO4. Prepare and describe haemin crystals, smooth and skeletal muscles.</p> <p>CO5. Explain salivary amylase activity with effect of pH and temperatures.</p> |
| ZOO/V/CC/13 | Biochemistry | <p>CO1. Classify carbohydrates and lipids and write their significance.</p> <p>CO2. Discuss the structure, properties and classification of amino acids and peptides.</p> <p>CO3. Recount the types, properties and kinetics of enzymes, inhibition and Michaelis-Menten equation.</p> <p>CO4. Discuss coenzyme and ribozyme, types and properties of vitamins.</p> <p>CO5. Describe the process of glycolysis reactions and significance.</p> <p>CO6. Explain the process of glycogenesis, glycogenolysis and gluconeogenesis.</p> <p>CO7. Describe the process and mechanism of oxidative phosphorylation and tricarboxylic cycle.</p> <p>CO8. Discuss the mechanism of electron transport chain, HMP shunt and ATP synthesis.</p> <p>CO9. Write the mechanism of fatty acid oxidation, lipogenesis and ketogenesis.</p> <p>CO10. Describe the process of urea cycle, nucleic acids and their metabolism.</p> |
| ZOO/V/CC/14 | Practical | <p>CO1. Explain the process of carbohydrates, lipids and proteins.</p> <p>CO2. Estimate ascorbic acid by titration process.</p> <p>CO3. Estimate proteins by Biuret method.</p> <p>CO4. Estimate proteins by Lowry's method.</p> <p>CO5. Estimate the total carbohydrates.</p> |
| ZOO/V/CC/15(B) | Entomology | <p>CO1. Write the classification, collection methods and preservation of insects.</p> <p>CO2. Identify major insect's pests.</p> <p>CO3. Discuss the physiology of insect.</p> <p>CO4. Describe the social behaviour and caste system in insect.</p> |

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| | | <p>CO5. Describe the different types of metamorphosis with examples.</p> <p>CO6. Discuss the role of hormones in regulation of insect metamorphosis.</p> <p>CO7. List the type of hormones and explain the mechanism of hormonal action and application.</p> <p>CO8. Discuss the importance of economically important insects.</p> <p>CO9. List the parasitic and predatory insects and their effects.</p> <p>CO10. Describe the biological, chemical and integrated methods of controlling insect pest.</p> |
| ZOO/V/CC/16(B) | Practical | <p>CO1. Give comments on the important insect specimens from permanent slides/models.</p> <p>CO2. Dissect and display endocrine glands.</p> <p>CO3. Dissect and display the reproductive, nervous and digestive systems of cockroach.</p> <p>CO4. Prepare and explain the mouthparts of mosquito.</p> <p>CO5. Identify the locally available insects, collect, preserve and display the collected insects.</p> |
| ZOO/VI/CC/17 | Molecular Biology and Genetics | <p>CO1. Write the structure and types of DNA and RNA.</p> <p>CO2. Describe the higher order of chromosome organization, polytene and lampbrush chromosome.</p> <p>CO3. Recount the techniques of DNA replication and semi conservative method of replication.</p> <p>CO4. Explain the basis of DNA repair mechanism.</p> <p>CO5. Describe the process of gene expression, central dogma and transcription.</p> <p>CO6. Explain genetic code, translation and concept of operon.</p> <p>CO7. Write the concepts of Mendellian genetics, incomplete dominance and co-dominance.</p> <p>CO8. Describe cytoplasmic inheritance, pleiotropism and allelism.</p> <p>CO9. Discuss the process of crossing over and recombination of genes and chromosomal sex determination.</p> <p>CO10. Explain genetic disorders and the different types of mutation.</p> |
| ZOO/VI/CC/18 | Practical | <p>CO1. Give comments on the structure of chromosomes and aberrations from permanent slides/models.</p> <p>CO2. Prepare and describe the polytene chromosome from dipteran larvae.</p> <p>CO3. Prepare sex chromatin.</p> |

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| | | <p>CO4. Explain the process of quantitative estimation of RNA.</p> <p>CO5. Explain the process of quantitative estimation of DNA.</p> |
| ZOO/VI/CC/19 | Developmental Biology | <p>CO1. Explain the structure of sperm, ovum, types of eggs and the different process of fertilization.</p> <p>CO2. Describe the process and types of parthenogenesis and patterns of cleavage.</p> <p>CO3. Describe the process of blastulation and gastrulation in frog and fate maps.</p> <p>CO4. Write the types and function of placenta in mammals and extra-embryonic membranes in chick.</p> <p>CO5. Explain the concept of organizer and induction.</p> <p>CO6. Discuss the morphogenetic fields and gradients.</p> <p>CO7. Describe the metamorphosis in insects and amphibians and their hormonal regulation.</p> <p>CO8. Explain the regeneration in invertebrates and vertebrates.</p> <p>CO9. Outline the concepts and models of ageing.</p> <p>CO10. Explain the concept of transgenesis and stem cell.</p> |
| ZOO/VI/CC/20 | Practical | <p>CO1. Explain the different pattern of cleavage, blastula and gastrula of frog from specimen/model.</p> <p>CO2. Explain the technique of permanent slide preparation and invertebrate larvae.</p> <p>CO3. Explain different stages of chick embryo development.</p> <p>CO4. Explain the technique of whole mount of chick embryo.</p> <p>CO5. Demonstrate and explain the process of regeneration in Planaria/Hydra or tail of tadpole.</p> |
| ZOO/VI/CC/21 | Parasitology and Immunology | <p>CO1. Explain the basics of parasitology.</p> <p>CO2. Summarize the life history, mode of infection and pathogenicity of protozoans.</p> <p>CO3. Summarize the life history, mode of infection and pathogenicity of Taenia solium/saginata and Fasciola hepatica.</p> <p>CO4. Explain parasitic adaptation in cestodes.</p> <p>CO5. Discuss the life history and pathogenicity of Schistosoma mansoni and Ascaris lumbricoides.</p> <p>CO6. Explain the parasitic adaptation in trematodes and nematodes.</p> <p>CO7. Write the basics of immune system, innate and acquired immunity. Understanding the components of immune system such as epitope, paratope, antigen and hapten.</p> |

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| | | <p>CO8. Explain the principle of vaccination and clonal selection theory.</p> <p>CO9. Describe the structure and types of antibodies and its interaction with antigens.</p> <p>CO10. Explain major histocompatibility complex and hypersensitivity.</p> |
| ZOO/VI/CC/22 | Practical | <p>CO1. Develop the skill of making permanent slides and systematic study of common protozoa from the slides and models.</p> <p>CO2. Explain the important helminth parasites from specimen and permanent slides.</p> <p>CO3. Explain the special morphological adaptations in cestodes, trematodes and nematode.</p> <p>CO4. Explain recovery, processing and identify helminths from fowl intestine.</p> <p>CO5. Prepare and explain blood film by double staining method.</p> |
| ZOO/VI/CC/23(B) | Ecology and Wildlife | <p>CO1. Explain the basics and concepts of ecology, ecosystem, food chain, food web and energy flow.</p> <p>CO2. Demonstrate the knowledge on the trophic relationship, ecological pyramids, interspecific and intraspecific interactions.</p> <p>CO3. Describe the abiotic environment and its biogeochemical cycles.</p> <p>CO4. Summarize the laws of tolerance and limiting factors.</p> <p>CO5. Discuss the biotic community concept, community developments and ecological succession.</p> <p>CO6. Explain the cause, effects and implications of greenhouse effect and global warming.</p> <p>CO7. Summarize the characteristics of population such as mortality, natality, density and growth curves.</p> <p>CO8. Discuss the species richness, species diversity and diversity indices; Sorenson's and Shannon- Wiever indices.</p> <p>CO9. Describe the conservation of natural resources and wildlife management.</p> <p>CO10. Illustrate the effect of anthropogenic activity and the environment as well as international and national programmes.</p> |
| ZOO/VI/CC/24(B) | Practical | <p>CO1. Performing experiments on temperature, pH & conductivity of soil and water samples.</p> <p>CO2. Estimate oxygen and carbon dioxide in water samples.</p> <p>CO3. Determine alkalinity and hardness of water samples.</p> <p>CO4. Estimate organic and phosphorus contents in soil samples.</p> |

