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No. BGSBU/Reg/21/5541- 42  
Date: 31.05.2021

IQAC Coordinator,  
BGSB University,  
Rajouri.

Sir,

Kindly find herewith the Programme outcomes, Programme specific outcomes and course outcomes for different programmes offered by the University for academic year 2018-19 for further necessary action.

Registrar  
**REGISTRAR**  
**BGSB University**  
**Rajouri - J&K**

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1. SS to HVC for kind information of Hon'ble Vice Chancellor.
2. Office File.

## **Programme: B.TECH ECE**

### **Programme Outcomes**

PO1

Engineering knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and computer engineering to the solution of engineering problems.

PO2

Problem analysis: Identify, formulate, review research literature, and analyze engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3

Design/development of solutions: Design solutions for engineering problems related to engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the engineering practice.

PO7

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

## PO10

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

## PO11

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

## PO12

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes in Engineering.

### **Programme specific outcomes:**

Upon successful completion of the B.TECH ECE programme, the students will be able to:

#### **PS01: Circuit Design Concepts:**

Apply basic and advanced electronics for implementing and evaluating various circuit configurations.

#### **PS02: Communication Theory and Practice:**

Possess application level knowledge in theoretical and practical aspects required for the realization of complex communication systems.

### **Course Outcomes**

**Course Title:** Mathematics-I

**Course Code:** BSC-ECE-101

### **COs**

- CO1.** Understand the significance of Rolle's Theorem, Mean Value theorem, Taylor's and Maclaurin's series for differentiable functions.
- CO2.** Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.
- CO3.** Use basic the integral rules to evaluate both definite and indefinite integrals and apply the same to find areas and volume of revolutions. Apart from these, they have a basic understanding of Beta and Gamma functions.
- CO4.** Apply the tools of power series and Fourier series to deal with functions of several

- variables that are essentials in most branches of engineering.
- CO5.** Learn the essential tools of matrices and linear algebra in a comprehensive manner.

**Course Title: Basic Electrical Engineering**

**Course Code: ESC-ECE-101**

**COs**

- CO1.** To understand the concepts and applications of different laws used in the networks and circuits.
- CO2.** To study and analyze the D.C. Circuit and A.C. Circuit with different theorem.
- CO3.** To study the concepts related to electromagnetism.
- CO4.** To understand the principle and working of transformers and power converters.
- CO5.** To study and understand different types of electrical installations.

**Course Title: Communication Skills**

**Course Code: HSMC-ECE-101**

**COs**

- CO1.** To acquire basic proficiency in English including reading, listening comprehension, writing and speaking skills.
- CO2.** To make the students authoritative in self-expression in their day to day life in this fast-changing world.
- CO3.** To identify the common errors involved in writing.
- CO4.** To understand the nature and style of sensible writing.
- CO5.** To write effective and coherent paragraphs.

**Course Title: Engineering Mechanics**

**Course Code: ESC-ECE-102**

**COs**

- CO1.** Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
- CO2.** Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts);
- CO3.** Understand basic dynamics concepts – force, momentum, work and energy;
- CO4.** Understand and be able to apply Newton’s laws of motion;
- CO5.** Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy.

**Course Title: Computer Fundamentals and Programming**

**Course Code: ESC-ECE-103**

**COs**

- CO1.** Assemble a computer system and troubleshoot problems.
- CO2.** Formulate simple algorithms for arithmetic and logical problems.

- CO3. Translate the algorithms to programs (in C language).
- CO4. Test and execute the programs and correct syntax and logical errors.
- CO5. Solve the problems using control statements.
- CO6. Decompose a problem into functions and synthesize a complete program.
- CO7. Use arrays, pointers and structures to formulate algorithms and programs.
- CO8. Be familiar with the concept of computer networking.

**Course Title: Indian Constitution**  
**Course Code: MC-ECE-101**

**COs**

- CO1. About the constitutional framework.
- CO2. About the government system
- CO3. Various type of government
- CO4. About Constitutional bodies: Election commission, UPSC, SPSC, Commission for ST/SC etc.
- CO5. Non-constitutional bodies: Planning Commission, NDC, NHRC, SHRC, CBI, Vigilance Commission and other dimensions of constitution.

**Course Title: Basic Electrical Engineering Lab**  
**Course Code: ESC-ECE-111**

**Cos**

- CO1. To study and analyze different circuit elements
- CO2. To study and implements different laws and theorems of electrical circuits.
- CO3. To make the students aware about the principles and applications of basic electricallaws.
- CO4. To measure the power using two wattmeter method.
- CO5. To study and analyze the phenomenon of Resonance in Series and Parallel circuits.

**Course Title: Communication Skills LabCourse**  
**Code: HSMC-ECE-111**

**COs**

- CO1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- CO2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- CO3. To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- CO4. To improve the fluency in spoken English and neutralize mother tongue influence
- CO5. To train students to use language appropriately for interviews, group discussion and public speaking

**Course Title: Engineering Mechanics Lab**  
**Course Code: ESC-ECE-112**

### COs

- CO1. Able to understand different engineering mechanics apparatus.
- CO2. Able to understand the mechanical properties of materials.
- CO3. Able to understand the moment of inertia of various shapes.
- CO4. Get the practical idea of frictional forces.
- CO5. Get working principle of screw jack.

**Course Title: Computer Fundamentals and Programming Lab**

**Course Code: ESC-ECE-113**

### COs

- CO1. To understand the working and troubleshooting of computer system.
- CO2. To formulate the algorithms for simple problems
- CO3. To be able to correct syntax and logical errors as reported by the compilers and runtime.
- CO4. To be able to write iterative as well as recursive programs
- CO5. To be able to represent data in arrays, strings and structures and manipulate through a program
- CO6. To be able to declare pointers of different types and use them in defining self-referential structures.
- CO7. To be able to create, read and write to and from simple text files.

**Course Title: Workshop Practice**

**Course Code: ESC-ECE-114**

### COs

- CO1. Fabricate components with their own hands.
- CO2. Gain practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- CO3. Produce small devices of their interest by assembling different components.

**Course Title: Mathematics-II**

**Course Code: BSC-ECE-201**

### COs

- CO1. Compute double and triple integrals over rectangular and spherical domains and memorize important theorems: Green, Gauss divergence and Stokes with their applications in various engineering problems.
- CO2. Distinguish between linear and non-linear equations. Recognize and solve equations of Bernoulli, Euler and Clairaut.
- CO3. Solve partial differential equations of various kinds and apply the same to solve problems of real world.
- CO4. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and conformal mapping.
- CO5. Apply the Cauchy Residue theorem to evaluate definite integrals, compute the Taylor and Laurent expansions of simple functions and determine the nature of the singularities and calculating residues.

**Course Title: Basic Electronics**

**Course Code: ESC-ECE-201**

**COs**

- CO1.** Describe the energy bands and the scientific principles behind conductivity in semiconductors.
- CO2.** Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.
- CO3.** Analyze the working of various traditional transistors such as BJT and FET along with the recently used MOSFET based transistors as well as the concept of biasing in these transistors.
- CO4.** Understand various feedback systems and oscillators.
- CO5.** Design basic analog circuits

**Course Title: Engineering Physics**

**Course Code: BSC-ECE-202**

**COs**

- CO1.** Understand the importance of Applied Physics in describing the technology we are using today in different engineering fields
- CO2.** Acquired knowledge of Waves, Vibration and acoustics, helps the students to develop the acoustically good hall.
- CO3.** Knowledge of basic Quantum Mechanics can help the students for further research applications as they can be applied to any quantum, mechanical situation to find energy, momentum etc.
- CO4.** Acquired knowledge of Optics help the students to:
  - a) Know more about propagation of light and wave optics.
  - b) Describe the requirements for a system to act as a laser.
  - c) Differentiates the various types of lasers and their means of excitation.
  - d) Able to explain, which laser would best meet the need for an industrial or research task.
  - e) Demonstrate an awareness of the safety responsibilities involved in working with lasers.

**Course Title: Engineering Chemistry**

**Course Code: BSC-ECE-203**

**COs**

- CO1.** Apply the methods to produce soft water for industrial use and potable water at cheaper cost.
- CO2.** Substitute metals with conducting polymers and also produce cheaper
- CO3.** Bio-degradable polymers to reduce environmental pollution,
- CO4.** Apply knowledge about photochemical and photo physical processes and the reactivity of excited states to explain applications in photochemical energy conversion.
- CO5.** Understand structure of organic compounds and transition metal compound synthesis,
- CO6.** Understand the manufacturing process of cement and lime.

**Course Title: Environmental Science**

**Course Code: MC-ECE-201**

**COs**

- CO1.** Learn about the environment and ecology.
- CO2.** Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.
- CO3.** Understand biogeochemical cycles and human contribution in it.
- CO4.** Learn succession and various types of succession.
- CO5.** Demonstrate the ability to understand the biomes of world and its importance in human survival.

**Course Title: Basic Electronics Lab**

**Course Code: ESC-ECE-211**

**COs**

- CO1.** Determine the characteristics of PN Junction and Zener diode.
- CO2.** Design various rectifiers configuration and evaluate its various performance parameters.
- CO3.** Design and analyze various wave shaping circuits.
- CO4.** Determine the characteristics of a BJT and MOSFET
- CO5.** Design and analyze the frequency response of RC Coupled Oscillators

**Course Title: Engineering Physics Lab**

**Course Code: BSC-ECE-211**

**COs**

- CO1.** Develop skills to impart practical knowledge in real time solution.
- CO2.** Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
- CO3.** Design new instruments with practical knowledge.
- CO4.** Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.
- CO5.** Understand measurement technology, usage of new instruments and real time applications in engineering studies

**Course Title: Engineering Chemistry Lab**

**Course Code: BSC-ECE-212**

**COs**

- CO1.** Perform Titrations
- CO2.** Synthesize organic compounds,



- CO3. Do protein determination and viscosity of solutions
- CO4. Learn temperature dependent properties of lubricant.
- CO5. Work as a team.

**Course Title: Engineering Graphics Lab**

**Course Code: ESC-ECE-212**

**COs**

- CO1. To read Engineering Drawing and execute the construction work with the help of available drawing
- CO2. To represent three dimensional objects by two dimensional views.
- CO3. Be in a position to show hidden details of objects or underground constructions work by drawing sectional views.
- CO4. Exposure to creating working drawings
- CO5. Exposure to the visual aspects of engineering design

**Course Title: Mathematics-III**

**Course Code: BSC-ECE-301**

**COs**

- CO1. Understand the basic concepts and techniques to solve Laplace transform and also learn to apply the same to solve various problems of engineering which are modelled through differential equations
- CO2. Demonstrate the ability to understand the basic concepts and techniques to solve Fourier's transform and also learn to apply the same to find solutions of boundary value problems (BVP).
- CO3. Apply the concepts of the z-transform in solving difference equations and other discrete signal system.
- CO4. Learn the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- CO5. Understand the basic ideas of statistics including measures of central tendency, correlation and regression and apply various statistical methods in engineering problems.

**Course Title: Network Analysis & Synthesis**

**Course Code: PCC-ECE-301**

**COs**

- CO1. Apply network theorems for the analysis of electrical circuits
- CO2. Provide solution for first and second order networks and obtain the transient and steady-state response of electrical circuits.
- CO3. Analyze two-port circuit behavior
- CO4. To synthesize various networks using different synthesis techniques.
- CO5. To understand and synthesize different types of filters.

**Course Title: Advanced Electronic Circuits**

**Course Code: PCC-ECE-302**

**COs**

- CO1.** Analyze and design BJT and MOSFET based circuits in different configurations at low frequencies.
- CO2.** Analyze and design BJT and MOSFET based circuits in different configurations at high frequencies.
- CO3.** Classify and analyze the performance of different power amplifiers.
- CO4.** Understand different feedback amplifier configurations and evaluate the performance parameters.
- CO5.** Analyze and design different types of oscillators

**Course Title: Signals & Systems**

**Course Code: PCC-ECE-303**

**COs**

- CO1.** Represent different Signals in mathematical form and apply basic operations on Signals. Also, Student's must know physical significance of various elementary signals.
- CO2.** Classify systems based on their properties and determine the response of LTI system using convolution.
- CO3.** Represent Signals in frequency domain i.e. Analyze the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.
- CO4.** Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems.

**Course Title: Digital Electronics**

**Course Code: PCC-ECE-304**

**COs**

- CO1.** Examine the structure of various number systems and its application in digital design.
- CO2.** Understand, analyze and design various combinational and sequential circuits.
- CO3.** Analyze different types of registers and design counter circuits.
- CO4.** Analyze different logic families, their characteristics and performances
- CO5.** Design solutions to real world problems.

**Course Title: Disaster Preparedness & Planning**

**Course Code: HSMC-ECE-301**

**COs**

- CO1.** Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
- CO2.** Capacity to describe, analyse and evaluate the environmental, social, cultural, economic, legal and organisational aspects influencing vulnerabilities and capacities to face

disasters.

- CO3.** Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
- CO4.** Capacity to manage the Public Health aspects of the disasters.
- CO5.** Capacity to obtain, analyse, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

**Course Title: Advanced Electronic Circuits Lab**

**Course Code: PCC-ECE-311**

**COs**

- CO1.** Verify the characteristics of BJT in CC, CE, CB configurations by measuring output response of each.
- CO2.** Determine gain- frequency response, input and output impedances of RC coupled Single stage & double stage BJT amplifier
- CO3.** Determine gain- frequency response, input and output impedances of RC coupled Single stage & double stage FET amplifier.
- CO4.** Determine gain, input and output impedances of BJT Darlington Emitter follower with and without bootstrapping.
- CO5.** Function effectively as a team.

**Course Title: Digital Electronics Lab**

**Course Code: PCC-ECE-312**

**COs**

- CO1.** Test and verify logic gates with its truth.
- CO2.** Implement basic arithmetic circuits.
- CO3.** Implement Multiplexer, De-Multiplexer, Encoder & Decoder circuits.
- CO4.** Use modern engineering and IT tools for circuit simulations.
- CO5.** Function effectively as a team.

**Course Title: Network Analysis Lab**

**Course Code: PCC-ECE-313**

**COs**

- CO1.** Verify various network Theorems.
- CO2.** Design various types of Filter using bread board.
- CO3.** Evaluate steady and transient state response of a network.

- CO4. Synthesize RC-networks.
- CO5. Function effectively as a team.

**Course Title: Numerical Techniques**  
**Course Code: BSC-ECE-401**

**COs**

- CO1 Comprehend of the Power of Numerical Techniques, and Ideas.
- CO2 Apply these techniques to problems drawn from Industry, Management and other engineering fields.
- CO3 Demonstrate the ability to solve linear system of equations.
- CO4 Solve various problem of linear and nonlinear differential equations by using numerical methods.

**Course Title: Solid State Electronic Devices**  
**Course Code: PCC-ECE-401**

**COs**

- CO1. Differentiate the energy bands in metals, insulators & semi-conductors; calculate Fermi-Dirac function, Fermi energy and contact potential, electronic conductivity and mean free time of metals, insulators & semiconductors.
- CO2. Derive of Fermi level & calculate the carrier concentration and mobility, and analyze the scattering mechanisms, the energy band structures of p-type and n-type semiconductors.
- CO3. Apply concepts of diffusion and drift currents and thereby calculate diffusion current & drift velocity.
- CO4. Plot I-V characteristics of diode, BJTs, FETS & MOSFETs.

**Course Title: Linear Control Systems**  
**Course Code: PCC-ECE-402**

**COs**

- CO1. Define concept of control systems & analyze characteristics equation as well as mathematical models.
- CO2. Plot the time response of different control systems and explain PID controllers.
- CO3. Analyze the different stability scheme in S-Domain and plot root- locus of control systems.
- CO4. Perform stability analysis in frequency domain using different techniques.
- CO5. Solve control system using state space equations.

**Course Title: Analog Communication Systems**  
**Course Code: PCC-ECE-403**

## COs

- CO1. Characterize different components of communication systems and find time domain and frequency domain representation of different signals.
- CO2. Apply concept of modulation and carry out power calculations & spectral analysis of AM wave.
- CO3. Carry out power calculations, Bandwidth calculations and Spectral analysis of FM wave.
- CO4. Calculate Noise figure, signal to noise ratio (SNR) in AM/FM systems and analyze different noises present in communication systems.

**Course Title: Linear Integrated circuits & Pulse Switching**

**Course Code: PCC-ECE-404**

## COs

- CO1. Solve Input and output voltage, CMRR and PSRR, offset voltages and currents, Input and output impedances, Slew rate of op-amps.
- CO2. analyze and design Voltage Followers, Non-inverting & Inverting amplifiers, Summing amplifiers, Instrumentation amplifier, AC amplifier, V to I, I to V converters using Op-Amps
- CO3. Analyze and design zero crossing detector, Inverting and non-inverting Schmitt trigger circuits, Monostable & Astable multivibrator, Triangular and Square wave generators, Log and Anti log amplifiers, Precision rectifiers using Op-amps
- CO4. Analyze Time- base Generators, Timers, Blocking Oscillator and Phase Locked Loops

**Course Title: Electronic Measurements & Instrumentation**

**Course Code: PCC-ECE-405**

## COs

- CO1. Test and Measure various electronics quantities with accuracy and precision
- CO2. Select accurate galvanometer for different applications and apply concepts of electromagnetic theory to calculate current flowing through galvanometer.
- CO3. Measure R, L & C accurately using bridges.
- CO4. Apply principles of transducer for selecting different types of transducer appropriate in different engineering applications.
- CO5. Select proper instruments such as electronic voltmeter, digital multimeter, CRO which will properly verify theoretically proposed data or for carrying out experiments.

**Course Title: Linear Control Systems Lab**

**Course Code: PCC-ECE-411**

**COs**

- CO1.** Apply concept of P, I and D control scheme in different engineering applications.
- CO2.** Plot torque & speed characteristics of AC servomotor.
- CO3.** Analyze roll of feedback in DC speed and DC position control system.
- CO4.** Gain ability to plot time response of variety of simulated linear control system.
- CO5.** Simulate different linear control system in software such as LabVIEW/MATLAB.

**Course Title: Analog Communication Systems Lab**  
**Course Code: PCC-ECE-412**

**COs**

- CO1.** Simulate amplitude modulated wave, DSB-SC, SSB-SC wave by selecting different frequencies for carrier wave and modulating wave.
- CO2.** Simulate PWM, PAM, PPM modulation and de-modulation and thereby can analyze their characteristics.
- CO3.** Compare frequency response of 2<sup>nd</sup> order and 4<sup>th</sup> order Butterworth low pass filter
- CO4.** Apply Nyquist theorem and thereby analyze the phenomena of aliasing.
- CO5.** Function effectively as a team.

**Course Title: Linear Integrated Circuits Lab**  
**Course Code: PCC-ECE-413**

**COs**

- CO1.** Establish relationship between input and output for the inverting and non-inverting configuration of the Op-Amp 741
- CO2.** Perform arithmetic operation using IC-741
- CO3.** Design 1<sup>st</sup> order and 2<sup>nd</sup> order active filters using IC-741
- CO4.** Implement Schmitt trigger circuits using IC-741 & IC-555
- CO5.** Design square wave and triangular wave generators using op-amps

**Course Title: Introduction to Microprocessors**  
**Course Code: PCC-ECE-501**

**COs**

- CO1.** Describe the various architectural aspects of 8085 Microprocessor.
- CO2.** Understand 8085 interrupt phenomenon, timing diagram and write basic assembly language programs
- CO3.** Elaborate the synchronous and asynchronous data transfer and Direct Memory Access in 8085 and interfacing of 8085 with external devices.
- CO4.** Describe the various architectural aspects of 8086 Microprocessor.
- CO5.** Understand the interrupt phenomenon and write basic assembly language programming in 8086

**Course Title: Digital Communication Systems**  
**Course Code: PCC-ECE-502**

**COs**

- CO1.** Understand different pulse digital modulations and their advantages, disadvantages.
- CO2.** Understand different line coding techniques and their properties.
- CO3.** Differentiate between various digital modulation techniques and their advantages & disadvantages.
- CO4.** Know about white Gaussian noise, mathematical modelling for different types of filters used to reduce noises in communication system.
- CO5.** Understand different spread spectrum techniques.

**Course Title: Electromagnetic Wave Theory**  
**Course Code: PCC-ECE-503**

**COs**

- CO1.** Apply vector calculus to static electric-magnetic fields in different engineering situations
- CO2.** To understand behaviour of Electric field.
- CO3.** To understand behaviour of Magnetic field.
- CO4.** Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems.
- CO5.** Analyze the nature of electromagnetic wave propagation in guided medium.

**Course Title: Computer Organization & Architecture**  
**Course Code: PCC-ECE-504**

**COs**

- CO1.** Understand the basic architecture and organization of computers.
- CO2.** Understand and perform computer arithmetic operations.
- CO3.** Understand control unit operations.
- CO4.** Understand memory hierarchy and its impact on performance and cost.
- CO5.** Understand the concept of I/O organization.

**Course Title: Microprocessor Lab**  
**Course Code: PCC-ECE-511**

**COs**

- CO1.** Understand the various features of 8085 and 8086 microprocessor kits.
- CO2.** Write various arithmetic and logical based assembly language programs in 8085 and 8086.
- CO3.** Write various string manipulation based assembly language programs in 8085 and 8086.
- CO4.** Write basic data transfer programs using 8085 and 8086.
- CO5.** Function effectively as a team.

**Course Title: Digital Communication Systems Lab**  
**Course Code: PCC-ECE-512**

**COs**

- CO1.** Understand basic theories of Digital communication system in practical.
- CO2.** understand sampling theorem and modulation techniques in practical.
- CO3.** design and implement different modulation and demodulation technique.
- CO4.** Analyze modulation techniques using MATLAB tool.
- CO5.** Function effectively as a team.

**Course Title: Modelling and Simulation Lab**  
**Course Code: PCC-ECE-513**

**COs**

- CO1.** Perform various operations on continuous and discrete signals
- CO2.** Validate various systems properties
- CO3.** Perform various frequency transforms on signals solve differential equations
- CO4.** Model various modulation schemes in SIMULINK
- CO5.** Function effectively as a team.



**Course Title: Digital Signal Processing**  
**Course Code: PCC-ECE-601**

**COs**

- CO1.** Understand the basic concepts of Discrete Fourier transform and its application to linear filtering.
- CO2.** Understand and explain FFT algorithms and their computational efficiency in comparison to DFT.
- CO3.** Understand and explain the design of IIR filters by approximation of derivatives, impulse invariance and bilinear transformation.
- CO4.** Understand and explain the design of FIR filters by windowing and frequency sampling technique and provide a basic overview of special type of FIR filters.
- CO5.** Understand and explain the realization of filters using cascade and parallel structures as well as signal flow graphs and provide brief overview of the application areas of DSP.

**Course Title: Micro-Controller and Embedded Systems**  
**Course Code: PCC-ECE-602**

**COs**

- CO1.** Ability to understand basic structure embedded systems
- CO2.** Ability to understand basic structure microcontroller.
- CO3.** Ability to understand basic concepts used in embedded system.
- CO4.** Ability to program microcontroller.
- CO5.** Ability to design conceptual embedded system.

**Course Title: Antenna and Wave Propagation**  
**Course Code: PCC-ECE-603**

**COs**

- CO1.** Understand the important and fundamental antenna parameters and terminology.
- CO2.** Explain the working of antennas and formation of antenna patterns for different cases.
- CO3.** Explain loop, slot, patch and horn antennas. Derive expressions for the parameters of loop and slot antennas.
- CO4.** Explain ionosphere and troposphere propagation.
- CO5.** Develop the basic skills for designing a wide variety of practical antennas and antenna arrays.

**Course Title: Digital Signal Processing Lab**  
**Course Code: PCC-ECE-611**

**COs**

- CO1.** Analyze basic signals using MATLAB.
- CO2.** Carry out linear and circular convolution of different signals.
- CO3.** Carry out DFT and FFT of various signals.
- CO4.** Design FIR and IIR filters using various techniques.
- CO5.** Function effectively as a team.

**Course Title: Micro-Controller and Embedded Systems Lab**  
**Course Code: PCC-ECE-612**

**COs**

- CO1.** Understand the working of 8051 with the help of Kiel IDE.
- CO2.** Perform Data transfer, Arithmetic and Logical Operations.
- CO3.** Interface various devices with 8051 Microcontroller.
- CO4.** Develop embedded systems for real world problems.
- CO5.** Function effectively as a team.

**Course Title: Antenna Lab**  
**Course Code: PCC-ECE-613**

**COs**

- CO1.** Understand the working of antenna
- CO2.** Understand the radiation pattern of half wave dipole and monopole antenna
- CO3.** Develop understanding of conducting sheet with slot
- CO4.** Function effectively as a team.

**Course Title: RF & Microwave Engineering**  
**Course Code: PCC-ECE-701**

**COs**

- CO1.** Understand the basic concepts and principles of high frequency signal propagation with the importance of using s-parameter in microwave circuits.
- CO2.** Know the demerits of vacuum tubes and their solution using cavity based klystron at microwave frequencies.
- CO3.** Understand different solid state microwave devices with and their use in different microwave circuits.
- CO4.** Understand the principle of operation of different passive waveguide components.
- CO5.** Measure different parameters like frequency, VSWR, power etc. at microwave frequencies.

**Course Title: Entrepreneurship Development & Management**  
**Course Code: HSMC-ECE-701**

**COs**

- CO1.** Understand the basic development of entrepreneurship as a profession.
- CO2.** Understand marketing strategies for any business enterprise.
- CO3.** Acquire basic knowledge of human resource management for small business.
- CO4.** Understand the social responsibilities of business managers.
- CO5.** Know how to establish and manage a business enterprise.

**Course Title: Microwave Engineering /Optical Communication Lab**  
**Course Code: PCC-ECE-711**

**COs**

- CO1.** Analyze and explore different Microwave devices physically.
- CO2.** Perform microwave measurements with modern digital instruments such as spectrum analyzer using different techniques and with different microwave devices.
- CO3.** Analyze the performance of optical devices: light sources like laser and LED's, fibers and detectors.
- CO4.** Understand and explain different losses and plot the loss characteristics of optical fibers.
- CO5.** Function effectively as a team.

**Course Title: PCB and Troubleshooting Lab**  
**Course Code: PCC-ECE-712**

**COs**

- CO1.** Perform hand-on the PCB design procedures for various circuit components.
- CO2.** Perform PCB design for Microprocessor and interface ICs.
- CO3.** Perform PCB design for Diodes circuits, Rectifiers, ICs like 555, Schmitt Trigger etc.
- CO4.** Execute troubleshooting procedures for the any given PCB design to pinpoint the problem.
- CO5.** Function effectively as a team.

**Course Title: Industrial Electronics**  
**Course Code: PEC-ECE-501**

COs

- CO1. Control speed of DC motors.
- CO2. Control speed of AC motors.
- CO3. Gain knowledge of various Industrial Components.
- CO4. Understand PCB design rules. Design of PCB using computer aided tools.
- CO5. Design Power transformers, voltage stabilizer, inverter and battery charger.

**Course Title: Electronic Multimedia Engineering**  
**Course Code: PEC-ECE-502**

COs

- CO1. Understand and analyse various microphones and loudspeakers.
- CO2. Know the basic principle of recording and reproduction system like stereo recording and playback.
- CO3. Explain the modern digital systems like DVD, Dolby digital sound, Blue ray disc.
- CO4. Understand the basics of television standards and advanced HD TV and advanced DTH.

**Course Title: Smart Material Systems & MEMS**  
**Course Code: PEC-ECE-503**

COs

- CO1. State the importance of miniaturized structure and importance of MEMS
- CO2. Outline step-wise processing of smart material systems
- CO3. Apply principles of different sensors and actuators for obtaining their MEMS models
- CO4. Sketch the fabrication & design considerations of commercial products

**Course Title: Engineering Material Science**  
**Course Code: PEC-ECE-504**

COs

- CO1. Understand the basic structures of Crystal, Atom & Interatomic Bonding
- CO2. Understand the various classifications of materials
- CO3. Understand various characterization Techniques like SEM, TEM etc.
- CO4. Understand the various fabrication techniques
- CO5. Understand the applications in MEMS, NEMS & Integrated Electronic Circuits

**Course Title: Mobile and Wireless Communication**

**Course Code: PEC-ECE-601**

**COs**

- CO1.** Understand cellular mobile system, formulate its performance criteria.
- CO2.** Characterize the trade-off among frequency reuse, signal to interference ratio, capacity & able to understand interferences in cellular communication.
- CO3.** Apply the knowledge of mathematics to find out the average received signal strength at a distance from the transmitter using different propagation model.
- CO4.** Identify the advantages & disadvantages of different mobile antennas.
- CO5.** Understand multiple access method, spread spectrum techniques, wireless communication system.

**Course Title: VLSI Design**

**Course Code: PEC-ECE-602**

**COs**

- CO1.** Describe the operational characteristics of MOSFET and its application as capacitor and switch.
- CO2.** Design CMOS Inverters and analyze its static and dynamic characteristics
- CO3.** Understand the complete CMOS fabrication process
- CO4.** Design various CMOS based logic gates and logic structures
- CO5.** Understand and draw the layout of basic CMOS based circuits.

**Course Title: Electrical Machines**

**Course Code: PEC-ECE-603**

**COs**

- CO1.** Understand the basic concepts and principle of operation of transformers and their types.
- CO2.** Explain the concept of DC generators.
- CO3.** Explain the principle of DC motors and characteristics of different DC motors.
- CO4.** Understand the operation of Single phase induction motors.
- CO5.** Understand principle of operation of Alternators.