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| | | CO5. Visiting of a farm, zoo and sanctuary thereby discuss the different species of animals encountered. |
| Program Outcome | | |

| Department of MATHEMATICS | | |
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| Course Code | Course Name | Course outcome |
| MATH/1/CC/111 | Calculus | CO1. Solve the differentiation and different methods of Integration, its application. CO2. Define sequences and series ; different methods to test the convergence. CO3. Verify the values of limit of a function at a point using the definition of a limit. CO4. Determine the intermediate value theorem, mean value thm and L"Hospital"s rule. |
| MATH/2/CC/121 | Algebra | CO1. Define group theory. CO2. Solve properties of polynomials. CO3. Solve various problems on properties of integers and use the basic concepts of divisibility, congruence and their applications in basic algebra. CO4. Determine factor theorem, remainder theorem. CO5. Solve the system of homogeneous and non-homogeneous linear form equations. |
| MATH/3/CC/231 | Differential Equation | CO1. Solve ordinary and partial differential equations. CO2. Solve orthogonal trajectories. CO3. Application of differential equation to physical problems. |
| MATH/4/CC/241 | Vector Calculus and Solid Geometry | CO1. Solve two dimensional geometry and different conics and their properties. CO2. Solve three dimensional geometry, planes, cone, cylinder and spheres. CO3. Define coplanar lines and illustrate. CO4. Compute the angle between a line and a plane, length of perpendicular from a point to a line. CO5. Define skew lines. CO6. Calculate the shortest distance between two skew line. |
| MATH/5/CC/351 | Computer Oriented Numerical Analysis | CO1. Determine Gauss elimination method, Gauss-Jordan method, Gauss-Siedel method and Crout's to solve system of linear equations. CO2. Solutions of differential equations using different methods. CO3. Derive Simpson's 1/3 ,3/8 rules using trapezoidal rule. CO4. Find the solution of the first order and second order equation with constant coefficient. CO5. Find the summation of series finite difference techniques. |

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| | | CO6. Find the solution of ordinary differential equation of first by Euler, Taylor and Runge-Kutta methods. |
| MATH/5/CC/352 | Real Analysis | CO1. Determine basic properties of Euclidean distance function, neighbourhood, open set, closed set in Euclidean spaces. CO2. Define metric spaces. CO3. Show that convergence of sequence and series of functions, Riemann integrals, improper integrals and its applications. |
| MATH/5/CC/353 | Complex Analysis | CO1. Define power series and its convergence. CO2. Find integral of complex valued functions. CO3. Solve problems on basic concepts of modulus, argument of a complex number, deMoivre's theorem and use them to find roots of an algebraic equation. |
| MATH/6/CC/361 | Modern Algebra | CO1. Define rings, integral domain, ideals, quotient rings. CO2. Define vector spaces. |
| MATH/6/CC/362 | Advanced Calculus | CO1. Solve Riemann integrals, properties of integrable functions. CO2. Define improper integrals. CO3. Compute double integrals, applications to area and volume, Green's thm in the plane and the change of variables in double integrals. |
| MATH/6/CC/363 | Mechanics | CO1. Solve problems of coplanar forces & friction. CO2. Find out C.G. of gravity rigid bodies CO3. Define motion in straight lines, in planes, projectiles. CO4. Define resultant component of a force, coplanar forces, like and unlike parallel forces, moment of a force and couple with examples. CO5. Prove the parallelogram of forces, triangle of forces, Lami's Theorem, Varignon's theorem of moments. CO6. Find the resultant of coplanar couples, equilibrium of couples and the equation to the line of action of the resultant. |
| MATH/6/CC/364(B) | Computer programming in Fortran | CO1. Find various programming approaches in Fortran : Data routine in real handling, control over input and output and files to preserve data, program flow and repeating parts. CO2. Find arrays for matrix calculation in engineering and to implement standard blocks. CO3. Determine Fortran programming to do calculation routine in real mechanical engineering applications. |

| Department of ECONOMICS | | |
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| Course Code | Course Name | Course Outcome |
| Eco/1/CC/01 | Microeconomics-I | <p>CO1. Give the meaning of economics, scope and basic problems of economics, price system in the economy and the role of the government in price system.</p> <p>CO2. Explain how the individual consumer reaches the equilibrium level of consumption by using cardinal and ordinal approaches & how consumption is affected by the changes in price and income.</p> <p>CO3. Explain the theory of production and cost, the input-output relation of factors of production, equilibrium level of output and various concepts of cost.</p> <p>CO4. Describe market structure by giving the meaning of market and its features & explain how the producer fixes the price in various markets and the equilibrium level of output in the short and long run. Explain price discrimination under monopoly and government intervention, so that they can compare different markets.</p> <p>CO5. Describe market structure-II by giving the meaning and features of monopolistic competition, oligopoly, duopoly and monopsony & classify various markets with reference to their price and output determination.</p> |
| Eco/2/CC/02 | Micro-Economics-II | <p>CO1. Explain factor prices by determining the price of input using marginal productivity of distribution. Identify various types of interest, rent, wages and profit paid to the factors.</p> <p>CO2. Give the meaning of factor market and explain determinants of demand for factors of production under factor market - firm's demand for single and several variable factors. Explain how the firm reaches its equilibrium level of employment of factors of production & the comparison of wages under perfect and imperfect markets.</p> <p>CO3. Describe welfare economics & its various concepts. Illustrate basic tools in welfare economics and explain how the government achieved economics welfare of by studying welfare economics.</p> <p>CO4. Illustrate investment analysis by studying various concepts and types of investment, calculate returns and its benefits from investment.</p> <p>CO5. Explain international trade & the difference between inter regional and international trade. Explain what does a nation trade gains from trade, the distribution of gains from trade between the trading countries.</p> |
| Eco/3/CC/03 | Macro-Economics-I | <p>CO1. Explain the concepts and measurement of national income & identify the problems in the calculation</p> |

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| | | <p>of national income and the basic structure of the economy and the contribution made by the various sectors to the national income. Analyse the policy of the government to improve the economic health of the nation.</p> <p>CO2. Explain various theories of employment & answer the question of what determines the volume of employment and output in an economy. Demonstrate the principle of effective demand and income determination.</p> <p>CO3. Describe consumption function & explain the relationship between the increase in income, increase in consumption and the factors which determined consumption function.</p> <p>CO4. Explain investment and saving & give the relation between investment and saving. Calculate whether investment is profitable or not depending upon MEC and MEI, the increase in income and employment due to investment multiplier.</p> <p>CO5. Interpret interest by giving the meaning of net and gross interest. Illustrates various theories of interest and determine the rate of interest in the economy. Explain the effect of interest on investment and saving.</p> |
| Eco/4/CC/04 | Macro-Economics-II | <p>CO1. Define money and explain various function of money. Classify money and explain Gresham's Law. Explain how the money circulates in the economy by using quantity theory of money.</p> <p>CO2. Identify types of banks and its different functions. Illustrate how the commercial banks create money in the economy, the need for control of credit in the economy & methods of credit control by the Central Bank.</p> <p>CO3. Explain the meaning and phases of trade cycle, different theories of trade cycle. Explain the effect of cyclical fluctuation of trade cycle on the economy and suggest measures to control harmful effect of fluctuation in business cycle.</p> <p>CO4. Illustrate the meaning of inflation, deflation, stagflation and reflation. Identify different kinds of inflation, causes and effects of inflation on different sectors of the economy & describe the measures to control inflation.</p> <p>CO5. Explain the meaning of economic growth and development. Identify economic growth using Harrod-Domer Model and Solow's growth mode. Distinguish between economic growth and technical progress.</p> |
| Eco/5/CC/05 | Indian Economy | <p>CO1. Explain the basic characteristic of under developed economy and the nature of Indian economy. Illustrate the role of the state for economic development and importance of sustainable development in recent context. Identify various natural resources which are available in India.</p> <p>CO2. Give the actual size of population in India and find the impact and causes of the rapid growth of population. Suggest measures to control population growth and Government population Policy in India. Identify occupational and regional distribution in India & relate population growth with economic development.</p> |

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| | | <p>CO3. Describe planning in India & the importance of planning for economic development, objectives, success and failure of 5Years Plan. Explain the composition and role of NITI Aayog. Illustrate the importance of New Economic Reforms.</p> <p>CO4. Explain the importance of agriculture in Indian economy, contribution of Agriculture to the National Income of India. Analyse the agricultural production and productivity, in India & the drawbacks of Indian agriculture, suggest measures to improve agriculture in India. Illustrate the importance and results of Green Revolution.</p> <p>CO5. Explain the basic features of Mizoram economy, the area where their university is located. Find occupational structure and sources of income of the state. Analyse the trend of public expenditure, the shifting cultivation, its drawbacks and environmental impacts.</p> |
| Eco/5/CC/06 | Public Finance | <p>CO1. Explain the meaning and scope of public finance, the difference between public and private finance, difference between public and private good. Illustrate the maximum social advantage on public expenditure. Explain meaning and courses of market failure and role of government.</p> <p>CO2. Explain the meaning and various classification of public expenditure. Explain the principles which should guide the public expenditure policy of the state. Explain the direction and causes of growth of public expenditure in modern economy.</p> <p>CO3. Explain how the government raised funds from various sources to finance its activities & inculcate the knowledge by studying various types of tax and the principle which should govern the tax system and how the burden of tax is distributed in the economy, suggest the good tax system in the economy.</p> <p>CO4. Explain why a government resort to borrowing because of some fiscal compulsion & the sources of such borrowings and the repayment method of public debt. Explain the effect of Public debt in the economy and India's Public debt.</p> <p>CO5. Explain the meaning and various classification of budget and how the budget are prepared and passed in the house. Explain the role of Finance Commission & identify a budget which satisfies certain identified criteria.</p> |
| Eco/5/CC/07 | Quantitative Technique-I | <p>CO1. Describe the basic concept of sets and linear equation and apply the knowledge of sets and linear equation in various economic activities.</p> <p>CO2. Demonstrate the rule and usage of differentiation and application of simple differentiation in economic activities. Explain the concept of revenue and cost, profit maximization, cost minimization, elasticity's.</p> <p>CO3. Demonstrate the uses and rules of simple integration & calculate the problem of the Consumer's and Producer's surplus, revenue and cost.</p> |