**Course Title: Data Communication & Computer Networks**

**Course Code: PEC-ECE-604**

**COs**

- CO1.** Understand the fundamental concepts of Data Communication.
- CO2.** Understand and explain digital transmission over different types of communication media.
- CO3.** Understand the principles of framing, flow control, error control and access control mechanisms.
- CO4.** Understand the concept of logical addressing and building the skills of sub-netting.
- CO5.** Understand and explain the principles and protocols for route calculations.

**Course Title: Optoelectronic Devices**

**Course Code: PEC-ECE-605**

**COs**

- CO1.** Describe the principles of light generation and detection, operation, and design of state-of-the-art optoelectronic and photonic devices.
- CO2.** Explain key concepts in quantum and statistical mechanics relevant to physical, electrical and optoelectronic properties of materials and their applications to optoelectronic devices and photonic integrated circuits
- CO3.** Describe fundamental and applied aspects of optoelectronic device physics and its applications to the design and operation of laser diodes, light-emitting diodes, and photodetectors.
- CO4.** Describe techniques to improve the operation of optoelectronic devices and device characteristics that have to be optimized for new applications by employing their understanding of optoelectronic device physics.
- CO5.** Explain and analyse the working principles of optoelectronic devices like CCD,SOA, solar cell etc.

**Course Title: Non-Conventional Energy Sources**

**Course Code: PEC-ECE-606**

**COs**

- CO1.** Understand the importance of non-conventional energy resources for the present energy scenario.
- CO2.** Understand the working criteria of hydro power generation.
- CO3.** Acquire knowledge about wind energy conversion system for power generation.
- CO4.** Analyze solar energy conversion technologies.
- CO5.** Study other non-conventional sources of energy like geothermal resources, biomass, etc.

**Course Title: Power Electronics**  
**Course Code: PEC-ECE-607**

**COs**

- CO1.** Articulate the basics of power electronic devices and characteristics of SCR, IAC, TRIAC, MOSFET and IGBT.
- CO2.** Express the design and control of converters.
- CO3.** Design power electronic converters in power control applications.
- CO4.** Design AC voltage controller, chopper circuit, inverter circuit and cyclo-converter.
- CO5.** Analyze the operation of DC-DC choppers and voltage source inverters.

**Course Title: Device Modeling for Circuit Simulations**  
**Course code: PEC-ECE-701**

**COs**

- CO1.** Simulate characteristics of a simple device using MATLAB, SPICE.
- CO2.** Explain about the qualitative understanding of the physics of a new device with equations.
- CO3.** Explain the equations, approximations and techniques available for deriving a model for any semiconductor device.
- CO4.** Understand different MOS models like BSIM and their modelling procedure.
- CO5.** Describe the latest devices like HBT, HEMT, MESFET etc.

**Course Title: Advanced 3G and 4G Wireless & Mobile Communication**  
**Course Code: PEC-ECE-702**

**COs**

- CO1.** Understand cellular mobile system and its working.
- CO2.** Design different wideband channel model.
- CO3.** Understand OFDM in detail, identify different OFDM issues.
- CO4.** Identify different ST channels and design MIMO channel.
- CO5.** Understand Ultra-Wide Band technology, knowledge of WiMAX, WCDMA & LTE.

**Course Title: Satellite Communication**  
**Course code: PEC-ECE-703**

**COs**

- CO1.** Explain the principles, concepts and operation of satellite communication systems.
- CO2.** Describe the concepts of signal propagation affects, link design, rain fading and link availability and perform interference calculations.
- CO3.** Understand modulation techniques and error correction codes for satellite communication.
- CO4.** Use software tools to simulate and analyse the performance of satellite communication systems, and use real satellite up/down links (subject to the availability of satellite links) to conduct link experiments.

Course Title: Optical Communication

Course Code: PEC-ECE-704

COs

- CO1.** Recognize and classify the structures of Optical fiber networks and their types.
- CO2.** Discuss the channel impediments like losses, interference and dispersion.
- CO3.** Describe the Optical sources and detectors and thus able to illustrate their working principle.
- CO4.** Familiar with Design considerations of fiber optic systems.
- CO5.** perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyse the results to provide valid conclusions

Course Title: Random Processes & Information Theory

Course Code: ECE-705

COs

- CO1.** Understand the basic concepts of Probability & Random Variables & able to solve numerical problems.
- CO2.** Understand various standard distributions used in various fields of engineering
- CO3.** Understand different types of Random processes
- CO4.** Understand the concept of correlation & apply it on Linear time invariant systems.
- CO5.** Understand the concept of Information Theory in the field of communication systems & design solutions for noise free channels

Course Title: Radar Engineering

Course Code: PEC-ECE-706

COs

- CO1.** Understand the essential principles of operation of radar systems.
- CO2.** Understand the principles behind detection of Radar signals in noise.
- CO3.** Design simple radar systems and the associated signal processing, at block diagram level.
- CO4.** Apply the relevant design equations to phased array antennas, and understand the advantages and constraints of phased array radar.
  
- CO5.** Design and describe various circuits and systems of Radar transmitters and receivers.

Course Title: Biomedical Instrumentation

Course Code: PEC-ECE-707

- CO1.** Understand biomedical instrumentation, propagation of action potential.
- CO2.** Acquire knowledge of electrodes, transducers & amplifiers used in biomedical instrumentation.
- CO3.** Apply the knowledge of science, engineering fundamentals & engineering specialization for electrode potential recording.
- CO4.** Understand different human assist devices.
  
- CO5.** Gain knowledge of different imaging techniques used in medical science.



Course Title: Analog and Mixed Signal Design

Course code: PEC-ECE-708

- CO1. Understand the basics of analog, digital and mixed signal design
- CO2. Design basic cascade and cascade circuits using MOS and extract their performance parameters
- CO3. Analyze various CMOS based analog designs
- CO4. Design low power and non-linear circuits
- CO5. Explain the basics of RF Design and its challenges

Course Title: RF IC Design

Course Code: PEC-ECE-801

- CO1. Appreciate the importance and applications of RF and Wireless Technology.
- CO2. Model active RF Components used in the RF IC design.
- CO3. design analog and digital modulation circuits and biasing for RF Circuits.
- CO4. design various types of Amplifiers, oscillators and Mixers in the RF Domain.
- CO5. Design and simulate RF IC's using software tools and evaluate their output parameters.

Course Title: Adaptive Signal Processing

Course Code: PEC-ECE-802

- CO1. Design and apply optimal minimum mean square estimators and compute their expected performance and verify it.
- CO2. Design and analyse the Wiener filters (FIR, non-causal, causal) and evaluate their performance.
- CO3. Identify applications in which it would be possible to use the different adaptive filtering approaches and implement them in software.
- CO4. Design, implement and apply LMS, RLS, and Kalman filters to given applications.
- CO5. Use MATLAB to implement the Wiener filter, Least Squares, LMS and RLS algorithms, and understand their convergence.

**Course Title: Digital Image Processing**

**Course code: PEC-ECE-803**

- CO1. Explain the various fundamentals of digital image processing.
- CO2. Perform Fourier analysis of an image and implement different image enhancement techniques.
- CO3. Analyse various spatial and frequency domain image restoration approaches.
- CO4. Classify various image compression techniques and implement different image segmentation techniques.
- CO5. Interpret various image restoration and description techniques.

Course Title: RF IC Design  
Course Code: PEC-ECE-801

- CO6. Appreciate the importance and applications of RF and Wireless Technology.
- CO7. Model active RF Components used in the RF IC design.
- CO8. design analog and digital modulation circuits and biasing for RF Circuits.
- CO9. design various types of Amplifiers, oscillators and Mixers in the RF Domain.
- CO10. Design and simulate RF IC's using software tools and evaluate their output parameters.

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**Course Title: Advanced Communication System**  
**Course code: PEC-ECE-804**

- CO1. Acquire knowledge of spread spectrum technique used in communication.
- CO2. Acquire knowledge of DS-CDMA, their performance analysis, capacity estimation, hand-off techniques and different CDMA systems.
- CO3. Acquire knowledge of Network Transmission System design services.
- CO4. Understand different line coding techniques, error detection codes, switching techniques. Analyze different protocols used in data communication network.
- CO5. Gain knowledge of transmission principles.

Course Title: Digital System Design

Course Code: PEC-ECE-805

- CO1.** Design various combinational and sequential digital logics.
- CO2.** Explain various digital programmable devices such as PALs and PLDs as well as FPGAs.
- CO3.** Understand Hardware description language and write basic programs in VHDL.
- CO4.** Design digital logic in various simulation tools such as SciLab and Simulink.
- CO5.** Get familiarized with Integrated Circuit design flow and process.

Course Title: Nanotechnology

Course Code: PEC-ECE-806

- CO1.** Understand the basics of Nanotechnology along with MEMS and NEMS technology.
- CO2.** Describe the preparation and applications of various nanomaterials.
- CO3.** Explain the synthesis and application of Carbon Nanotubes.
- CO4.** Understand various nano-electronic approaches such as CNTFET and quantum devices.
- CO5.** Get familiarized with various nanotechnology related fabrication and characterization techniques.

Course Title: Optical Networks

Course code: PEC-ECE-807

- CO1.** Understand the different optical switching methods and transmission basics in optical networks
- CO2.** Explain the construction and working of various optical amplifiers
- CO3.** Get familiar with various multiplexers and filters for wavelength conversion
- CO4.** Understand the various concepts and aspects of optical transmission systems
  
- CO5.** Design wavelength division multiplexing based optical networks by considering various trade-offs

Course Title: RF IC Design

Course Code: PEC-ECE-801

- CO1.** Appreciate the importance and applications of RF and Wireless Technology.
- CO2.** Model active RF Components used in the RF IC design.
- CO3.** design analog and digital modulation circuits and biasing for RF Circuits.
- CO4.** design various types of Amplifiers, oscillators and Mixers in the RF Domain.
- CO5.** Design and simulate RF IC's using software tools and evaluate their output parameters.

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- CO3.** Get familiar with various multiplexers and filters for wavelength conversion
- CO4.** Understand the various concepts and aspects of optical transmission systems
  
- CO5.** Design wavelength division multiplexing based optical networks by considering various trade-offs

**Course Title: Object Oriented Programming with C++**  
**Course code: OEC-ECE-501/PCC-CSE-302**

- CO1.** Specify simple abstract data types and design implementations, using abstraction functions to document them.
- CO2.** Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
- CO3.** Name and apply some common object-oriented design patterns and give examples of their use.
- CO4.** Design applications with an event-driven graphical user interface.
- CO5.** Must be able to understand and use Exception handling

**Course Title: Java Programming**  
**Course Code: OEC-ECE-502/PCC-ITE-504**

- CO1.** Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- CO2.** Write Java application programs using OOP principles and proper program structuring.
- CO3.** Demonstrate the concepts of polymorphism and inheritance.
- CO4.** Write Java programs to implement error handling techniques using exception handling.

**Course Title: Power Engineering**

**Course code: OEC-ECE-503/PEC-EE-501**

- CO1.** Understand economic aspects of power generation, transmission & transmission along with the advantages of power factor improvement.
- CO2.** Analyze different costs associated with power systems and ways to reduce it analyze various tariffs schemes.
- CO3.** Understand the layout and design considerations of thermal and nuclear plants
- CO4.** Understand the layout and design considerations of hydroelectric plants.
- CO5.** Understand various types of substation groundings.

Course Title: RF IC Design

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- CO1.** Appreciate the importance and applications of RF and Wireless Technology.
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- CO5.** Gain knowledge of transmission principles.

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Course Code: PEC-ECE-805

- CO1.** Design various combinational and sequential digital logics.
- CO2.** Explain various digital programmable devices such as PALs and PLDs as well as FPGAs.
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- CO2.** Explain the construction and working of various optical amplifiers
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- CO4. Understand the layout and design considerations of hydroelectric plants.
- CO5. Understand various types of substation groundings.

**Course Title: Environmental Engineering**

**Course code: OEC-ECE-504/PCC-CE-502**

- CO1. Understand the impact of humans on environment and environment on humans
- CO2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
- CO3. Be able to plan strategies to control, reduce and monitor pollution.
- CO4. Be able to select the most appropriate technique for the treatment of water, waste water solid waste and contaminated air.
- CO5. Be conversant with basic environmental legislation



**Course Title: Natural Language**

**Course code: OEC-ECE-505/PEC-CSE-705**

- CO1.** Understand the basic concepts of language for processing.
- CO2.** Implement different data models for language processing.
- CO3.** Understand parsing techniques related to English language.
- CO4.** Process and analyse the language semantically.
- CO5.** Understand the application of NLP.

**Course Title: Python Programming**

**Course code: OEC-ECE-601/PCC-CSE-402**

- CO1.** To Understand data types (like character strings, integers, and real numbers) and the Operations that can be applied to each data type
- CO2.** To write programs that get input, perform calculations, and provide output (using Conditional logic, loops, Functions).
- CO3.** To understand the OOPs concepts with respect to fourth generation language
- CO4.** To write well designed and well documented programs that is easily maintainable.
- CO5.** To test and debug programs (find out what is wrong and fix it).

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- CO1.** Appreciate the importance and applications of RF and Wireless Technology.
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- CO1. Understand economic aspects of power generation, transmission & transmission along with the advantages of power factor improvement.
- CO2. Analyze different costs associated with power systems and ways to reduce it analyze various tariffs schemes.
- CO3. Understand the layout and design considerations of thermal and nuclear plants
- CO4. Understand the layout and design considerations of hydroelectric plants.
- CO5. Understand various types of substation groundings.

**Course Title: Environmental Engineering**

**Course code: OEC-ECE-504/PCC-CE-502**

- CO1. Understand the impact of humans on environment and environment on humans
- CO2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
- CO3. Be able to plan strategies to control, reduce and monitor pollution.
- CO4. Be able to select the most appropriate technique for the treatment of water, waste water solid waste and contaminated air.
- CO5. Be conversant with basic environmental legislation

**Course Title: Natural Language**

**Course code: OEC-ECE-505/PEC-CSE-705**

- CO1. Understand the basic concepts of language for processing.
- CO2. Implement different data models for language processing.
- CO3. Understand parsing techniques related to English language.
- CO4. Process and analyse the language semantically.
- CO5. Understand the application of NLP.

**Course Title: Python Programming**

**Course code: OEC-ECE-601/PCC-CSE-402**

- CO1. To Understand data types (like character strings, integers, and real numbers)and the Operations that can be applied to each data type
- CO2. To write programs that get input, perform calculations, and provide output (using Conditional logic, loops, Functions).
- CO3. To understand the OOPs concepts with respect to fourth generation language
- CO4. To write well designed and well documented programs that is easily maintainable.
- CO5. To test and debug programs (find out what is wrong and fix it).

**Course Title: Power Systems-I**

**Course code: OEC-ECE-602/PCC-EE-403**

- CO1. Understand the concepts of power systems.
- CO2. Understand the various power system components.
- CO3. Understand the generation of over-voltages and insulation coordination.
- CO4. Evaluate fault currents for different types of faults.
- CO5. Understand various DC transmission techniques

**Course Title: Discrete Mathematics**

**Course code: OEC-ECE-603/PCC-ITE-404**

- CO1. For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives.
- CO2. For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference.
- CO3. For a given a mathematical problem, classify its algebraic structure.
- CO4. Evaluate Boolean functions and simplify expressions using the properties of Boolean  $\{\{ \}$  algebra.
- CO5. Develop the given problem as graph networks and solve with techniques of graph theory.

**Course Title: Building Materials and Construction**

**Course code: OEC-ECE-604/PCC-CE-405**

- CO1. Identify various construction materials like stone and bricks
- CO2. Know and differentiate elemental properties of construction materials
- CO3. Know about the different types of materials used in construction such as steel timber polymers
- CO4. Demonstrate an appropriate application of construction material.
- CO5. Know about the different components in construction building

**Course Title: Wireless Networks**

**Course code: OEC-ECE-605/PEC-CSE-611**

- CO1. Identify the basic concept of wireless networks, channel coding, and cellular concepts;
- CO2. Compare and contrast LEO, MEO and GEO. Routing and handover in satellite communication
- CO3. Understand various wireless LAN technologies
- CO4. Understand the terminologies in mobile network layers and the process of packet discovery and registration in network layer.
- CO5. Compare and contrast between cellular and Ad Hoc wireless networks, areas of its applications and challenges

**Course Title: Computer Graphics and Multimedia**

**Course code: OEC-ECE-606/PCC-ITE-601**

- CO1. Explain various applications of computer Graphics.
- CO2. To be able to understand a graphics processing system.
- CO3. To be able to understand and implement computer graphics algorithms.
- CO4. To be able to implement 3D graphics primitives

**Course Title: Artificial Intelligence**

**Course code: OEC-ECE-701/PCC-CSE-702**

- CO1. To learn different forms of logic
- CO2. Deal with inconsistencies and uncertainties of logic
- CO3. Be familiar with informed and uniformed searching techniques
- CO4. To study different matching techniques
- CO5. To learn pattern recognition and expert systems

**Course Title: Power Systems-II**

**Course code: OEC-ECE-702/PCC-EE-501**

- CO1. Use numerical methods to analyze a power system in steady state.
- CO2. Understand stability constraints in a synchronous grid.
- CO3. Understand methods to control the voltage, frequency and power flow.
- CO4. Understand the monitoring and control of a power system.
- CO5. Understand the basics of power system economics

**Course Title: Internet and Web Technologies**

**Course code: OEC-ECE-703/PCC-ITE-502**

- CO1. Develop simple static websites.
- CO2. Static websites with CSS.
- CO3. Dynamic websites using java Scripting.
- CO4. Dynamic website with server side scripting using PHP.
- CO5. Address various web security related issues

**Course Title: Flood Control and Rural Engineering**

**Course code: OEC-ECE-704/PEC-CE-749**

- CO1. Understand the different flood control measures
- CO2. Know the different types diversion headwork and cross-Drainage work.
- CO3. Know the terminology of river engineering and flood control measures.
- CO4. Measure the discharge of a river
- CO5. Understand the different River Protection and Training Works

**Course Title: Internet of Things**

**Course code: OEC-ECE-705/PEC-CSE-702**

Interpret the vision of IoT from a global context

- CO1. Compare and contrast the use of Devices, Gateways and Data Management in IoT.
- CO2. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- CO3. To study and analyse data and to understand the security issues in IoT
- CO4. To study IoT physical devices and end points and to understand the communications between components

**Course Title: Neural Networks**

**Course code: OEC-ECE-801/PEC-CSE-806**

- CO1. The role of neural networks in engineering, artificial intelligence, and other areas.
- CO2. Understanding of basic neural network models like Mcculloch-Pitts Model, Radial Basis Function Model, resistive networks for vision models, complex dynamical learning models.
- CO3. Understanding of the concepts and techniques of neural networks through the study of the most important neural network models.
- CO4. Have knowledge of sufficient theoretical background to be able to reason about the behavior of neural networks.
- CO5. Able to evaluate whether neural networks are appropriate to a particular application

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**Programme: B.TECH EE**

**Programme Outcomes**

PO1

Engineering knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and computer engineering to the solution of engineering problems.

PO2

Problem analysis: Identify, formulate, review research literature, and analyze engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3

Design/development of solutions: Design solutions for engineering problems related to engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the engineering practice.

PO7

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8



Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes in Engineering.

## PROGRAM SPECIFIC OUTCOMES

- 1. To develop acquaintance and conceptual knowledge in students supported with practical exposure in the area of Electrical Power Generation, Transmission and Distribution.**
2. To model, analyze, design and realize physical systems, components or processes related to Conventional Energy resources in general and Renewable Energy resources in particular.
- 3. To empower the students with engineering concepts along with aptitude skills for developing competency to succeed in various competitive examinations, getting jobs or pursuing their career in higher education.**

**Course title: Mathematics-I**

**Course Code: BSC-EE-101**

**Course outcome:**

Upon the successful completion of the course, the student will be able to:

1. Understand the significance of Rolle's Theorem, Mean Value theorem, Taylor's and Maclaurin's series for differentiable functions.
2. Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.
3. Use basic the integral rules to evaluate both definite and indefinite integrals and apply the same to find areas and volume of revolutions. Apart from these, they have a basic understanding of Beta and Gamma functions.
4. Apply the tools of power series and Fourier series to deal with functions of several variables that are essentials in most branches of engineering.
5. Learn the essential tools of matrices and linear algebra in a comprehensive manner.

**Course title: Basic Electrical Engineering Course Code: ESC-EE-101**

**Course outcome:**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability

1. To understand the concepts and applications of different laws used in the networks and circuits.
2. To study and analyze the D.C. Circuit and A.C. Circuit with different theorem.
3. To study the concepts related to electromagnetism.
4. To understand the principle and working of transformers.
5. To study and understand different types of electrical installations.

**Course title: Communication Skills**

**Course Code: HSMC-EE-101**

**Course outcome:**

Upon the completion of the course, the students will be able:

1. To acquire basic proficiency in English including reading, listening comprehension, writing and speaking skills.
2. To make the students authoritative in self-expression in their day to day life in this fast-changing world.
3. To identify the common errors involved in writing.
4. To understand the nature and style of sensible writing.
5. To write effective and coherent paragraphs.

**Course title: Engineering Mechanics**

**Course Code: ESC-EE-102**

**Course outcome:**

Upon successful completion of the course, student should be able to:

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
2. Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts);
3. Understand basic dynamics concepts – force, momentum, work and energy;
4. Understand and be able to apply Newton's laws of motion;
5. Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy;

**Course title: Computer Fundamentals and Programming 103**

**Course Code: ESC-EE-**

**Course outcome:**

The student will be able:

1. To assemble a computer system and formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language) for execution and usage of various control statements for problem solving.
3. To decompose a problem into functions and usage of arrays to synthesize a complete program.
4. To use pointers, files and user defined data types to formulate algorithms and programs.
5. To be familiar with the concept of computer networking.

**Course title: Indian Constitution**

**Course Code: MC-EE-101**

**Course outcome:**

Upon the completion of this, the students will able to know:

**CO6.** About the constitutional framework.

**CO7.** About the government system

**CO8.** Various type of government

**CO9.** About Constitutional bodies: Election commission, UPSC, SPSC, Commission for ST/SC and many others.

**CO10.** Non-constitutional bodies: Planning Commission, NDC, NHRC, SHRC, CBI, Vigilance Commission and other dimensions of constitution.

### **Laboratory Courses**

**Course title: Basic Electrical Engineering Lab.**

**Course Code: ESC-EE-111**

**Lab. Outcomes:**

1. To study and analyze different circuit elements.
2. To study and implements different laws and theorems of electrical circuits.
3. To make the students aware about the principles and applications of basic electrical laws.
4. To measure the power using two wattmeter method.
5. To study and analyze the phenomenon of Resonance in Series and Parallel circuits.

**Course title: Communication Skills Lab.**

**Course Code: HSMC-EE-111**

**Lab. Outcomes:**

Upon the completion of the lab, the students will be able to:

1. Developing intellectual, personal and professional abilities.
2. On completion of the course, the students will be accurate in communication.
3. The students will be able to communicate effectively on complex engineering activities with the engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

**Course title: Engineering Mechanics Lab.**

**Course Code: ESC-EE-112**

**Lab. Outcomes:**

After the completion of lab course students will be-

1. Able to understand different engineering mechanics apparatus.
2. Able to understand the mechanical properties of materials.
3. Able to understand the moment of inertia of various shapes.
4. Get the practical idea of frictional forces.
5. Get working principle of screw jack.

**Course title: Computer Fundamentals & Programming Lab. Course Code: ESC-EE-113**

**Lab. Outcomes:**

1. To understand the working and troubleshooting of computer system.
2. To formulate the algorithms for simple problems
3. To be able to correct syntax and logical errors as reported by the compilers and run time.
4. To be able to write iterative as well as recursive programs
5. To be able to represent data in arrays, strings and structures and manipulate through a program
6. To be able to declare pointers of different types and use them in defining self-referential structures.
7. To be able to create, read and write to and from simple text files.

**Course title: Workshop Practice**

**Course Code: ESC-EE-114**

**Lab. Outcomes:**

1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. By assembling different components, they will be able to produce small devices of their interest.

**Course title: Mathematics-II**

**Course Code: BSC-EE-201**

**Course outcome:**

Upon the completion of this course, the students will be able to:

1. Compute double and triple integrals over rectangular and spherical domains and memorize important theorems: Green, Gauss divergence and Stokes with their applications in various engineering problems.
2. Distinguish between linear and non-linear equations. Recognize and solve equations of Bernoulli, Euler and Clairaut.
3. Solve partial differential equations of various kinds and apply the same to solve problems of real world.
4. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and conformal mapping.
5. Apply the Cauchy Residue theorem to evaluate definite integrals, compute the Taylor and Laurent expansions of simple functions and determine the nature of the singularities and calculating residues.

**Course title: Basic Electronics Engineering**

**Course Code: ESC-EE-201**

**Course outcome:**

At the end of the course, the student will be able to

1. Describe the energy bands and the scientific principles behind controlled conductivity in semiconductors.
2. Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.
3. Analyze the working of the traditional transistor BJT and as well as the concept of biasing.
4. Understand the operation of MOSFET and various issues of scaling in MOSFET.
5. Design basic analog circuits

**Course title: Engineering Physics**

**Course Code: BSC-EE-202**

**Course outcome:**

After completing of the course, the students will:

1. Understand the importance of Applied Physics in describing the technology we are using today in different engineering fields
2. Acquired knowledge of Waves, Vibration and acoustics, helps the students to develop the acoustically good hall.
3. Knowledge of basic Quantum Mechanics can help the students for further research applications as they can be applied to any quantum, mechanical situation to find energy, momentum etc.
4. Acquired knowledge of Optics help the students to
  - f) Know more about propagation of light and wave optics.
  - g) Describe the requirements for a system to act as a laser.
  - h) Differentiate the various types of lasers and their means of excitation.
  - i) Able to explain, which laser would best meet the need for a industrial or research task.
  - j) Demonstrate an awareness of the safety responsibilities involved in working with lasers.

**Course title: Engineering Chemistry**

**Course Code: BSC-EE-203**

**Course outcome:**

At the end of course, the student will be able to

1. Apply the methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce cheaper bio-degradable polymers to reduce environmental pollution,
3. Apply knowledge about photochemical and photo physical processes and the reactivity of excited states to explain applications in photochemical energy conversion.
4. Understand structure of organic compounds and transition metal compound synthesis,
5. Understand the manufacturing process of cement and lime.

**Course title: Environmental Science**

**Course Code: MC-EE-201**

**Course outcome:**

Upon the completion of the course, students will be able to:

1. Learn about the environment and ecology.
2. Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.
3. Understand biogeochemical cycles and human contribution in it.
4. Learn succession and various types of succession.
5. Demonstrate the ability to understand the biomes of world and its importance in human survival.

**Laboratory Course:**

**Course title: Basic Electronics Lab.**

**Course Code: ESC-EE-211**

**Lab. Outcomes:**

Upon the completion of course, the students will be able to:

1. Determine the characteristics of PN Junction and Zener diode.
2. Design various rectifiers configuration and evaluate its various performance parameters.
3. Design and analyze various wave shaping circuits.
4. Determine the characteristics of a BJT and MOSFET
5. Design and analyze the frequency response of RC Coupled Oscillators

**Course title: Engineering Physics Lab.**

**Course Code: BSC-EE-211**

**Lab. Outcomes:**

On Completion of this course, students are able to –

1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.
5. Understand measurement technology, usage of new instruments and real time applications in engineering studies.

**Course title: Engineering Chemistry Lab.**

**Course Code: BSC-EE-212**

**Lab. Outcomes:**

At the end of practical course the students will be familiarized about Titrations, Synthesis of organic compounds, protein determination and viscosity of solutions and temperature dependent properties of lubricant.

**Course title: Engineering Graphics**

**Course Code: ESC-EE-212**

**Course Outcomes:**

On completion of course students must be able

1. To read Engineering Drawing and execute the construction work with the help of available drawing
2. To represent three dimensional objects by two dimensional views.
3. Students must be in a position to show hidden details of objects or underground constructions work by drawing sectional views.
4. Exposure to creating working drawings
5. Exposure to the visual aspects of engineering design

**Course title: Mathematics-III**

**Course Code: BSC-EE-301**

**Course Outcomes:**

After the completion of this course, the students will be able to:

1. Understand the basic concepts and techniques to solve Laplace transform and also learn to apply the same to solve various problems of engineering which are modelled through differential equations
2. Demonstrate the ability to understand the basic concepts and techniques to solve Fourier's transform and also learn to apply the same to find solutions of boundary value problems (BVP).
3. Apply the concepts of the z-transform in solving difference equations and other discrete signal system.
4. Learn the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
5. Understand the basic ideas of statistics including measures of central tendency, correlation and regression and apply various statistical methods in engineering problems.

**Course title: E. M. Field Theory**

**Course Code: PCC-EE-301**

**Course Outcomes:**

At the end of the course, students will demonstrate the ability.

1. Apply vector calculus to static electric-magnetic fields in different engineering situations.
2. Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems.
3. Examine the phenomena of wave propagation in different media and its interfaces.
4. Analyze the nature of electromagnetic wave propagation in guided medium.

**Course title: Electrical Machine I**

**Course Code: PCC-EE-302**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand the basic concepts of magnetic circuits.
2. Able to explain the concept behind Electromagnetic force and torque.
3. Analyze single phase and three phase transformers circuits.
4. Understand the operation of dc machines.
5. Analyze the differences in operation of different dc machine configurations.