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| | | <p>CO4. Explain different types of matrix operations. Use Cramer's rule to solve equations and Co- factors method to find the inverse of a matrix.</p> <p>CO5. Explain the concept and formulation of Linear Programming problems. Solve linear equation problem using graph methods. Demonstrate the concept of dual.</p> |
| Eco/5/CC/08A | Agriculture Economics. | <p>CO1. Discuss the composition of Indian rural economy & identify the importance as well as opportunities available in those flourishing sectors such as horticulture, fisheries, floriculture and forestry.</p> <p>CO2. Illustrate the overall development and engine of growth in agriculture. Sensitize the distinctive features of rural and urban economy or agricultural and non- agricultural which can influence the whole economy.</p> <p>CO3. Identify the reasons for the need of land reforms in India and enable to comprehend the necessary objectives and measures for the improvement.</p> <p>CO4. Give the need to exploit traditional practices and utilize through development and improvements of production techniques. Aware of the availability of rich natural endowments to achieve sustainable agricultural development.</p> <p>CO5. Identify globalization of the Indian economy and its effect on Indian agriculture. Challenge the problems of unemployment, shortage of food production, and be useful to compete advanced agricultural economies.</p> |
| Eco/6/CC/09 | Environmental Economics | <p>CO1. Explain how the economy and environment are linked, the environmental issues in relation to the theory of externalities and public goods, identify key reasons why markets sometimes fail to achieve socially optimal outcomes.</p> <p>CO2. Identify the relation between development environmental quality with the help of Environmental Kuznet's Curve. Maintain environment and economic issues relating demographic transition, increase in population and poverty.</p> <p>CO3. Implement the sustainable development to foster economic growth while preserving the quality of the environment for future generations and apply millennium development goals to ensure environmental sustainability and develop a global partnership for development</p> <p>CO4. Describe the causes, effects and measures to control pollution in order to achieve optimal level of pollution in India</p> <p>CO5. Examine the factors forcing climate change and solve the global environmental issues. Explain the importance of preserving the environment and set forth international guidelines to protect environment</p> |
| Eco/6/CC/10 | Quantitative Techniques – II | <p>CO1. Explain the basic importance and uses of statistics. Collect data and manipulate using statistics method. Apply the different methods of data collection: Classify Primary and Secondary data, Census and</p> |

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| | | <p>sample survey.</p> <p>CO2. Demonstrate and calculate measures of central tendency – mean, median, mode etc. Determine the measures of dispersion like range, mean deviation, standard deviation, coefficient of variation etc.</p> <p>CO3. Explain the concept of probability and basic theorem of probabilities. Calculate theoretical distribution like binomial, poisson and normal distribution.</p> <p>CO4. Demonstrate Karl Pearson and rank correlation. Explain concepts of partial and multiple correlations. Describe regression analysis and estimate regression line by different methods.</p> <p>CO5. Demonstrate the concept and components of time series and various trends of time series. Calculate problems of index number using various methods.</p> |
| Eco/6/CC/11 | Financial Institutions & Markets | <p>CO1. Describe the functions, objectives and measures taken by RBI and how it helps in controlling Inflation in the economy. Identify different financial instruments and apply different methods in controlling credit in the economy.</p> <p>CO2. Examine the importance and functioning of money market in an economy. Demonstrate an understanding of the commercial banking and its operational issues within a globalized economic system.</p> <p>CO3. Identify the existence of Non-banking Financial Institutions, know the important role of LIC, Investment Companies, Mutual funds etc. and understand how RBI take measures for their regulations in the economy.</p> <p>CO4. Explain the conditions of financial markets, money market and capital market and its impact in the economy.</p> <p>CO5. Explain the role and significance of foreign exchange rate and the concept of different exchange rate. Apply Eurodollar markets to help financial institutions to have greater flexibility in adjusting their cash and liquidity position of the economy</p> |
| Eco/6/CC/12B | International Trade | <p>CO1. Inculcate the importance of international trade for economy. Explain the difference between inter-regional trade and international trade. Illustrate the importance of international trade and the determinants of international trade.</p> <p>CO2. Explain how a nation gains from international trade and explain the rate at which the commodities are exchange between the trading countries. Explain how the international trade take place by using reciprocal demand.</p> <p>CO3. Illustrate the various trade protection measures adopted by the trading countries and their impacts on the economy. Suggest policies and measures on trade protection.</p> <p>CO4. Differentiate between the balance of trade and balance of payments. Illustrate the causes of disequilibrium in the balance of payments and harmful effect of disequilibrium in the balance of payments.</p> |

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| | | <p>Suggest measures to correct the balance of payments. CO5. Illustrate the various items of India's foreign trade and its trading partners. Explain the causes of deficit in the balance of payments and suggest measures to correct the deficit in the balance of payments. Explain the nature of Indian currency system.</p> |
| <p>Program Outcome</p> | | <p>PO1. After completion of under graduate degree course, students will understand the basic principle and concepts of micro-economics and macro-economics. By studying micro-economics, they will understand various economics principle and structures which governed individual economic activities in the real world. Macro-economic will also give the knowledge the overall dimension of economic live, like distribution of national income, consumption behaviour, price level and price policy of the government, employment level and problems, etc. In short, they are equipped with the relevant knowledge of economic principle in order to solve the economic problems, planning and investment.</p> <p>PO2. By studying Indian economics, our students are well equipped with various economic problems like its nature, natural resources, unemployment problems, national income, financial institutions and source of finance for different sectors of economy, industrial development, population, trade and balance of payments, etc. So that, after completing the program, they understand what step should be taken to develop our economy and what should be given more importance in our planning.</p> <p>PO3. Under this program and course, the study of public finance gives the knowledge of financial management of government. Sources of revenue and expenditure and their classification. In our institution, we offer Agriculture Economics. Agriculture occupies an important place in our economy since almost 75% per cent of our population are engaged in agriculture and its allied activities. Students are well equipped with the importance and problems of our agricultural sector. Environmental economics gives the importance of sustainable economic development and various measures which should be taken for the future.</p> <p>International trade helps the students to understand the nature, importance and problems international trade. It informs how the trading countries would gain through international trade. After having a good knowledge on such papers and topics they will become more efficient and good contributor for economic development.</p> |

| Department of EDUCATION | | |
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| Course Code | Course Name | Course Outcome |
| UG/EDN/I/EC/I | Psychological Foundations of Education | CO1. Describe the implications of - educational psychology in teaching and learning, Piaget's theory of cognitive development. CO2. Explain the implications of understanding individual differences in teaching and learning. CO3. Identify the role of teachers in developing mental health and hygiene of the student. CO4. Examine the theories of intelligence and characteristics of creativity. CO5. Describe the assessment of personality and factors affecting personality development. CO6. Examine the different theories of learning and their educational contributions. |
| UG/EDN/I/EC/II | Philosophical and Sociological Foundation of Education | CO1. Discuss the role of philosophy and society in Education. CO2. Explain the Philosophy of idealism, realism, naturalism and pragmatism and their contributions to educational theory and practice. CO3. Discuss the structure and functions of the society and the process of social interaction for change towards better human relationship. CO4. Examine the correct social problems relating to education in India based on equalizations of educational, opportunities, education of backward classes, literacy of girl's education and freedom and discipline. |
| UG/EDN/I/EC/III | Development of Education | CO1. Discuss the development of education in India in historical perspective. CO2. Explain the salient features of education in ancient, medieval and British India. CO3. Describe the significant points of selected educational documents and reports of these period. CO4. Explain the recommendations of various commission and committee on Indian Education. CO5. Examine the development of education in Mizoram in historical perspective. |
| UG/EDN/I/EC/IV | Issues and Trends in Contemporary Indian Education | CO1. Explain the basic aspects and problems relating to elementary, secondary and higher education and the role or functions of various organizations in education at different stages. CO2. Discuss the initiative and actions taken by Government of India in providing alternatives for schooling. CO3. Analyse the important modern trends in Mizoram. |
| UG/EDN/V/EC/V | Research Methodology in Education | CO1. Outline the steps and need for educational research. CO2. Describe the different types of variables and hypotheses. |