**Course title: Network Analysis & Synthesis**

**Course Code: PCC-EE-303**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Apply network theorems for the analysis of electrical circuits.
2. Provide solution for First and second order networks and obtain the transient and steady-state response of electrical circuits.
3. Analyze two-port circuit behaviour.
4. To synthesize various networks using different synthesis techniques.
5. To understand and synthesize different types of filters.

**Course title: Bio-Sciences**

**Course Code: PCC-EE-304**

**Course Outcomes:**

1. Students will understand the Basic of Cell.
2. To familiarize the students with the basic organization of organisms and subsequent building to a living being.
3. To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.
4. To provide knowledge about biological problems that requires engineering expertise to solve them.
5. To provide knowledge Nervous System, Immune System, and Cell Signaling

**Course title: Analog Electronics**

**Course Code: PCC-EE-305**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Analyze BJT amplifiers in different configurations at low frequency.
2. Classify power amplifier and analyze performance of different power amplifiers. Also understand the concept of multistage amplifiers.
3. Understand the Operational amplifier fundamentals.
4. Design and analyze various circuits using operational amplifier.
5. Understand the concept of 555 timer and phase locked loop.



## **Laboratory Course:**

**Course title: Electrical Machine-I Lab.**

**Course Code: PCC-EE-311**

### **Lab. Outcomes:**

At the end of this laboratory student

1. Get an exposure to common electrical machines and their ratings.
2. Understand the basic characteristics of transformers and D.C. machines.
3. Student will be able to control speed of DC machine with different means.
4. Understand the usage of transformers and D.C. machines.
5. Get an exposure to the working of transformers and D.C. Machines.

**Course title: Network Analysis & Synthesis Lab.**

**Course Code: PCC-EE-312**

### **Lab. Outcomes:**

At the end of this laboratory the students will

1. Know about various networks.
2. Able to analysis various theorems.
3. Able to design and implement passive filters.
4. Able to evaluate steady and transient state of a network.
5. Able to finds many performance indices in the circuit.

**Course title: Analog Electronics Lab.**

**Course Code: PCC-EE-313**

### **Lab. Outcomes:**

At the end of this laboratory the students should be

1. Able to devise simple circuit using BJTs, Op-Amp etc.
2. Able to understand characteristics of different electronics devices.
3. Able to perform different operations on devices.
4. Able to understand the applications of different types of filters and timer.
5. Able to finds many performance indices in the circuit.

**Course title: Numerical Techniques**

**Course Code: BSC-EE-401**

### **Course Outcomes:**

Upon the completion of this course, the students will:

1. Comprehend of the Power of Numerical Techniques, and Ideas.
2. Apply these techniques to problems drawn from Industry, Management and other engineering fields.
3. Demonstrate the ability to solve linear system of equations.
4. Solve various problem of linear and nonlinear differential equations by using numerical methods.

**Course title: Renewable Energy Sources**

**Course Code: PCC-EE-401**

### **Course Outcomes:**

After learning the subject, student will be able to:

1. Appreciate the importance of energy crises and consequent growth of the power generation from the renewable energy sources
2. Demonstrate the knowledge of physics of solar power generation and the associated issues.
3. Demonstrate the knowledge of the physics of wind power generation and all associated issues.
4. Understand the utilization of Bio Gas Plants, Tidal, MHD, Fuel Cells by identifying the sites where their production is feasible.
5. Demonstrate the ways by which energy can be stored in different forms.

**Course title: Digital Electronics**

**Course Code: PCC-EE-402**

**Course Outcomes:**

After completion of the course student will be able to:

1. *Examine the structure of various number systems and its application in digital design.*
2. *Understand, analyze and design various combinational and sequential circuits.*
3. *Analyze different types of registers and design counter circuits.*
4. *Analyze different logic families, their characteristics and performances*
5. *Design solutions to real world problems.*

**Course title: Power System-I**

**Course Code: PCC-EE-403**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand the various concept of power system and realize its importance.
2. Understand the various power system components.
3. Understand the generation of over-voltages and requirement of insulation coordination.
4. Evaluate fault currents and voltages for different types of faults.
5. Understand various DC transmission techniques.

**Course title: Electrical Machine II**

**Course Code: PCC-EE-404**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand the fundamentals of ac machine winding.
2. Understand the concepts of rotating magnetic fields.
3. Understand the operation and characteristics of 3-phase Induction machines.
4. Understand the operation and characteristics of 1-phase Induction machines.
5. Understand the constructional features, operation and characteristics of Synchronous machines.

**Course title: Electrical Measurement-I**

**Course Code: PCC-EE-405**

**Course Outcomes:**

At the end of this course the student will learn:

1. Introduction to Measurement System & Characteristics of Instruments.
2. Exposure to the Bridge Circuits and to learn various measurements techniques used for the measurement of capacitance and inductance.
3. Exposure to Electromechanical Indicating Instruments.
4. Exposure to various types of Ammeters and Voltmeters.
5. Exposure to different methods used in the measurements of Energy & Power.

**Course title: Digital Electronics Lab.**

**Course Code: PCC-EE-411**

**Lab. Outcomes:**

At the end of this laboratory the student will:

1. Test and verify logic gates with its truth.
2. Implement basic arithmetic circuits.
3. Implement Multiplexer, De-Multiplexer, Encoder & Decoder circuits.
4. Use modern engineering and IT tools for circuit simulations.
5. Function effectively as a team.

**Course title: Electrical Machine-II Lab.**

**Course Code: PCC-EE-412**

**Lab. Outcomes:**

At the end of this laboratory the student will:

1. Get an exposure to common electrical machines and their ratings.
2. Understand the basic characteristics of various A.C. machines.
3. Understand the usage of different type of A.C. machines.
4. Get an exposure to the working of general purpose A.C. Machines.
5. Can be able to formulate the model on software package for simulation purpose.

**Course title: Renewable Energy Sources Lab.**

**Course Code: PCC-EE-413**

**Lab. Outcomes:**

At the end of this laboratory the student will:

1. Understand the V-I characteristics of Solar cell.
2. Able to evaluate MMP and efficiency.
3. Able to understand the installation of wind turbine.
4. Able to measure V-I of wind energy based DC supply but changing various means.
5. Able to understand the application of wind energy based DC supply system.

**Course title: Power System-II**

**Course Code: PCC-EE-501**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to:

1. Use numerical methods to analyze a power system in steady state.
2. Understand stability constraints in a synchronous grid.
3. Understand methods to control the voltage, frequency and power flow.
4. Understand the monitoring and control of a power system.
5. Understand the basics of power system economics.

**Course title: Signals & Systems**

**Course Code: PCC-EE-502**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to:

1. Understand the concepts of continuous time systems.
2. Understand the time domain representation of LTI system using convolution.
3. Analyze systems in complex frequency domain.
4. Understand s-domain representations of systems and its applications to analyze electrical circuit.
5. Understand Z-transform in context with digital signals.

**Course title: Control System**

**Course Code: PCC-EE-503**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to:

1. Understand the basics of control systems.
2. Understand the modeling of linear-time-invariant systems using transfer function.
3. Know the frequency response for stability analysis.
4. Design the controller.
5. Perform state-space representations for stability, controllability and observability.

**Course title: Electrical Measurement-II**

**Course Code: PCC-EE-504**

**Course Outcomes:**

The fundamentals developed in this study will expose the students to a broad knowledge of experimental methods and measurement techniques. After completion of this subject the student will be able to:

1. Understand the principal, standardization and application of AC and DC potentiometer.
2. Analyze different types and applications of transducers.
3. Understand basic concepts of phase and frequency measurements.
4. Analyze digital instruments.
5. Analyze data recording systems.

**Course title: Power System Lab.**

**Course Code: PCC-EE-511**

**Lab. Outcomes:**

At the end of this course the students will:

1. Get an exposure to common power system equipment's and their ratings.
2. Understand the basic performance of an artificial DC distributor.
3. Understand the basic characteristics of various A.C. transmissions systems.
4. Understand the usage of different type of A.C. machines.
5. Able to perform simulations for transmission on software package.

**Course title: Electrical & Electronic Measurement Lab.**

**Course Code: PCC-EE-512**

**Lab. Outcomes:**

At the end of this laboratory the students will:

1. Get an exposure to common electrical and electronic measurements instruments systems and their ratings.
2. Able to measure frequency and phase of signal using CRO.
3. Understand the basic characteristics of various bridges to know the different network parameter.
4. Understand the usage of different type of transducers.
5. Able to measure different quantities using transducers.

**Course title: Control system Lab.**

**Course Code: PCC-EE-513**

**Lab. Outcomes:**

The students should know about various control systems and able to:

1. Analysis various open loop and close loop control systems.
2. Understand performance characteristics of servo motors.
3. Check the response of various performance indices of various controllers used in the digital control system.
4. Able to understand DC speed and position control.
5. Learn about MATLAB simulink.

**Course title: Power Electronics**

**Course Code: PCC-EE-601**

**Course Outcomes:**

At the end of the course the students will be able to:

1. Articulate the basics of power electronic devices and characteristics of SCR, DIAC, TRIAC, MOSFET and IGBT.
2. Express the design and control of converters.
3. Design of power electronic converters in power control applications.
4. Ability to design AC voltage controller, Chopper circuit, Inverter circuit and Cyclo-Converter.
5. Analyze the operation of DC-DC choppers and voltage source inverters.

**Course title: Microprocessors & Interfacing**

**Course Code: PCC-EE-602**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to:

1. Do understand the Fundamental of Microprocessors and microcontrollers.
2. The students will be able to understand the basics of 8086 microprocessor.
3. Do assembly language programming.
4. Do understand the External Communication Interface and Applications.
5. Do understand interfacing design of peripherals like I/O, A/D, D/A, timer etc.

**Course title: Design of Power Apparatus**

**Course Code: PCC-EE-603**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to:

1. Understand the construction and performance characteristics of electrical machines.
2. Understand the various factors which influence the design: electrical, magnetic and thermal loading of Transformer.
3. Understand the various factors which influence the design: electrical and magnetic loading of Induction motor and synchronous machine.
4. Understand the principles of electrical machine design and carry out a basic design of synchronous machines.
5. Use software tools to do design calculations.

**Course title: Professional Elective courses-II**

**Course Code: PEC-EE-...**

**Course Outcomes:**

**Course title: Professional Elective courses-III**

**Course Code: PEC-EE-...**

**Course Outcomes:**

**Course title: Open Elective courses-II**

**Course Code: OEC-EE-...**

**Course Outcomes:**

**Course title: Power Electronics Lab.**

**Course Code: PCC-EE-611**

**Lab. Outcomes:**

At the end of the laboratory the students will be able to:

1. Obtain the characteristics of SCR, TRIAC, MOSFET and IGBT.
2. Implement the phase controlled switching using TRIAC.
3. To realize different type of triggering circuits for particular application.
4. To use UJT as a relaxation oscillator and for triggering circuits.
5. To implement different types of converters for various applications.

**Course title: MATLAB & Machine Design Lab.**

**Course Code: PCC-EE-612**

**Lab. Outcomes:**

At the end of the laboratory the students will be:

1. Able to model and compute transmission line parameter.
2. Perform load flow for line flows.
3. Stability analysis.
4. Economical Load dispatch.
5. Able to design various types machine on MATLAB.

**Course title: Microprocessor & Interfacing Lab.**

**Course Code: PCC-EE-613**

**Lab. Outcomes:**

On completion of this lab course the students will be able to:

1. Understand and apply the fundamentals of assembly level programming of microprocessors.
2. Work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters;
3. Troubleshoot interactions between software and hardware;
4. Analyze abstract problems and apply a combination of hardware and software to address the problem.
5. Use standard test and measurement equipment to evaluate digital interfaces.

**Course title: Electrical Drives**

**Course Code: PCC-EE-701**

**Course Outcomes:**

At the end of the course the students will be able to:

1. Apply the knowledge of drives and use them effectively.
2. Able to control the speed of DC motor and Induction motor.
3. Able to realize different braking methods in AC/ DC drive.
4. Suggest the particular type of AC/DC drive system for an application.
5. To apply close loop control in AC/DC Drive.

**Course title: Power System Protection**

**Course Code: PCC-EE-702**

**Course Outcomes:**

This course will enable student to:

1. Understand the importance of various types of relays.
2. Understand the protection scheme for generators and transformers.
3. Understand the protection scheme of feeder, bus-bar and transmission lines.
4. Understand the concept and use of fuses.
5. Understand the use of circuit breaker in protection schemes of various power system equipments.

**Course title: Power System Protection Lab.**

**Course Code: PCC-EE-711**

**Lab. Outcomes:**

At the end of the laboratory the student will able:

1. Get an exposure to different types of protecting relays.
2. Understand the basic characteristics of Time graded protection system.
3. Understand the usage of different type of circuit breaker.
4. To understand digital protection.
5. To understand microprocessor based over voltage/ under voltage relay.

**Course title: Advance Microcontroller lab.**

**Course Code: PCC-EE-712**

**Lab. Outcomes:**

Student will

1. Study and understand programing on Arduino.
2. Study and understand programing on Raspberry.
3. Study and understand programing on ATmega.
4. Study and understand programing on PIC16F877A.
5. Interface various controllers with MATLAB.

**Course title: Electrical Drives Lab.**

**Course Code: PCC-EE-713**

**Lab. Outcomes:**

At the end of the laboratory the students will be able to

1. Control the speed of DC and BLDC motor.
2. Control the speed of Multiphase Inverter Drive.
3. Control the speed of Switched Reluctance motor.
4. Analyse V/f control of induction motor.
5. Develop and analyse the performance of DC motor and Induction motor in MATLAB.

**Course title: Entrepreneurship Development & Management**

**Course Code: HSMC-EE-801**

**Course Outcomes:**

After completion of this subject student will be able to:

1. Understand the meaning, objectives and types of entrepreneurs.
2. Understand the Entrepreneurship Support System.
3. Prepare to Project Report.
4. Analyze business opportunities, technical feasibility and financial viability in context to entrepreneurship.
5. Plan the business.



**Course title: Wind and Solar Energy Systems**

**Course Code: PEC-EE-01**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand the basic physics of wind.
2. Understand the various wind generation topologies.
3. Understand the sun characteristics and solar photovoltaic systems.
4. Understand the power electronic interfaces for wind and solar generation.
5. Understand concentrated solar photo voltaic technology.

**Course title: Line-Commuted and Active PWM Rectifiers** Course Code: PEC-EE-02

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Analyze different rectifier circuit with passive filter.
2. Express the design and control of 6 pulse and 12 pulse converter.
3. Analyze the operation of single phase AC/DC single switch converter.
4. Understand the working and control of AC/DC bi directional boost converter.
5. Analyze the operation of Isolated AC/DC fly back converter.

**Course title: Energy Audit and Management**

**Course Code: PEC-EE-03**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand the current energy scenario and realize the need for new reforms to efficiently manage the energy resources.
2. Learn various auditing techniques used for proper energy management.
3. Realize how energy conservation could be done in Electrical Systems by managing the energy losses and malpractices.
4. Realize how energy conservation could be done in Industrial Systems by finding out the factor affecting the performance of various industrial devices and mitigating the same.
5. How electrical energy management could be achieved using new energy efficient devices.

**Course title: Electrical and Hybrid Vehicles**

**Course Code: PEC-EE-04**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand the models to describe hybrid vehicles and their performance.
2. Understand the suitability of particular drive for electrical traction.
3. Understand the different possible ways of energy storage.
4. Understand the different strategies related to energy storage systems.
5. Analyze various implemented case studies across globe.

**Course title: EHV AC & DC Transmission**

**Course Code: PEC-EE-05**

**Course Outcomes:**

This course will allow the students to:

1. Understand the need of EHV transmission.
2. Analyze different parameters of EHV AC transmission systems and study of various compensation methods.
3. Understand different EHVDC transmission systems and various associated protection schemes.
4. Study and understand the design of EHV transmission system.
5. Realize the need for control of EHV systems and implementing the corresponding control strategies.

**Course title: Power Quality and FACTS**

**Course Code: PEC-EE-06**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand the basic concepts of power quality.
2. Understand the characteristics of ac transmission and the effect of shunt and series reactive compensation.
3. Understand working of various VSC.
4. Study the applications of FACTS.
5. Understand the working of DSTATCOM along with its control.

**Course title: High Voltage Engineering**

**Course Code: PEC-EE-07**

**Course Outcomes:**

At the end of this module students will be able to:

1. Understand different breakdown mechanisms in gases as well as post breakdown mechanisms.
2. Analyze different conduction and breakdown mechanisms in liquid dielectrics.
3. Analyze different conduction and breakdown mechanisms in solid dielectrics.
4. Foresee applications of different insulating materials in electrical apparatus.
5. Analyze the different techniques of generation and measurement of high voltage and current.

**Course title: Industrial Electrical Systems**

**Course Code: PEC-EE-08**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Understand various components of industrial electrical systems.
2. Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
3. Understand illumination and various design scheme for energy systems.
4. Analyze and select the proper size of various electrical system components.
5. Study the basics of PLC and SCADA systems.

**Course title: Digital Signal Processing**

**Course Code: PEC-EE-09**

**Course Outcomes:**

After learning the course the students should be able to:

1. Understand the basic concepts of Discrete Fourier transform and its application to linear filtering.
2. Understand and explain FFT algorithms and their computational efficiency in comparison to DFT.
3. Understand and explain the design of IIR filters by approximation of derivatives, impulse invariance and bilinear transformation.
4. Understand and explain the design of FIR filters by windowing and frequency sampling technique and provide a basic overview of special type of FIR filters.
5. Understand and explain the realization of filters using cascade and parallel structures as well as signal flow graphs and provide brief overview of the application areas of DSP.

**Course title: Electromagnetic Waves**

**Course Code: PEC-EE-10**

**Course Outcomes:**

At the end of this course, students will demonstrate the ability to

1. Analyze transmission lines and estimate voltage and current at any point on transmission line for different load conditions.
2. Understand Maxwell Equation.
3. Provide solution to real life plane wave problems for various boundary conditions.
4. Analyze the field equations for the wave propagation in special cases such as lossy and low loss dielectric media.
5. Visualize TE and TM mode patterns of field distributions in a rectangular wave-guide. Understand and analyses radiation by antennas.

**Course title: Control Systems Design**

**Course Code: PEC-EE-11**

**Course Outcomes:**

At the end of this course,

1. Students will demonstrate the ability to understand various design specifications.
2. To understand the role of compensators in classical control system.
3. To study design of compensators in frequency domain using bode plot.
4. Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators). Design controllers using the state-space approach.
5. To understand state space design of control system.

**Course title: Power Engineering**

**Course Code: PEC-EE-12**

**Course Outcomes:**

After the completion of this course student will be able to:

1. Understand economic aspects of power generation, transmission & transmission along with the advantages of power factor improvement.
2. Analyze different costs associated with power systems and ways to reduce it analyze various tariffs schemes.
3. Understand the layout and design considerations of thermal and nuclear plants.
4. Understand the layout and design considerations of hydroelectric plants.
5. Understand various types of substation groundings.

**Course title: Electric Substation Design**

**Course Code: PEC-EE-13**

**Course Outcomes:**

By the end of this course, the student should be able to:

1. Explain the principles of design and operation of electric Sub-Station Design
2. Apply analytic techniques pertaining to primary Bus-Bar Design systems.
3. Use basic design principles for Switch Operation and facilities.
4. Examine primary Transformers and Circuit Breakers systems using computer-based modeling.
5. Discuss computational algorithms of Control & Relay panels' system analysis and operation.

**Course title: Restructuring of Power System**

**Course Code: PEC-EE-14**

**Course Outcomes:**

The restructuring and deregulation of the power utility industry is resulting in significant competitive, technological and regulatory changes. Independent power producers, power marketers and brokers have added a new and significant dimension to the task of maintaining a reliable electric system. This course been made to get students familiar with new ways of restructuring of power system. This course will enable student to:

1. Basic concept of deregulated system
2. Differences between regulated and Deregulated system
3. Study various deregulated models present worldwide
4. How demand and supply bids are auctioned
5. Study various transmission pricing mechanisms

**Course title: Energy Economics and Planning**

**Course Code: PEC-EE-15**

**Course Outcomes:**

At the end of this course, students will be able to:

1. Understand the law of demand subject to resource scarcity.
2. Basic concepts of Energy economics subject to eco ground rules.
3. Understand the econometric forecasting of energy resources.
4. Analyze economics sector of rural area.
5. Analyze financing performance of non-conventional energy systems.

**Course title: Microcontroller & Interfacing**

**Course Code: PEC-EE-16**

**Course Outcomes:**

This course will familiarize students with the basic idea of:

1. Converters, Filters and architecture of microcontrollers.
2. Programming of ISR
3. Programming of different peripherals of microcontrollers.
4. LED and LCD interfacing
5. Temperature control based on PID.

**Course title: Virtual Instrumentation**

**Course Code: PEC-EE-17**

**Course Outcomes:**

At the end of this course, the student will be able to:

1. Understand the historical perspective, architecture and data flow techniques involved in virtual instruments.
2. Analyze techniques of programming along with publishing measurement data in the web.
3. Understand sampling techniques, ADC and DAC in data acquisition systems.
4. Understand fundamental concepts of networking in addition with common instrument interfaces.
5. Analyze the importance and application of virtual instruments.

**Course title: Optimization Techniques**

**Course Code: PEC-EE-18**

**Course Outcomes:**

This will enable student to:

1. Learn the basics about optimization problem.
2. Solve linear problems using optimization.
3. Solve non-linear problem using optimization.
4. Use various approximation techniques for problem solving.
5. Use dynamic programming for problem solving.

**Course title: Power Semiconductor Controllers**

**Course Code: PEC-EE-19**

**Course Outcomes:**

After completing the course, the students should be able to:

1. Understand and analyze various AC and DC supplies.
2. Know the practical aspect of different types of power electronic converters.
3. Perform analysis and simulation of power electronic circuits.
4. Learn current state-of-the-art technological development.
5. Study Application of these converters.

**Course title: Communication system**

**Course Code: PEC-EE-20**

**Course Outcomes:**

After the completion of this course student will be able to:

1. Understand different modulation techniques used in communication system.
2. Analyze configuration AM transmitters and receivers.
3. Understand working of FM transmitters and receivers.
4. Learn components of DCM and appreciate the working of DPCM.
5. Understand generation and demands of Digital Modulation Techniques.

**Course title: Power System Transients**

**Course Code: PEC-EE-21**

**Course Outcomes:**

This course will enable students to:

1. Understand nature and origin of surges and transients in power system.
2. Analyze the effects of earthing and controlling of power surges.
3. Understand lightning phenomenon and travelling waves in multi-conductor lines.
4. Understand breakdown phenomenon and dielectric properties of insulating materials.
5. Analyze various phenomenon involved in breakdown of gaseous insulation along with basics of over voltage limiting devices.

**Course title: Neural Networks and Fuzzy Systems**

**Course Code: PEC-EE-22**

**Course Outcomes:**

The course is aimed to introduce students to neural networks and fuzzy theory from an engineering perspective and their application real world control problems. This course will enable student to learn:

1. Introduction to Neural networks and various neural network models
2. Various important concepts related with neural networks
3. Various learning paradigms in artificial neural networks
4. How fuzzy systems are used to solve problems of uncertainties.
5. How various artificial intelligence methods are clubbed to introduce hybrid systems.

**Course title: Disaster Management**

**Course Code: PEC-EE-23**

**Course Outcomes:**

After completing subject, Students will be able to

1. Affirm the usefulness of integrating management principles in disaster mitigation work
2. Distinguish between the different approaches needed to manage pre- during and post-disaster periods
3. Explain the relation between disaster and development
4. Relate to risk transfer

**Course title: Computers in medicine**

**Course Code: PEC-EE-24**

**Course Outcomes:**

After completing subject, Students will be able to

1. Understand the informatics related to hospital management and security concerns.
2. Understand the importance of Computerized Patient Record.
3. Understand the importance of computers in Clinical Laboratory and Medical Imaging.
4. Aware with the Recent Trends in Medical Informatics.

**Course title: Engineering Material Science**

**Course Code: PEC-EE-25**

**Course Outcomes:**

1. Given a type of material, the students will be able to qualitatively describe the bonding scheme and its general physical properties, as well as possible applications in electrical engineering.
2. This will be helpful for the students to understand about the insulating properties of the materials.
3. This will be helpful for the students to understand about the Dielectric properties of the materials.
4. Students will be able to do comparative analysis of magnetic materials based upon their properties.
5. Students will be able to differentiate among various materials such as conductor and semiconductor based upon the internal composition and conductivities.

**Course title: Consumer Electronics**

**Course Code: OEC-EE-01**

**Course Outcomes:**

1. Appreciate the penetration of electronics into our everyday life.
2. Analyze the working principles of different electronic gadgets used in the entertainment industry.
3. Understand the underlying circuitry and algorithms behind smart home systems.
4. Describe the various electronic principles applied in the latest communication systems applying Wi-Fi, Li-Fi, GPS and other tracking systems etc.
5. Know about the theory and working behind the latest IoT devices, sensors and systems and then evaluate them.

**Course title: Mobile and Wireless Communication**

**Course Code: OEC-EE-02**

**Course Outcomes:**

After completion of the course student will be able to:

1. Understand cellular mobile system, formulate its performance criteria.
2. Characterize the trade-off among frequency reuse, signal to interference ratio, capacity & able to understand interferences in cellular communication.
3. Apply the knowledge of mathematics to find out the average received signal strength at a distance from the transmitter using different propagation model.
4. Identify the advantages & disadvantages of different mobile antennas.
5. Understand multiple access method, spread spectrum techniques, wireless communication system.

**Course title: Embedded Systems**

**Course Code: OEC-EE-03**

**Course Outcomes:**

After completion of the course student will be able to:

1. Understand and design embedded systems.
2. Learn basic of OS and RTOS.
3. Understand types of memory.
4. Understand embedded firmware design approaches.
5. Design RTOS embedded systems.

**Course title: 8051 Microcontroller  
EE-04**

**Course Code: OEC-**

**Course Outcomes:**

After completion of the course student will be able to:

1. Distinguish and analyze the properties of Microprocessors & Microcontrollers.
2. Apply a basic concept of digital fundamentals to 8051 Microcontroller.
3. Identify a detailed software and hardware Architecture of 8051.
4. Understand and apply the fundamentals of assembly level programming of microcontroller.
5. Analyze the data transfer information through serial & parallel ports
6. Illustrate how the different real time peripherals are interfaced with Microcontroller.

**Course title: Bio Inspired Engineering**

**Course Code: OEC-EE-05**

**Course Outcomes:**

After completion of the course student will be able to:

1. Appreciate the complexity of Natural and Biological systems over man made systems.
2. Analyze different Natural-inspired search techniques and compare with their classical counterparts.
3. Understand the various factors that make Bio-Inspired Algorithms more robust over conventional techniques.
4. Apply different Bio-Inspired engineering algorithms to solve engineering problems.
5. Apply the concept of Artificial Neural network to solve simple engineering problems.
6. Visualize and design a new natural inspired algorithm after improving or combining any existing algorithms or systems.

**Course title: Electronic Workshop Technology**

**Course Code: OEC-EE-06**

**Course Outcomes:**

After completion of the course student will be able to:

1. Understand different types of failures and methods to locate and rectify them.
2. Know about test tools and their use to measure different parameters for different electromechanical components.
3. Gain knowledge about different soldering and de-soldering techniques.
4. Test different active and passive components.
5. Acquire knowledge about the fault location techniques for different circuits.

**Course title: Nanotechnology**

**Course Code: OEC-EE-07**

**Course Outcomes:**

After completion of the course student will be able to:

1. Understand the basics of Nanotechnology along with MEMS and NEMS technology.
2. Describe the preparation and applications of various nanomaterials.
3. Explain the synthesis and application of Carbon Nanotubes.
4. Understand various nanoelectronic approaches such as CNTFET and quantum devices.
5. Get familiarized with various nanotechnology related fabrication and characterization techniques.

**Course title: CMOS VLSI Design**

**Course Code: OEC-EE-08**

**Course Outcomes:**

After completion of the course student will be able to:

1. Explain the VLSI Design flow and describe the operational characteristics of MOSFET.
2. Understand the complete CMOS fabrication process and techniques
3. Design CMOS Inverters and analyse its static and dynamic characteristics
4. Analyse different digital design approaches and design CMOS based combinational logics
5. Design CMOS based bistable and non-bistable sequential logics.



**Course title: Biomedical Instrumentation**

**Course Code: OEC-EE-09**

**Course Outcomes:**

After completion of the course student will be able to:

1. Understand biomedical instrumentation, propagation of action potential.
2. Acquire knowledge of electrodes, transducers & amplifiers used in biomedical instrumentation.
3. Apply the knowledge of science, engineering fundamentals & engineering specialization for electrode potential recording.
4. Understand different human assist devices.
5. Gain knowledge of different imaging techniques used in medical science.