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| | | <p>CO3. Discuss the importance of sample and the principles of sampling design. CO4. Identify the different tools for collecting data. CO5. Write a report on a research project.</p> |
| UG/EDN/V/EC/VI | Fundamental of Statistics | <p>CO. explain the basic concept of statistics and types of Statistics. CO2. Explain and illustrate Graphical representation of Histogram, Frequency Polygon and Pie-gram. CO3. Explain the concept, uses and apply measures of Central Tendencies. CO4. Describe the concept, uses and compute measures of variability. CO5. Explain the concept, characteristics and application of normal distribution. CO6. Compute co-efficient of correlation and interpret the result of coefficient of correlation.</p> |
| UG/EDN/V/EC/VII | Educational Evaluation | <p>CO1. Write an essay on the various function of evaluation in Education. CO2. Identify the nature of good measuring instrument and the scale of measurement. CO3. Differentiate between standardized and teacher-made tests. CO4. Discuss the various types of tests and the principles for constructing the tests. CO5. Analyse the process of Standardizing a test. CO6. Identify and examine the new trends in evaluation.</p> |
| UG/EDN/V/EC/VIII | Guidance and Counselling | <p>CO1. Explain the concept and basis of guidance. CO2. List out the principles of guidance. CO3. Describe the meaning, needs, purposes and functions of educational, vocational and personal guidance. CO4. Examine the difference between educational and vocational guidance. CO5. Examine the needs of job analysis and occupational information. CO6. Describe the importance of student's appraisal by using different kinds of test's. CO7. Explain the meaning and importance of counselling with the role of counsellor in secondary school.</p> |
| UG/EDN/IX/EC/09 | Curriculum Development | <p>CO1. Examine the functions and various types of curriculum. CO2. Develop critical thinking in the process of curriculum construction. CO3. Describe the psychological, sociological and philosophical foundations of curriculum. CO4. Demonstrate 'curriculum evaluation' using formative and summative evaluation. CO5. Explain the need and factor affecting curriculum change.</p> |

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| UG/EDN/VI/EC/X | Educational Planning and Management | <p>CO1. Discuss the basic concept of Educational Management and compare the different types of Management.</p> <p>CO2. Discuss the procedures to be followed in Educational Planning.</p> <p>CO3. Analyse the problems of Financial Educational Institutions and generate realistic solutions based on their sources of Income.</p> <p>CO4. Explain and examine the concept and factors affecting managerial behaviour.</p> <p>CO5. Describe the concept, types and principles of supervision.</p> |
| UG/EDN/VI/EC/XI | Development of Educational Thought | <p>CO1. Discuss the evolution of educational thought in Greece and Rome.</p> <p>CO2. Describe the roots of educational thought and practices in Medieval Europe – Monastic, Scholastic, University education for chivalry.</p> <p>CO3. Discuss the educational thought of M.K. Gandhi and Rabindranath Tagore.</p> <p>CO4. Outline the educational contribution of Rousseau and John Dewey.</p> <p>CO5. Describe the role of open and distance education and globalization of education as a means to modern education.</p> |
| UG/EDN/VI/EC/12(B) | Pedagogy | <p>CO1. Explain and examine the nature and characteristics of teaching.</p> <p>CO2. Describe the meaning, characteristics and types of audio-visual aids.</p> <p>CO3. Examine the principles of selection of audio-visual aids and advantages and disadvantages of audio-visual aids.</p> <p>CO4. Explain and demonstrate and lesson plan and diagnostic testing.</p> <p>CO5. Explain the models and different methods of teaching with its advantages and disadvantages.</p> <p>CO6. Explain the meaning and characteristics of the role and function of an effective teacher.</p> <p>CO7. Describe the meaning, needs and significance of professional ethics for a teacher.</p> |

| Department of English | | |
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| Course Code | Course Name | Course Outcome |
| ENG/I/FC/01 | English I | <p>CO1. Use the four skills of LSRW effectively in their everyday communication.</p> <p>CO2. Identify the parts of speech used in the sentence construction.</p> <p>CO3. Use tenses correctly according to the nature or message conveyed</p> <p>CO4. Master the rules of transforming voices and speeches.</p> <p>CO5. Identify the agreement of words in a sentence through the concept of Concord.</p> <p>CO6. Improve reading speed and comprehension as well as reading fluency skills from the set of comprehensive passages.</p> <p>CO7. Write effective essays and summaries from a recent topic or even a prose piece.</p> <p>CO8. Identify the different elements of a letter and apply these elements to compose a letter.</p> <p>CO9. Produce clear and coherent writing.</p> <p>CO10. Write a resume and also understand the typical conventions of report writing.</p> <p>CO11. Develop critical and analytical thinking skills from essay writing exercises.</p> <p>CO12. Use the correct pronunciation of words.</p> <p>CO13. Differentiate major accents of English speaking nations.</p> <p>CO14. Employ complex vocabulary and have a satisfactory grasp of syntax.</p> |
| ENG/I/EC/01 | Elective English (History of English Literature) | <p>CO1. Delineate major writers and their works from Anglo Saxon to the Modern. Period.</p> <p>CO2. Comment on how literature influences social political history of Middle English writers and Renaissance English society.</p> <p>CO3. Analyse the function of satire and it's didactic attention to literature.</p> <p>CO4. Identify Early Modern English literature during the 16th Century and analyse the Romantic and Victorian Moral which anticipated the counter linguistic turn in the 20th century.</p> |
| ENG/II/EC/02 | English II (History of Language & Phonetics) | <p>CO1. Describe the historical background to the evolution of English from its origins.</p> <p>CO2. Describe the nature of the language and its social economic and political spheres.</p> <p>CO3. Briefly analyse the process of speech sound making and their place and manner of</p> |

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| | | <p>articulation.</p> <p>CO4. Distinguish between the workings of vowels and consonants.</p> <p>CO5. Identify stress patterns in both everyday usage and artistic utility.</p> |
| ENG/II/FC/02 | English II | <p>CO1. Write a note on the best examples of English prose and poetry in English so as to realize the communicative power of literature.</p> <p>CO2. Develop the ideas and critical thinking behind the Romantic poets.</p> <p>CO3. Learn how to appreciate the creative use of language in 16th Century literature.</p> |
| ENG/III/EC/03 | English III (Prose & Poetry) | <p>CO1. Identify the minor forms of literature in English.</p> <p>CO2. Write a note on the excellent pieces of Indian Tribal literature written by North Eastern writers.</p> <p>CO3. Briefly describe the impact of NE Indian history written by the local writers of Northeast.</p> |
| ENG/IV/EC/04 | English IV (Fiction) | <p>CO1. Analyse the conventions of English novels during the Victorian Era.</p> <p>CO2. Describe how students interest in reading English literary pieces can be developed with examples.</p> <p>CO3. Comment on the different types and aspects of Victorian novels.</p> <p>CO4. Make an assessment of the characters of Victorian dramas through the English writers portrayal of characters.</p> <p>CO5. Describe how the novel of social protests, political satires and realistic fiction serves the purpose of humanity through readings of Victorian literature.</p> |
| ENG/V/CC/05 | English V (Drama) | <p>CO1. Identify Medieval Christianity, Shakespearean tragedies and the 16th Century dramas in general.</p> <p>CO2. Make a detailed study of a few sample masterpieces of English drama from different parts of the world.</p> <p>CO3. Describe how to appreciate and analyse drama independently.</p> <p>CO4. Develop a wider knowledge based on the critique of London society during the 1770's through drama studies.</p> <p>CO5. Distinguish the differences between Marlovian hero and Shakespearean hero.</p> |
| ENG/V/CC/06 | English VI (Women's Writing) | <p>CO1. Identify the different aspects of feminist novels.</p> <p>CO2. Analyse the English class structure and its radical break with Victorianism after the First World War.</p> |

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| | | <p>CO3. Write a note on the study of the status of women in Indian society through readings of Indian novels.</p> <p>CO4. Comment status of women across the world through the prescribed novels.</p> <p>CO5. Distinguish the plight of women from different cultures around the world.</p> |
| ENG/V/CC/07 | English VIII (Literary Theory and Criticism) | <p>CO1. Describe the genesis and the anticipation of English literary criticisms from its Greeko-Roman origins,</p> <p>CO2. Comment on the evolution of Middle English criticisms Into a more refined one in the neoclassical age under the study of John Dryden and his contemporaries.</p> <p>CO3. Define the nature of language use and simplicity in romantic poetry and practical mode of measurement used by Victorian critics.</p> <p>CO4. Write a comprehensive assessment on modern literary criticism.</p> |
| ENG/V/CC/08 | English VIII (Popular Studies) | <p>CO1. Comment on some of the best samples of the counterculture music of the 60's.</p> <p>CO2. Analyse the American history such as the Vietnam War and the Civil Rights Movement.</p> <p>CO3. Describe the impact of positive values and attitudes conducive to lifelong learning through the lives of Black Americans, 60's music and literature.</p> <p>CO4. Comment on the general culture of different places where English is used.</p> <p>CO5. What are the aspects of culturally diverse societies around the world.</p> |
| ENG/VI/CC/09 | English IX (Indian Writings in English) | <p>CO1. Describe the impact of representative literary and cultural texts through Post-Colonial novels.</p> <p>CO2. Comment how people develop a sense of national identity after reading texts about colonial domination, and the ways in which writers articulate and celebrate each identity.</p> <p>CO3. Describe the meaning of resistance of the colonizers.</p> <p>CO4. Describe the provisions of the various phases of Indian writings in English changes the literary scenario of different decades and their genres.</p> <p>CO5. Write an note on how the thematic concerns, genres and trends of Indian English writers develop a keenness for regional literatures.</p> |
| ENG/VI/CC/10 | English X (Drama) | <p>CO1. Describe how drama studies can shape students into formed, skilled, knowledgeable and ethical interpreters by nurturing their ability to understand drama.</p> <p>CO2. Discuss the historical context, psycho-social and discern values associated with the texts.</p> <p>CO3. Write a note on how to obtain a value orientation by means of poetic justice in</p> |

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| | | tragedy or comedy and comprehension of human actions and their consequences in life. |
| ENG/VI/CC/11 | English XI (Literary Theory & Criticism) | CO1. Analyse classical literary criticisms from the Greek Plato to Longinus in the Roman Period. CO2. Analyse the Medieval and Renaissance mode of criticism. CO3. Describe how to appreciate the critical approaches of philosophical theories proposed by 20th Century critics. CO4. Describe how to interpret literary works so as to develop aptitude for critical analysis. |
| ENG/VI/CC/12 | English XII (Commonwealth Literature) | CO1. Differentiate the nature of Commonwealth Literature from the Colonizers literature. CO2. Describe the culture and traditions of the Commonwealth. CO3. Describe the colonizers influence in all aspects of life including language. CO4. Discuss the need to resist the outside influence and uplifting one's own culture. |
| Programme Outcome | | PO1. Students are able to develop intellectual, personal and professional abilities through effective communicative skills by ensuring high standard of behavioural aptitude through literary subjects thereby shaping the students socially responsible citizens. PO2. Students employability is developed through their linguistic competence and communicative skills. PO3. Students are able to demonstrate a broad awareness of texts and their historical and cultural context in English. PO4. They recognize how literature has served a role in social change. PO5. They are able to appreciate the interconnectivity and inter-disciplinary aspects of all knowledge. |
| Programme Specific Outcome | | PSO1. Students are familiar with representative literature and cultural texts within a significant number of historical, geographical and cultural contexts. PSO2. They are able to apply critical and theoretical approaches to the reading and analysis of literary and cultural texts in multiple genres. PSO3. They are able to ethically gather, understand, evaluate, and synthesize information from a variety of written and electronic sources. PSO4. They are able to write analytically in a variety of formats- essays, reflective writing and reviews of secondary sources. PSO5. They develop intellectual flexibility, creativity and cultural literacy so as to |

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| | engage in life-long learning. |
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| Department of GEOGRAPHY | | |
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| Course Code | Course Name | Course Outcome |
| Geog – 101 | Physical Geography | CO1. Explain the spatial characteristics of the various natural phenomena associated with the Earth's lithosphere, hydrosphere, biosphere and atmosphere. CO2. Explain the character of, and processes shaping, the land-surface of the Earth and its envelope. CO3. Emphasizes the spatial variations that occur and the temporal changes necessary to understand the contemporary environments of the Earth. |
| Geog – 201 | Human Geography | CO1. Explain the spatio-temporal change of society, population and settlement. CO2. Analyse human adaptation to environment at a global scale. |
| Geog – 301 | Geography of India | CO1. Analyse spatial or regional variation in physiography, vegetation and climate, population, economics and society across the country, and explain the factor responsible for such variation. |
| Geog – 401 | Cartographic Technique (Practical) | CO1. Explain the basic concept of cartographic technique used in geographical studies and research. |
| Geog – 501 | Geographical Thought | CO1. Explain the fundamental philosophy of geography, the development of geography from the ancient period and different concept in geography. |
| Geog – 502 | Economic Geography | CO1. Analyse the interrelationship between economy and environment either physical or human. CO2. Criticize the impact of economic development on environment and; sustainable development for future reference. |
| Geog – 503 | Surveying & Statistical Techniques (Practical) | CO1. Apply the different types of surveying and statistical technique for geographical studies on either physical or social sites. |
| Geog – 504 A | Population Geography (Optional) | CO1. Explain the relationship between environment and population, spatial and structural dimensions of population and the emerging issues. CO2. Analyse the factors which influence the distribution and mobility of human populations including settlement and economic activities and networks, and human impacts on the physical environment. |

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| Geog – 504 B | Agriculture Geography (Optional) | CO1. Explain the relationship between environment and agriculture; the impact of environment on agriculture and vice versa. CO2. Evaluate different types of agriculture to support sustainable development of agriculture at a global and regional level viz. India. |
| Geog – 601 | Geomorphology | CO1. Explain the various processes and associated landforms at different spatial and time scales; endogenic and exogenic processes, their controlling mechanisms, and their interaction to form the landscape. |
| Geog – 602 | Remote Sensing & GIS | CO1. Discuss the basic knowledge of Remote Sensing and the application of GIS. CO2. Explain the importance of remote sensing on GIS application; the method of collection of spatial and non-spatial data from satellite or aerial photograph for making different kind of maps. |
| Geog – 603 | Remote Sensing & GIS and Project Work (Practical) | CO1. Provide different types of map by using GIS software through spatial and non-spatial data from satellite or aerial photograph. CO2. Explain different types of research methodology and its application. CO3. Apply the different surveying technique and research method in the actual field. |
| Geog – 604 A | Urban Geography (Optional) | CO1. Explain the origin, development and various aspects of cities with relation to the environment. CO2. Analyse the spatio-temporal change of cities, the inter and intra variation of the cities in physical and social aspects. |
| Geog – 604 B | Political Geography (Optional) | CO1. Explain the importance of geography for understanding the political system at the global or regional level. CO2. Analyse the influence of environment on the regional political system. |

| Department of HISTORY | | |
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| Course Code | Course Name | Course Outcome |
| Hist/I/EC/01 | History of Mizoram (Upto the 1960s) | CO1. Develop an understanding on the origins and migration of Mizos through oral sources and understand the socio-economic and political set up of the Pre-Colonial Mizo Society. CO2. Acquire ability to interpret the history of Mizoram in the Pre-Colonial and Colonial period with the help of the careful analysis of Early British accounts and oral sources. CO3. Have a broad historical knowledge into the period of British rule in Mizoram. CO4. Have a broad knowledge on the growth of political activism in Mizoram and its subsequent development to present day scenario. CO5. Gain profound knowledge on the introduction and development of Christianity in Mizoram and its impact on Mizo society. |
| Hist/II/EC/02 | History of India upto Post-Maurya period | CO1. Have a broad knowledge of the different sources used for the study of Early Indian History. CO2. Ability to answer the questions on the origins, growth and decline of the Indus Valley Civilization by holistically analyzing certain sources, both literary and archaeological. CO3. Be familiarized with the nature and growth of kingdoms in the Post-Vedic Northern and Central India. CO4. Have a historical insight into the emergence, administration, economy and decline of the Mauryan Empire and also of the developments in the aftermath of the Mauryan decline. CO5. Acquire profound knowledge on the emergence of heterodox sects and of the developments in art and architecture in Early India. |
| Hist/III/EC/03 | History of India (Gupta to Sultanate periods) | CO1. Be familiarized with the economy, society, political structure and cultural developments under the Gupta Empire. CO2. Understand the nature and growth of ruling families in Northern India after the decline of Gupta Empire and the growing importance of the samanta system. CO3. Understand the developments of the Pallavas and Cholas with special emphasis to their agrarian structure and role of temples in their socio-economic and cultural life. CO4. Acquire profound knowledge on the history of the Delhi Sultans and understand the various tenets of their administration. CO5. Familiarized with the development of Religion, Art and Regional polity during the Sultanate period. |
| Hist/IV/EC/04 | History of the Mughals | CO1. Inculcate a clear picture on the history of Pre –Mughal society and the foundation and consolidation of Mughal rule in India. |