**Course title: Data Structures Using C**

**Course Code: OEC-EE-10**

**Course outcomes:**

At the end of this course, the student will able to do the following:

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

**Course title: Data Object Oriented Programming**

**Course Code: OEC-EE-11**

**Course outcomes:**

At the end of this course, students will be able to:

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

**Course title: Computer Networks**

**Course Code: OEC-EE-12**

**Course outcomes:**

At the end of this course, the students will able to do the following:

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

**Course title: Operating System**

**Course Code: OEC-EE-13**

**Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

**Course title: Fundamental of Digital Image Processing  
14**

**Course Code: OEC-EE-**

**Course outcomes:**

At the end of this course, the students will be able to do the following:

1. To understand the basics of Image Processing
2. Mathematically represent the various types of images and analyze them.
3. Process these images for the enhancement of certain properties or for optimized use of the resources.
4. Develop algorithms for image compression and segmentation.

**Course title: Artificial Intelligence**

**Course Code: OEC-EE-15**

**Course outcomes:**

At the end of this course, the student will be able to do following:

1. To learn different forms of logic
2. Deal with inconsistencies and uncertainties of logic
3. Be familiar with informed and uninformed searching techniques
4. To study different matching techniques
5. To learn pattern recognition and expert systems

**Course title: Internet of Things**

**Course Code: OEC-EE-16**

**Course outcomes:**

After completion of this course, the students will be able to do following:

1. Interpret the vision of IoT from a global context.
2. Compare and contrast the use of Devices, Gateways and Data Management in IoT.
3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
4. To study and analyse data and to understand the security issues in IoT
5. To study IoT physical devices and end points and to understand the communications between components

**Course title: Natural Language Processing**

**Course Code: OEC-EE-17**

**Course outcomes:**

After completing this course, the student should be able to:

1. Understand the basic concepts of language for processing
2. Implement different data models for language processing
3. Understand parsing techniques related to English language
4. Process and analyse the language semantically
5. Understand the application of NLP

**Course title: Cloud Computing****Course Code: OEC-EE-18****Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Develop and deploy cloud application using popular cloud platforms.
2. Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud.
3. Explain and identify the techniques of big data analysis in cloud.
4. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
5. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

**Course title: Project Management System****Course Code: OEC-EE-19****Course outcomes:**

At the end of this course, the student will be able to do the following:

1. Understand the basic project management strategies
2. Understand the various planning strategies for successful completion of a project
3. Understand the project cost estimation techniques
4. Understand the strategies for the risk management
5. Understand the Team Management strategy

**Course title: Real Time Operating Systems****Course Code: OEC-EE-20****Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Understand the basic concept of RTOS and its usefulness for embedded systems
2. Understand Theoretical background and practical knowledge of real-time operating systems.
3. Understand multitasking techniques in real-time systems.
4. Understand the impact of real time operating systems on application area.

**Course title: Computer Organization & Architecture****Course Code: OEC-EE-21****Course outcomes:**

1. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
2. Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
3. Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

**Course title: Computer Graphics & Multimedia****Course Code: OEC-EE-22****Course outcomes:**

1. Students will get the concepts of Graphics display devices, techniques, and different types of graphics drawing algorithms.
2. Students will get the concepts of 2D and 3D Geometrical Transformations
3. Students will get the concepts of Viewing, Curves and surfaces.
4. Students will get the concepts of Hidden Line/surface elimination techniques.
5. Students will get the concepts of some Scan Conversion algorithms.

**Course title: Computer Based Numerical Techniques**

**Course Code: OEC-EE-23**

**Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Understand Various Numerical Techniques and their applications.
2. Implement various numerical solution algorithms using C programming.
3. Be familiar with calculations and interpretation of errors in numerical method.
4. To learn various integration and differentiation formulas in the field of computer science and engineering.
5. Understanding the implications of approximations.

**Course title: Internet & Web Technology**

**Course Code: OEC-EE-24**

**Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Understand the basic principles of web designing
2. Build an attractive website for various applications as per the requirements
3. Understand the various issues of internet security and their implementation
4. Build dynamic web pages using JavaScript
5. Understand the concepts of server side programming

**Course title: Data Warehousing and Data Mining**

**Course Code: OEC-EE-25**

**Course outcomes:**

Students who complete this course should be able to

1. Describe the fundamental concepts, benefits and problem areas associated with data warehousing.
2. Describe the various architectures and main components of a data warehouse.
3. Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.
4. Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis.
5. Applicability of various classification algorithms in data mining for real-world problems.

**Course title: Data Wireless Networks**

**Course Code: OEC-EE-26**

**Course outcomes:**

On successful completion of this unit students will be able to:

1. Identify the basic concept of wireless networks, channel coding, and cellular concepts;
2. Compare and contrast LEO, MEO and GEO. Routing and handover in satellite communication
3. Understand various wireless LAN technologies
4. Understand the terminologies in mobile network layers and the process of packet discovery and registration in network layer.
5. Compare and contrast between cellular and Ad Hoc wireless networks, areas of its applications and challenges

**Course title: System Software**

**Course Code: OEC-EE-27**

**Course outcomes:**

At the end of the course, the students will be able to do the following:

1. To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
2. Describe the various concepts of assemblers and macroprocessors.
3. To understand the various phases of compiler and compare its working with assembler.
4. To understand how linker and loader create an executable program from an object module created by assembler and compiler.
5. To know various editors and debugging techniques

**Course title: Green Computing****Course Code: OEC-EE-28****Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Understand the fundamentals of Green Computing Technology
2. Knowledge of middleware support for green computing
3. Understanding of various tools and techniques used in green computing
4. Understanding the data management of green computing
5. How embedded systems are involved with green computing

**Course title: Mobile Computing****Course Code: OEC-EE-29****Course outcomes:**

On successful completion of this unit students will be able to:

1. Understand the concept of mobile computing, various security issues, protocols and handover methods in mobile computing.
2. Grasp the concepts and features of SDMA, FDMA, TDMA, CDMA, DHCP
3. A good understanding of how the underlying wireless and mobile communication networks work, their technical features.
4. Grasp the concepts of Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation.
5. Identify the important issues of data dissemination

**Course title: Neural Networks****Course Code: OEC-EE-30****Course outcomes:**

At the end of the course, students should be able to understand and appreciate:

1. The role of neural networks in engineering, artificial intelligence, and other areas.
2. Understanding of basic neural network models like McCulloch-Pitts Model, Radial Basis Function Model, resistive networks for vision models, complex dynamical learning models.
3. Understanding of the concepts and techniques of neural networks through the study of the most important neural network models.
4. Have knowledge of sufficient theoretical background to be able to reason about the behavior of neural networks.
5. Able to evaluate whether neural networks are appropriate to a particular application.
6. Able to apply neural networks to particular applications, and to know what steps to take to improve performance.

**Course title: Pattern Recognition****Course Code: OEC-EE-31****Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms
2. Understand and apply both supervised and unsupervised classification methods to detect and characterize patterns in real-world data
3. Describe the strengths and limitations of some techniques used in computational Machine Learning for classification, regression and density estimation problems
4. Describe fuzzy logic, and its application of pattern recognition
5. Implement learning algorithms for supervised tasks
6. Conduct, document and present a literature review on a topic related to Machine Learning and Pattern Recognition

**Course title: Bio-Informatics**

**Course Code: OEC-EE-32**

**Course outcomes:**

At the end of this course, the students will be able to do the following:

1. Explain the basic principles that underpin Bioinformatics analyses, and apply these principles when analysing biological data;
2. Survey a selected field within Bioinformatics, synthesise information from primary literature, and coherently report your findings in a written document;
3. Analyse biological data using a variety of Bioinformatics tools; and
4. Interpret correctly the outputs from tools used to analyse biological data and make meaningful predictions from these outputs.

**Course title: Hydro-power Engineering**

**Course Code: OEC-EE-33**

**Course outcomes:**

The main objective is to allow students to

1. Know about generation of hydro-power and discover principles of operation and installation of the necessary accessories for a specific location.
2. Know basic principle of various dams and their selection accordingly
3. To understand the general layout of Power house
4. To understand the financial implications on account of construction of power house.

**Course title: Engineering Geology**

**Course Code: OEC-EE-34**

**Course outcomes:**

After completing subject, Students will be able to

1. Understand the role of geology in the design and construction process of underground openings in rock.
2. Apply geologic concepts and approaches on rock engineering projects.
3. Identify and classify rock using basic geologic classification systems.
4. Use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.

**Course title: Tunnel Engineering**

**Course Code: OEC-EE-35**

**Course outcomes:**

The students will able to

1. Design the tunnel for the given geo-technical conditions
2. Choose the type of the equipment and operations.
3. Understand the conventional tunneling methods
4. Understand the modern tunneling methods.
5. Have a sound knowledge of safety norms adopted while tunneling.

**Course title: Introduction to Solid Mechanics**

**Course Code: OEC-EE-36**

**Course outcomes:**

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

1. Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, relative to the strength and stability of structures and mechanical components;
2. Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures; analyze solid mechanics problems using classical methods and energy methods;
3. Analyses various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress; locate the shear center of thin wall beams ;and

4. Calculate the deflection at any point on a beam subjected to a combination of loads; solve for stresses of beams under unsymmetrical loading; apply various failure criteria for general stress states at points; solve torsion problems in bars and thin walled members.
5. The stresses in thick and thin cylinder.

**Course title: Introduction to Fluid Mechanics**  
**Course outcomes:**

**Course Code: OEC-EE-37**

After the completion of the course the students will be able to

1. Understand type of fluid, behavior of fluid, basic concept and theorem used in fluid Mechanics and apply their knowledge of fluid mechanics in addressing problems in Hydraulics.
2. They will possess the skills to solve problems in laminar flow, Turbulent flow, boundary layer thickness calculation and for better understanding of this all application.
3. They will gain knowledge in Types of models, Application of dimensional analysis and model studies to fluid flow problem.
4. The basic of The Laminar Flow and turbulent flow and concept of boundary layer theory
5. The Dimensional analysis and model studies to the flow problems.

**Course title: Surveying and Geomatics**  
**Course outcomes:**

**Course Code: OEC-EE-38**

The course will enable the students to:

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
2. Translate the knowledge gained for the implementation of Civil infrastructure facilities.
3. Identify and calculate the errors in measurements and to develop corrected values for differential level circuits, horizontal distances and angles for open or closed-loop traverses,
4. Operate an automatic level to perform differential and profile leveling; properly record notes; mathematically reduce and check levelling measurements,
5. Effectively communicate with team members during field activities; identify appropriate safety procedures for personal protection; properly handle and use measurement instruments. Be able to identify hazardous environments and take measures to insure one's personal and team safety.

**Course title: Estimating & Costing**  
**Course outcomes:**

**Course Code: OEC-EE-39**

After successfully studying this course, students will:

1. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
2. Able to determine rates of different items in engineering works.
3. Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
4. Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
5. Be able to quantify road estimation and valuation.

## **Programme: B.Tech (CSE)**

### **PROGRAM OUTCOMES (POs)**

#### **Engineering Graduates will be able to:**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **Program Specific Outcomes (PSOs)**

- **The ability to understand, analyze and develop computer programs** in the areas related to algorithms, system software, multimedia, web design and networking for efficient design of computer-based systems of varying complexity.
- **The ability to apply standard practices and strategies** in software project development using modern programming environments to deliver a quality product for business success.
- **The ability to employ modern computer languages, environments, and platforms** in creating innovative career paths to be an entrepreneur, and a zest for higher studies.



#### SEMESTER-I

Course Title: Mathematics-I

Course Code: BSC-CSE-101

Course Outcomes

Upon the successful completion of the course, the student will be able to:

1. Understand the significance of Rolle's Theorem, Mean Value theorem, Taylor's and Maclaurin's series for differentiable functions.
2. Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.
3. Use basic the integral rules to evaluate both definite and indefinite integrals and apply the same to find areas and volume of revolutions. Apart from these, they have a basic understanding of Beta and Gamma functions.
4. Apply the tools of power series and Fourier series to deal with functions of several variables that are essentials in most branches of engineering.
5. Learn the essential tools of matrices and linear algebra in a comprehensive manner.

#### SEMESTER-I

Course Title: Basic Electrical Engineering

Course Code: ESC-CSE-101

Course Outcomes

At the end of this course, students will demonstrate the ability

1. To understand the concepts and applications of different laws used in the circuits and network.
2. To study and analyze the D.C. Circuits with different theorem.
3. To study and analyze the A.C. Circuits with different theorem.
4. To study the concepts related to Electromagnetism.
5. To study and understand the working of transformers incorporating with different types of Basic Electrical Installations.

#### SEMESTER-I

Course Title: Engineering Chemistry

Course Code: BSC-CSE-102

Course Outcomes

At the end of course, the student will be able to

1. Apply the methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce cheaper bio-degradable polymers to reduce environmental pollution,
3. Apply knowledge about photochemical and photo physical processes and the reactivity of excited states to explain applications in photochemical energy conversion.
4. Understand structure of organic compounds and transition metal compound synthesis,
5. Understand the manufacturing process of cement and lime.

#### SEMESTER-I

Course Title: Engineering Physics

Course Code: BSC-CSE-103

Course Outcomes

After completing of the course, the students will:

1. Understand the importance of Applied Physics in describing the technology we are using today in different engineering fields

2. Acquired knowledge of Waves, Vibration and acoustics, helps the students to develop the acoustically good hall.
3. Knowledge of basic Quantum Mechanics can help the students for further research applications as they can be applied to any quantum, mechanical situation to find energy, momentum etc.
4. Acquired knowledge of Optics help the students to
  - a) Know more about propagation of light and wave optics.
  - b) Describe the requirements for a system to act as a laser.
  - c) Differentiate the various types of lasers and their means of excitation.
  - d) Able to explain, which laser would best meet the need for a industrial or research task.
  - e) Demonstrate an awareness of the safety responsibilities involved in working with lasers.

#### SEMESTER-I

Course Title: Environmental Science

Course Code: MC-CSE-101

Course Outcomes

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

1. Learn about the environment and ecology.
2. Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.
3. Understand bio geo chemical cycles and human contribution in it.
4. Learn succession and various types of succession.
5. Demonstrate the ability to understand the biomes of world and its importance in human survival.

#### Semester II

Course Title: Mathematics-II

Course Code: BSC-CSE-201

Course Outcomes

Upon the completion of this course, the students will be able to:

- 1 Compute double and triple integrals over rectangular and spherical domains and memorize important theorems: Green, Gauss divergence and Stokes with their applications in various engineering problems.
- 2 Distinguish between linear and non-linear equations. Recognize and solve equations of Bernoulli, Euler and Clairaut.
- 3 Solve partial differential equations of various kinds and apply the same to solve problems of real world.
- 4 Understand the significance of different ability for complex functions and be familiar with the Cauchy-Riemann equations and conformal mapping.
- 5 Apply the Cauchy Residue theorem to evaluate definite integrals, compute the Taylor and Laurent expansions of simple functions and determine the nature of the singularities and calculating residues.