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| | | <p>CO2. Possess knowledge on the nature of the different sources used for the reconstruction of Mughal History.</p> <p>CO3. Have a clear grasp on the nature of state and administration under the Mughal rule.</p> <p>CO4. Profound historical knowledge to analyse the social structure, status of women and economic patterns under the Mughal rule.</p> <p>CO5. Have a clear insight on the relationship of the Mughals with the Sikhs, Rajputs, and Marathas with great emphasis to the religious policies of Akbar and Aurangzeb.</p> <p>CO6. Demonstrate with historical accuracy the different factors that led to the disintegration of the Mughal Empire.</p> |
| Hist/IV/EC/05 | Modern India -I | <p>CO1. Acquire profound understanding on the nature of expansion and consolidation of British Rule in India with special reference to Bengal, Mysore, Punjab, Awadh and the Revolt of 1857.</p> <p>CO2. Understand the important features of the administrative patterns and policies of the British.</p> <p>CO3. Develop an in depth understanding of the rural economy and society of Colonial India.</p> <p>CO4. Be able to analyse the changes in trade and industry of India in the 18th Century.</p> <p>CO5. Acquaint historical knowledge on the Social and Cultural Changes and Religious Reforms Movements in India the 19th Century.</p> |
| Hist/IV/EC/06 | Historiography | <p>CO1. Develop the crucial understanding of studying history as a discipline and imparted a broader outlook on the scope and relation of History with other disciplines.</p> <p>CO2. Acquire familiarisation with the concept of Generalization, Causation, Objectivity and Subjectivity in Historical interpretation.</p> <p>CO3. Basic understanding of the different sources in History.</p> <p>CO4. Demonstrate the different trends in the traditions of Historical Writing from the Ancient period to Modern period.</p> <p>CO5. Acquire in-depth comprehension on the different approaches that governs the writing of Indian History.</p> |
| Hist/IV/EC/07 | Early Modern Europe | <p>CO1. Demonstrate with historical accuracy the rise of Ottoman Empire, Venetian monopoly of the Mediterranean trade and the rise of Portuguese Empire as a supreme naval power.</p> <p>CO2. Possess a clear notion on the historical relevance and philosophy of the Renaissance and Reformation of Religion</p> <p>CO3. Achieve profound historical knowledge of The French Revolution and the destruction of the Absolutist Regime.</p> <p>CO4. Acquire important knowledge on the intellectual roots and influence of the Scientific Revolution and the Enlightenment.</p> |

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| Hist/IV/EC/08 (C) | History of Northeast India (1822-1986) | <p>CO1. Be familiarized with the Early British Policy in North East India, the significance of the First Anglo Burmese War and the annexation of Assam, Cachar and Jaintia Hills</p> <p>CO2. Acquire knowledge and understanding on the patterns of administration and consolidation of British rule in the Khasi, Garo, Naga and Mizo Hills.</p> <p>CO3. Develop an understanding of the economic and social changes under the British rule.</p> <p>CO4. Demonstrate the impact of nationalist movements in Assam.</p> <p>CO5. Acquire in depth knowledge on the different political developments in North East India since Independence with regard to the nature of integration of North Eastern States into the Indian Union.</p> |
| Hist/IV/EC/09 | Modern World History | <p>CO1. Develop a profound understanding of the background, causes and impact of The Industrial Revolution taking into account the important characteristics of society in the Nineteenth Century Europe.</p> <p>CO2. Understand the political and ideological trends that dominate Europe in the Nineteenth Century.</p> <p>CO3. Demonstrate the important features of the 'New Imperialism' and the changing trends in technology, industry and social life</p> <p>CO4. Acquire proficiency on the history of the two World Wars with special emphasis to the causes and important events that shaped the outcome of the two Wars.</p> |
| Hist/IV/EC/10 | Contemporary World | <p>CO1. Acquire important knowledge on the The Cold War and its impact on Global politics.</p> <p>CO2. Demonstrate the important features on the surge of Revolutions and Decolonization in Asia and Africa and its transforming effect on the global scale.</p> <p>CO3. Understand the political scenario in different parts of the world during the Cold War period and analyse the rise of Third World Countries.</p> <p>CO4. Develop a clear cut comprehension on the disintegration of Cold War politics and the rise of Social and Cultural Movements in different parts of the World; with emphasis given to the end of Soviet Union, Gender Movement and Civil Rights Movement.</p> <p>CO5. Demonstrate in comprehensible terms the features of Globalization, Post-Colonial politics and the rise of the Fourth World.</p> |
| Hist/IV/EC/11 | Modern India -II | <p>CO1. Understand the Historiography of Indian Nationalism.</p> <p>CO2. Acquire awareness of the historical background preceding the formation of the Indian National Congress, eventual formation of the Congress, existence of internal factions and its role in the freedom movement.</p> <p>CO3. Be able to trace the contributions of the Revolutionaries, Leftists and civilians in the freedom struggle</p> <p>CO4. Understand the beliefs and ideologies of Mahatma Gandhi and his contributions to the freedom struggle</p> <p>CO5. Develop an understanding of the various legislations of the British Government of India.</p> |

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| | | <p>CO6. Analyse the history of Communalism in India with special emphasis to the British policy to Communalism in India.</p> <p>CO7. Analyse the important challenges and features of the Partition of India, Integration of the princely states and framing of the Constitution.</p> |
| Hist/IV/EC/12 (A) | History of USA(1776 -1945) | <p>CO1. Understand the important features of English Colonial Rule and American Revolution in North America .</p> <p>CO2. Understand the important features of the Early Republic in America with special regard to the ideological contrast and debates.</p> <p>CO3. Analyse the programmes of Westward expansion and Sectionalism in America.</p> <p>CO4. Develop an understanding on the background, causes and aftermath of the American Civil War with special regard to the growth of slavery in America.</p> <p>CO5. Analyse the reasons for the expansion of US industry and commerce post-Civil War and its impact on business, social and agrarian sector.</p> <p>CO6. Analyse the various policies and factors determining the participation of United States in the two World Wars.</p> |
| Programme Outcome | | <p>PO1. The Students will acquire the curiosity of the mind, the chief characteristic of a historian which will help them to have a broad outlook and a reliable knowledge.</p> <p>PO2. The students will acquire proficient knowledge in the understanding of different traditions and approaches to history which will provide assistance for their further research work and for their endeavor for the objective, rational and unbiased reconstruction of history.</p> <p>PO3. The student will understand the importance of historical awareness and the need for the preservation of heritage (tangible and intangible) as they are the windows to the past that influences the present world.</p> <p>PO4. The emphasis of this programme on the political, social and economic aspects of World history will enable the students to be proficient, progressive and responsible in their social life and be sensitized to the issues and challenges of gender and Social inequalities.</p> |

| Department of MIZO | | |
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| Course Code | Course Name | Course Outcome |
| MZ/1/EC/1 | Poetry - I | CO1. Explain the genesis of Mizo Folk Songs. CO2. Analyse Mizo Folk Songs having individual composers. CO3. Interpret pioneer of Mizo modern poets and their poetry. CO4. Assess Mizo 'Hla Lenglawng'. CO5. Examine Mizo lyrical songs. CO6. Elaborate emergence of patriotic songs in Mizo literature. |
| MZ/2/EC/2 | Drama-1 | CO1. Demonstrate drama, appearance of women's writings in Mizo literature. CO2. Analyse translation works from English literature. CO3. Assess and clarify Mizo plays. CO4. Imparted knowledge and consciousness on English play in order to elaborate the same. |
| MZ/3/EC/3 | Fiction-I | CO1. Describe Mizo fiction with different techniques. CO2. Examine status and hardships of impoverished women in Mizo society. CO3. Analyse the second short story in Mizo literature, its quality and approaches. CO4. Have Critical study of Mizo fiction, theme and techniques. |
| MZ/3/FC/3 | Introduction to mizo language and literature | CO1. Explain pattern and background of hymns composed during Western missionaries occupied in Mizoram. CO2. Have vivid explanation to outgrowth and progress of hymns amongst the Mizos. CO3. Trace rise and development of patriotic songs in Mizo literature. CO4. Examine theme and approach of recent Mizo Poetry. CO5. Assess different techniques employ in the writing of Drama based on Mizo History. |
| MZ/4/EC/4 | Essays | CO1. Explain first Mizo essay, how it deals with humanity and nature. And having a guest as one of Mizo culture, the right approach. CO2. Cope with hardships in life; it leads to fortune. Compare new and old religion of the mizo, significance and impacts, consequences. CO3. Clarify Mizoram, its physical settings and environment, how patriotic feeling is set, about sentiments of Mizo. How hard work brings its own reward. CO4. Explain the meaning and contrary of 'Mizo tlawmngaihna'. Importance and tremendous ability of books. |

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| | | CO5. Analyse courage, differentiate two types of courage. Express logical study of optimism and pessimism. |
| MZ/5/CC/5 | Theory of literature | CO1. Describe the Outline view of Literature, similarities and differences of literature and history. Classification, trends and progress of Mizo literature. CO2. Elaborate Poetry: Genre and techniques. CO3. Express Critical study of drama in literature. CO4. Trace the rise and development of prose writing and fiction in literature. CO5. Explain Criticism: its essence significance in literature, with special reference two Mizo literature. |
| MZ/5/CC/6 | Selected English Poems | CO1. Elaborate Elizabethan poetry, mete-physical school of thought . CO2. Explain John Milton and his poetry and the Puritan Poetry. CO3. Describe Romantic Poetry- Keats, Wordsworth and Italian Sonnet. CO4. Classify Victorian Poetry, Mathew Arnold and Alexander Pope. CO5. Analyse poetry of Frost, American poet and Indian writing in Poetry. CO6. Examine modern poetry from W.B. Yeats and American famous poet Dylan Thomas. |
| MZ/5/CC/7 | Poetry - II | CO1. Gain knowledge in Mizo folk songs, its reflects and ideology. CO2. Know the history of the emergence and beginning of Mizo modern Poetry. CO3. Classify Ode and Satire. CO4. Explain different techniques of Poetry, know-how the use of alliteration, personification, rhyme, poetic diction, etc. CO5. Identify Ode and its techniques in Mizo poetry. CO6. Identify pattern and techniques of Ballad and Satire in Mizo poetry. |
| MZ/5/CC/8 (B) | Prose Writings | CO1. Recognize Religion and beliefs of the ancient Mizo. CO2. Explain marriage system, rites and supernatural belief in the olden days of Mizos. CO3. Describe erstwhile fascinating life of young men and young women in Mizo society. CO4. Demonstrate honor and exaltation, grandest trophy amongst our predecessors. CO5. Appreciate the patriotic view of Mizoram and psyche of the people living therein. CO6. Describe 'Ral lu ai' ceremony, how they prepare the celebration of their victory when they take enemy's head during war. |

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| MZ/6/CC/9 | History of Mizo Literature | CO1. Know the chronology of Mizo literature. CO2. Get broader knowledge in Mizo poetry. CO3. Recognize the emergence and approach of Mizo prose writings. CO4. Have gained knowledge of the emergence and progress of Drama. CO5. Receive and appreciate the rise of Fiction in Mizo literature. |
| MZ/6/CC/10 | Fiction- II | CO1. Grasp knowledge on outbreak of first Mizo fiction, 'HAWILOPARI' By L.Biakliana. CO2. Have critical appreciation in Mizo historical novel, trends and progress. CO3. Gain critical perception in observation of Social life and religion of Mizo modernism. CO4. Able to classify and clarify Christianity and fore religion of Mizo, political environment and economic status. |
| MZ/6/CC/11 | Mizo Language and Grammar | CO1. Explain what is language, its etymology. CO2. Describe root and basis of Mizo language, its differences. CO3. Elaborate characteristics of Mizo language. CO4. Demonstrate transformation, how Mizo language going through changes. CO5. Clarify enrichment of Mizo language through alteration and preservation of different Mizo dialects. CO6. Explain correct usage, correct system and orders in writing Mizo language- methods and strategies. |
| MZ/6/CC/12 (B) | Selected English Prose | CO1. Appreciate English prose writing and catch the importance of studies, points to write well. CO2. Elaborate Riches, how land and environment is dealt by the Red Indian people. CO3. Explain Shakespeare as the father of the dramatic poet, having wit. How the weather change due to false activities of man. CO4. Examine what is Happiness and the two types of Courage. CO5. Describe- many ideas about life, thought and reality, Vanishing animals due to man's entry into their paradise. CO6. Explain meaning of Culture, religious and political importance of Tawang. |
| Programme Outcome | | PO1. Provide understanding to significant development of Mizo literature. PO2. Impart knowledge and familiarity in English literature. PO3. Sow understandings in different genres of literature. PO4. Develop analytical skills and create critical thinking. PO5. Create awareness on progress, shortage and importance of Mizo language. |

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| Programme Specific Outcome | PSO1. Inculcates and inspires to develop Mizo literature. PSO2. Creates consciousness and critical perception in different genres and techniques in different streams of literature. PSO3. Recognizes unspeakable importance of Mizo language as it is one of our social identity, privation and progress. |
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| Department of POLITICAL SCIENCE | | |
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| Course Code | Course Name | Course Outcome |
| Pols/I/EC/01 | Government and Politics of Mizoram | <p>CO1. Discuss the regional profile of North-east India and the place of Mizoram in it.</p> <p>CO2. Explain the effects of British Annexation on traditional, political and social institutions.</p> <p>CO3. Explain inner line regulation.</p> <p>CO4. Analyze the sixth schedule- structure, powers and functions of autonomous district council in Mizoram.</p> <p>CO5. Critically examine the causes and consequences of insurgency in Mizoram.</p> <p>CO6. Assess the memorandum of Settlement, 1986 (The Peace Accord).</p> <p>CO7. Explain the constitutional development leading to the creation of the state of Mizoram.</p> <p>CO8. Elaborate the functioning of the Government in Mizoram - Governor, Chief Minister and Legislative Assembly.</p> <p>CO9. Emphasize the emergence of political parties in Mizoram.</p> <p>CO10. Elaborate the National and Regional political parties in Mizoram .</p> <p>CO11. Assess the local self-government in Mizoram i.e., municipality with special reference to the 74th constitutional amendment.</p> <p>CO12. Explain the structure and functions of Village Councils.</p> |
| Pols/II/EC/02 | Indian Government and Politics | <p>CO1. Explain the Indian constitution - the making of India's constitution.</p> <p>CO2. Discuss the preamble - ideals and philosophy.</p> <p>CO3. List out the salient features of the constitution.</p> <p>CO4. Explain the fundamental rights and duties.</p> <p>CO5. State the directive principles of state policy.</p> <p>CO6. Explain the nature of Indian federalism, tension areas of centre-state relations, amendment procedures and emergency provisions.</p> <p>CO7. Critically analyze the important institutions of the Indian Union Government, i.e., The President, Parliament and Prime Minister.</p> <p>CO8. Critically analyze the important institutions of the State Government i.e.,</p> |

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| | | <p>Governor, State Legislatures and Chief Minister.</p> <p>CO9. Critically analyze the important institutions of Judiciary i.e., Supreme Court, High Court and Judicial Review.</p> <p>CO10. Emphasize the election commission of India and its composition, powers and functions.</p> <p>CO11. Explain the major issues and challenges to Indian polity like casteism, communalism and regionalism and the criminalization of politics.</p> <p>CO12. Elaborate the Panchayati Raj system with special reference to 73rd constitutional amendment.</p> |
| Pols/III/EC/03 | Major Political System | <p>CO1. Trace the historical background of the British constitution and analyze its basic features.</p> <p>CO2. Examine the importance of rule of law and conventions in the British political system.</p> <p>CO3. Discuss the inter-relationship, functioning and structure of the British monarchy, parliament, the Prime Minister and the Cabinet.</p> <p>CO4. Assess the salient features of the US constitution and their ramifications in the US political system.</p> <p>CO5. Analyze the principles of the US federal system and separation of powers and their significance.</p> <p>CO6. Assess the working and importance of the role of the US President, congress and the supreme court.</p> <p>CO7. Examine the outstanding features of the Swiss constitution.</p> <p>CO8. Evaluate the working of the Swiss Government with special emphasis on the Swiss federal assembly.</p> <p>CO9. Explain the various devices of direct democracy in Switzerland and their usage.</p> <p>CO10. Trace the evolution of the Chinese constitution and examine its ideological principles and basic features.</p> <p>CO11. Assess the working of the Chinese political system with special reference to the national people's congress, the Chinese President and the State Council.</p> <p>CO12. Comparative analysis of the party system and their role in the political systems of Britain, USA, Switzerland and China.</p> |

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| Pols/IV/EC/04 | Political Theory | <p>CO1. Analyse what is political theory, nature, scope and significance.</p> <p>CO2. Explain the approaches to the study of political theory –traditional, behavioural, post-behavioural, Marxist.</p> <p>CO3. Assess the theories of origin of state, liberal and Marxist.</p> <p>CO4. Describe the meaning, characteristics and types of sovereignty.</p> <p>CO5. Explain the concept of state sovereignty: monistic and pluralistic theories.</p> <p>CO6. Explain the basic concepts of liberty, equality, rights, law and justice & analyse the theories.</p> <p>CO7. Analyse the meaning and different theories of democracy including western liberal democracy.</p> <p>CO8. Discuss the features of welfare state.</p> |
| Pols/V/CC/05 | Western Political Thought | <p>CO1. Analyze Plato and his justice, education, communism and his ideal state.</p> <p>CO2. Analyze Aristotle and his classification of Constitution, best practicable state, revolution and slavery.</p> <p>CO3. Give comments on St. Augustine’s two cities and separation of church and state.</p> <p>CO4. Discuss Machiavelli’s ideas on religion and morality and his ideas on state.</p> <p>CO5. Explain Social Contract Theory, absolute sovereignty and individualism by Hobbes.</p> <p>CO6. Explain Social Contract Theory, government and property by Locke.</p> <p>CO7. Explain Social Contract Theory and general will by Rousseau.</p> <p>CO8. Describe utilitarianism by Bentham.</p> <p>CO9. Explain liberty, women, alterations of utilitarianism and democracy by J.S. Mill.</p> <p>CO10. Investigate dialectics and state by Hegel.</p> <p>CO11. Discuss dialectic materialism, historical materialism, theory of revolution, class struggle and surplus value by Marx.</p> |
| Pols/V/CC/06 | International Relations | <p>CO1. Explain the meaning and nature of International relations approaches and methods to study the discipline through political realism and idealism.</p> <p>CO2. Elaborate the meaning and nature of sovereign nation-state system, nation interest and national power.</p> <p>CO3. Outline the emergence of third world & assess the impact of NAM in world</p> |

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| | | <p>politics.</p> <p>CO4. Describe the causes, different phases of cold war and the post-cold war era.</p> <p>CO5. Provide an insight into International security such as – disarmament and arms control, balance of power, collective security, diplomacy, terrorism.</p> |
| Pols/V/CC/07 | Public Administration | <p>CO1. Illustrate the nature, scope and meaning of public administration.</p> <p>CO2. Explain the various approaches to the study of public administration like Classical Theory, Scientific Management, Human Relation Approach, Bureaucratic Approach, Ecological Approach and Public Administration in the age of globalization.</p> <p>CO3. Explain the types of Organization such as Formal and Informal, Hierarchy, Centralization and Decentralization and Coordination.</p> <p>CO4. Examine the administrative behaviour such as Leadership, decision-making, communication and accountability.</p> <p>CO5. Analyze development administration and personnel administration such as recruitment, training and promotion.</p> <p>CO6. Explain the Indian administration such as Minister- Civil servant relation.</p> <p>CO7. Compare the Legislative and Judicial control over administration.</p> <p>CO8. Give the meaning and Principles of budgeting, preparation and passing of budget in India.</p> <p>CO9. Explain the Comptroller & Auditor General, estimates committee and public accounts committee.</p> |
| Pols/V/CC/08 (a) | Human Rights | <p>CO1. Critically examine the meaning of human rights, its scope and importance.</p> <p>CO2. Analyze the role played by the United Nations in preserving and promoting Human rights worldwide.</p> <p>CO3. Discuss the various declarations, resolutions and conventions adopted by the United Nations and their importance in the protection and promotion of human rights.</p> <p>CO4. Discuss the universal declaration of human rights and its various provisions.</p> <p>CO5. Examine the role played by governments, NGOs as well as the United Nations in protecting and preserving the rights of children, minority groups, disabled and old aged persons, with special reference to the initiatives taken by the Indian government.</p> |

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| | | <p>CO6. Evaluate the contributions of international NGOs in the protection of Human Rights with special reference to the role and function of the Amnesty International.</p> <p>CO7. Explain the various civil, political and socio-economic instruments of Human Rights and analyze their application and implementation by governments and organizations worldwide.</p> <p>CO8. Discuss the third generation of Human Rights i.e. the right to development and its significance in the 21st century.</p> <p>CO9. Examine the various provisions of Human Rights in the Indian constitution and their relevance.</p> <p>CO10. Evaluate the structure and working of the National Human Rights Commission of India in protecting and promoting Human Rights in India.</p> |
| Pols/VI/CC/09 | Indian Political Thought | <p>CO1. Explain the sources of Indian Political thought.</p> <p>CO2. Explain Kautilya's Arthashastra, theory of government and statecraft.</p> <p>CO3. Discuss social liberalism by Raja Ram Mohan Roy.</p> <p>CO4. Analyze Vedic Nationalism by Dayananda Saraswati.</p> <p>CO4. Examine Nationalism and Internationalism by Swami Vivekananda.</p> <p>CO5. Comments on Swadeshi by Gopal Krishna Gokhale.</p> <p>CO6. Give comments on Swaraj by Bal Gangadhar Tilak.</p> <p>CO7. Elaborate non-violence and Satyagraha by Mahatma Gandhi.</p> <p>CO8. Explain socialism and individualism by Jawaharlal Nehru.</p> <p>CO9. Discuss radical humanism and party-less democracy by M.N. Roy.</p> <p>CO10. Explain equity and contribution to the Constituent Assembly by B.R. Ambedkar.</p> <p>CO11. Critically analyze total revolution by J.P. Narayan.</p> |
| Pols/VI/CC/10 | Indian Foreign Policy | <p>CO1. Provide an in-depth study of Indian Foreign Policy – Its determinants, principles and objectives.</p> <p>CO2. Evaluate India's Policy of non-alignment.</p> <p>CO3. Explain the concept and relevance of non-alignment.</p> <p>CO4. Describe India's relationships with various countries.</p> <p>CO5. Give detailed assessment of its relationships with its neighbouring countries</p> <p>CO6. Evaluate India's Nuclear Policy.</p> <p>CO7. Highlight India's looked East Policy and its relationship with European</p> |

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| Pols/VI/CC/11 | The United Nations | <p>CO1. Discuss the origin of International Organization, League of Nations and its failure.</p> <p>CO2. Explain the historical development of the United Nation.</p> <p>CO3. Analyze the United Nations Charter, its objectives and principles.</p> <p>CO4. Give detail information on the membership of the United Nations.</p> <p>CO5. Examine the Principal organs of the United Nations like General Assembly, Security Council, Economic and Social Council, Secretariat and International Court of Justice.</p> <p>CO6. Explain the United Nations specialized Agencies like I.L.O, U.N.E.S.C.O and W.H.O</p> <p>CO7. Analyze the United Nations programs and funds like UNICEF, UNDP and UNEP.</p> <p>CO8. Evaluate the United Nations & Peace keeping.</p> <p>CO9. Examine the United Nations & Human Rights.</p> <p>CO10. Analyze the relevance of United Nations in Post-Cold War period.</p> <p>CO11. Explain the reforms in the United Nations and the issues and debates in the United Nations.</p> |
| Pols/VI/CC/12 (a) | Political Sociology | <p>CO1. Examine the concept of Political Sociology, its nature, scope & importance.</p> <p>CO2. Examine the concepts of power, influence, authority and legitimacy in the context of various societies.</p> <p>CO3. Critique the various theories of power, namely, Elitist Theory, with special reference to Wilfredo Pareto, Gaetano Mosca and Roberto Michels, the Marxian conception of power and the Pluralist criticism of the Elitist Theory.</p> <p>CO4. Discuss the approaches to the study of political culture, examining the various agents of political socialization and the factors affecting the nature of political participation.</p> <p>CO5. Assess the concepts of political development and modernization and the inter-relationship between the two concepts.</p> <p>CO6. Evaluate the forms of social stratification with special emphasis on the concepts of caste and class and their impacts on the society.</p> <p>CO7. Examine the various factors of social change and theoretically analyze the</p> |

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| | | <p>various dimensions of social change. CO8. Analyze the concepts of sanskritization, modernization and secularization, their underlying principles and influence on the social structure.</p> |
| <p>Programme Outcome</p> | | <p>PO1. Empirical Analysis of Society - Understand the various underlying principles that governs the socio-political structure of a society. This is achieved through a comprehensive study of the concept of political sociology and developing analytical and critical thinking in the minds of the students through their study of political theories and thoughts of eminent theorists and political scientists. PO2. Understanding the Nations, Governments and the Governmental Structures - Through in-depth study of the political systems of major democracies as well as the working of Indian democracy and its political system, students are able to understand the nature and working of various governmental structures and their significance in sustaining the socio-political systems vital for our existence and future. PO3. Development of spirits of individual and team work - The curriculum enriches and hones the abilities and potentials of students to be a responsible citizen, or to become a leader in various types of socio-political setting. This is achieved through the conduct of continuous internal assessments, presentations, seminars, field works and assignments on varied topics under the subject discipline. PO4. Practical implications of the subject Discipline - Students needs to develop and inculcate a sense of civic duty and imply their theoretical and ideological tendencies to the benefit of the society. This aim has been achieved through interacting with various civil society organizations and conducting research among the public on various issues such as electoral behavior, church and politics, government and civil society organizations, etc.</p> |
| <p>Programme Specific Outcome</p> | | <p>PSO1. Understand the political history and development of politics and government in Mizoram PSO2. Analyze the various trends and issues in Indian politics and understand the working of the Indian political system PSO3. Encourage a comprehensive and broader understanding of various types of political systems and ideologies worldwide by examining political systems based on the two main political principles-socialism and democracy.</p> |

PSO4. Develop a critical mind and outlook towards politics and society through the study of various political theories, political thinkers and theorists, from ancient to modern times.

PSO5. Understanding the various structure and practices of public administration, administrative studies and public policy with special reference to Indian administrative structures and practices.

PSO6. Examining the various facets of foreign policy formulations, placing emphasis on the nature and principles of India's foreign policy as well as analyzing the significance of the concept of International relations, International Organizations ,etc., and their importance for various countries and political systems worldwide.

PSO7. Critically examine the concept of Human Rights and its various dimensions with an aim to disseminate the importance of preserving, protecting and promoting human rights in the minds of the public.