## SEMESTER-II

Course Title: Basic Electronics

Course Code: ESC-CSE-201

Course Outcomes

At the end of the course, the student will be able to

- 1 Describe the energy bands and the scientific principles behind controlled conductivity in semiconductors.
- 2 Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.
- 3 Analyze the working of the traditional transistor BJT and as well as the concept of biasing.
- 4 Understand the operation of MOSFET and various issues of scaling in MOSFET.
- 5 Design basic analog circuits

## Semester II

Course Title: Engineering Mechanics

Course Code: ESC-CSE-202

Course Outcomes

Upon successful completion of the course, student should be able to:

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
2. Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts);
3. Understand basic dynamics concepts – force, momentum, work and energy;
4. Understand and be able to apply Newton's laws of motion;
5. Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy.

## Semester II

Course Title: Communication Skill

Course Code: HSMC-CSE-201

Course Outcomes

Upon the completion of the course, the students will be able:

1. To acquire basic proficiency in English including reading, listening comprehension, writing and speaking skills.
2. To make the students authoritative in self-expression in their day to day life in this fast-changing world.
3. To identify the common errors involved in writing.
4. To understand the nature and style of sensible writing.
5. To write effective and coherent paragraphs.

## Semester II

Course Title: Computer Fundamentals & Programming

Course Code: ESC-CSE-203

Course Outcomes

The student will be able:

- 1 To assemble a computer system and formulate simple algorithms for arithmetic and logical problems.
- 2 To translate the algorithms to programs (in C language) for execution and usage of various control statements for problem solving.

- 3 To decompose a problem into functions and usage of arrays to synthesize a complete program.
- 4 To use pointers, files and user defined data types to formulate algorithms and programs.
- 5 To be familiar with the concept of computer networking.

#### Semester II

Course Title: Indian Constitution

Course Code: MC-CSE-201

Course Outcomes

Upon the completion of this, the students will able to know:

1. About the constitutional framework.
2. About the government system
3. Various type of government
4. About Constitutional bodies: Election commission, UPSC, SPSC, Commission for ST/SC and many others.
5. Non-constitutional bodies: Planning Commission, NDC, NHRC, SHRC, CBI, Vigilance Commission and other dimensions of constitution.

#### Semester III

Course Title: Mathematics-III

Course Code: BSC-CSE-301

Course Outcomes

After the completion of this course, the students will be able to:

1. Understand the basic concepts and techniques to solve Laplace transform and also learn to apply the same to solve various problems of engineering which are modeled through differential equations.
2. Demonstrate the ability to understand the basic concepts and techniques to solve Fourier's transform and also learn to apply the same to find solutions of boundary value problems (BVP).
3. Apply the concepts of the z-transform in solving difference equations and other discrete signal system.
4. Learn the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
5. Understand the basic ideas of statistics including measures of central tendency, correlation and regression and apply various statistical methods in engineering problems.

#### Semester III

Course Title: Data Structures Using C

Course Code: PCC-CSE-301

Course outcomes

At the end of this course, the student will able to do the following:

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

5. Student will be able to implement Graph search and traversal algorithms and determine the time and computation complexity.

#### Semester III

Course Title: Object Oriented Programming Using C++

Course Code: PCC-CSE-302

Course Outcomes

At the end of this course, students will be able to:

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.
5. Must be able to understand and use Exception handling

#### Semester III

Course Title: Software Engineering

Course Code: PCC-CSE-303

Course Outcomes

At the end of this course, the students will be able to

1. Learn about the phases in software development cycle
2. To understand various types of models and requirements engineering
3. To understand the design principles.
4. Learn about the levels of testing and testing approaches
5. Learn about the maintenance model.

#### Semester III

Course Title: Digital Logic Design

Course Code: ESC- CSE-301

Course Outcomes

After studying this course the students would gain enough knowledge

1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. To understand and examine the structure of various number systems and its application in digital design.
3. Ability to identify basic requirements for a design application and propose a cost effective solution.
4. The ability to identify and prevent various hazards and timing problems in a digital design.
5. To develop skill to build, and troubleshoot digital circuits.

#### Semester III

Course Title: Entrepreneurship Dev & Management

Course Code: HSMC-CSE-301

Course Outcomes

At the end of this course, the students will be able to do following:

1. Have the ability to discern distinct entrepreneurial traits
2. Understand the systematic process to select and screen a business idea
3. Understanding the market strategy and constraints for new business ideas
4. Design strategies for successful implementation of ideas

5. Write a successful business plan

#### Semester IV

Course Title: Discrete Mathematics

Course Code: PCC-CSE-401

Course Outcomes

After the completion of this course, the students will be able to:

1. Understand basic concept of functions and relations
2. Understand and use argument, evaluation, analysis, logic and truth tables.
3. Comprehend the basic terminology and analyse applications of graph theory in modern society.
4. Learn to model problems using graphs and understand some basic algorithms to solve these real world problems.
5. Understand relation between matrix theory and graph theory.

#### Semester IV

Course Title: Python Programming

Course Code: PCC-CSE-402

Course Outcomes

At the end of this course, the students will able to do the following:

1. To Understand data types (like character strings, integers, and real numbers)and the Operations that can be applied to each data type
2. To write programs that get input, perform calculations, and provide output (using Conditional logic, loops, Functions).
3. To understand the OOPs concepts with respect to fourth generation language
4. To write well designed and well documented programs that is easily maintainable.
5. To test and debug programs (find out what is wrong and fix it).

#### Semester IV

Course Title: Computer Organization & Architecture

Course Code: PCC-CSE-403

Course Outcomes

1. Draw the functional block diagram of single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
2. Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
3. Write a flowchart for Concurrent access to memory and cache cohe Sency in Parallel Processors and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipe-lining, parallelism and RISC methodology.

Semester IV

Course Title: Database Management System

Course Code: PCC-CSE-404

Course Outcomes

1. For a given query write relational algebra expressions for that query and optimize the developed expressions
2. For a given specification of the requirement design the databases using E R method and normalization.
3. For a given specification construct the SQL queries for Open source and Commercial DBMS - MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.

Semester IV

Course Title: Operating System

Course Code: PCC-CSE-405

Course Outcomes

At the end of this course, the students will able to do the following:

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Semester IV

Course Title: Management Information Systems

Course Code: HSMC-CSE- 401

Course Outcomes

At the end of this course, the students will able to do the following:

1. Understand the concept and function of MIS.
2. Understand the structure of MIS.
3. Understand the methods of data and information collections, Characteristics of Information and its qualities
4. Understand the decision making models and DSS
5. Understand the ERP model and its implementation steps

Semester V

Course Title: Theory of Automata

Course Code: PCC-CSE-501

Course Outcomes

At the end of this course, the students have ability to:

1. Apply the basic knowledge of computing and mathematics appropriate to the discipline.
2. Apply mathematical foundation, algorithm design, and theory of computer science to the modeling and designing of computer based system.
3. Apply the knowledge of theoretical computer science to design and development of compilers and system software.
4. Understand the solvable and unsolvable problems
5. Understand Decidable and Undecidable problems

Semester V

Course Title: Computer Networks

Course Code: PCC-CSE-502

Course Outcomes

At the end of this course, the students will be able to do the following:

1. Explain the functions of the different layers of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) and describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available components.
4. For a given problem related to TCP/IP protocol develop the network programming.
5. Configure DNS, DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Semester V

Course Title: Java Programming

Course Code: PCC-CSE-503

Course Outcomes

At the end of the course, the student will be able to:

1. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
2. Write Java application programs using OOP principles and proper program structuring.
3. Demonstrate the concepts of polymorphism and inheritance.
4. Write Java programs to implement error handling techniques using exception handling.
5. Use Collections Framework to solve problems

Semester V

Course Title: Microprocessors and Interfacing

Course Code: PCC-CSE-504

Course Outcomes

After completion of the course student will be able to:

- 1 Describe the various architectural aspects of 8085 Microprocessor.
- 2 Understand the interrupt phenomenon, timing diagram and write basic assembly language programming in 8085
- 3 Elaborate the synchronous and asynchronous data transfer and Direct Memory Access in



- 8085 and interfacing of 8085 with external devices.
- 4 Describe the various architectural aspects of 8086 Microprocessor.
  - 5 Understand the interrupt phenomenon and write basic assembly language programming in 8086

Semester V

Course Title: Data Warehousing and Data Mining

Course Code: PEC-CSE-501

Course Outcomes

Students who complete this course should be able to

1. Describe the fundamental concepts, benefits and problem areas associated with data warehousing.
2. Describe the various architectures and main components of a data warehouse.
3. Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.
4. Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis.
5. Applicability of various classification algorithms in data mining for real-world problems.

Semester V

Course Title: Software Project Management

Course Code: PEC-CSE-502

Course Outcomes

At the end of this course, the student will be able to do the following:

1. To have an understanding of how Software Project Management is done.
2. How to build the project schedules.
3. Understand how budgeting is done.
4. How to assure quality in software through testing.
5. To have understanding of Planning and Scheduling Tools.

Semester V

Course Title: System Software

Course Code: PEC CSE-503

Course Outcomes

At the end of the course, the students will able to do following:

1. To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
2. Describe the various concepts of assemblers and microprocessors.
3. To understand the various phases of compiler and compare its working with assembler.
4. To understand how linker and loader create an executable program from an object module created by assembler and compiler.
5. To know various editors and debugging techniques

Semester V

Course Title: Internet and Web Technology

Course Code: PEC- CSE-504

Course Outcomes

At the end of this course, the students will able to do the following:

1. Understand the basic principles of web designing

2. Build an attractive websites for various applications as per the requirements
3. Understand the various issues of internet security and their implementation
4. Build dynamic web pages using JavaScript
5. Understand the concepts of server side programming

#### Semester V

Course Title: Mobile Computing

Course Code: PEC-CSE-505

Course Outcomes

On successful completion of this unit students will be able to:

1. Understand the concept of mobile computing, various security issues, protocols and handover method in mobile computing.
2. Grasp the concepts and features of SDMA, FDMA, TDMA, CDMA, DHCP
3. A good understanding of how the underlying wireless and mobile communication networks work, their technical features.
4. Grasp the concepts of hoarding techniques, caching invalidation mechanisms, client server computing with adaptation.
5. Identify the important issues of data dissemination

#### Semester V

Course Title: Introduction to Fluid Mechanics

Course Code: OEC-CSE-501/PCC-CE-303

Course Outcomes

After the completion of the course the students will be able to

1. Understand type of fluid, behavior of fluid, basic concept and theorem used in fluid Mechanics and applies their knowledge of fluid mechanics in addressing problems in Hydraulics.
2. They will possess the skills to solve problems in laminar flow, Turbulent flow, boundary layer thickness calculation and for better understanding of this all application.
3. They will gain knowledge in Types of models, Application of dimensional analysis and model studies to fluid flow problem.
4. The basic of The Laminar Flow and turbulent flow and concept of boundary layer theory
5. The Dimensional analysis and model studies to the flow problems.

#### Semester V

Course Title: Disaster Preparedness & Planning

Course Code: OEC-CSE-502/PCC-CE-305

Course Outcomes

At the end of completion of subject students will able to understand:

- 1 Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
- 2 Capacity to describe analyses and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
- 3 Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
- 4 Capacity to manage the Public Health aspects of the disasters.

- 5 Capacity to obtain, analyses, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

#### Semester V

Course Title: Electrical Machine I

Course Code: OEC-CSE-503/PCC-EE-302

#### Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Understand the basic concepts of magnetic circuits.
2. Able to explain the concept behind Electromagnetic force and torque.
3. Analyze single phase and three phase transformers circuits.
4. Understand the operation of dc machines.
5. Analyze the differences in operation of different dc machine configurations

#### Semester V

Course Title: Network Analysis & Synthesis

Course Code: OEC-CSE-504/PCC-EE-303

#### Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Apply network theorems for the analysis of electrical circuits.
2. Provide solution for First and second order networks and obtain the transient and steady-state response of electrical circuits.
3. Analyze two-port circuit behavior.
4. To synthesize various networks using different synthesis techniques.
5. To understand and synthesize different types of filters.

#### Semester V

Course Title: Signals & Systems

Course Code: OEC-CSE-505/PCC-ECE-303

#### Course Outcomes

After completion of the course student will be able to:

1. Represent different Signals in mathematical form and apply basic operations on Signals. Also, Student's must know physical significance of various elementary signals.
2. Classify systems based on their properties and determine the response of LTI system using convolution.
3. Represent Signals in frequency domain i.e. Analyze the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.
4. Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems.

#### Semester V

Course Title: Electronic Multimedia Engineering

Course Code: OEC-CSE-506/PEC-ECE-502

Course Outcomes

After completion of the course student will be able to:

1. Understand and analyze various microphones and loudspeakers.
2. Know the basic principle of recording and reproduction system like stereo recording and playback.
3. Explain the modern digital systems like DVD, Dolby digital sound, Blue ray disc.
4. Understand the basics of television standards and advanced HD TV and advanced DTH.
5. Acquire knowledge about advanced digital cameras, LED display, 3D display and touch screen.

#### Semester VI

Course Title: Compiler Design

Course Code: PCC-CSE-601

Course Outcomes

1. Master building symbol tables and generating intermediate code.
2. Master generating assembly code for a RISC machine.
3. Master programming in Java.
4. Be familiar with compiler architecture.
5. Be familiar with register allocation.

#### Semester VI

Course Title: Computer Graphics and Multimedia

Course Code: PCC- CSE-602

Course Outcomes

1. Explain various applications of computer Graphics.
2. To be able to understand a graphics processing system.
3. To be able to understand and implement computer graphics algorithms.
4. To be able to implement 3D graphics primitives
5. To be able to understand and use multimedia aids.

#### Semester VI

Course Title: Design & Analysis of Algorithms

Course Code: PCC- CSE-603

Course Outcomes

1. For a given algorithm student will be able to analyze the algorithms to determine the computational complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will be able to implement it.
3. For a given problem of Stacks, Queues and linked list student will be able to implement it and analyze the same to determine the computational complexity.
4. Student will be able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will be able to implement Graph search and traversal algorithms and

determine the time and computation complexity.

Semester VI

Course Title: Advanced Java

Course Code: PEC-CSE-601

Course Outcomes

At the end of this course, the students will be able to do the following:

1. Understanding and designing of GUI
2. Understanding the Java Database connectivity
3. Understanding and designing the distributed and web-based applications
4. Understanding the Server-side and client-side programming
5. Understand JSP and its usages

Semester VI

Course Title: Unix/Linux & Shell Programming

Course Code: PEC-CSE-602

Course Outcomes:

At the end of this course, the students will be able to do the following:

1. Understanding the concept of shell programming
2. Understanding the working of kernel and implementing them.
3. Implementing the system calls, process management, and inter process communication
4. Understand Shell Programming and its implementation.
5. Understanding Semaphores along with inter process communication.

Semester VI

Course Title: R Programming

Course Code: PEC-CSE-603

Course Outcomes

At the end of the course, the students will be able to do the following:

1. Understanding the concept of R Programming
2. Using the R programming for the data analysis
3. Apply the R Programming for plotting various graphs
4. Apply R Programming for statistical analysis
5. Implementing various algorithms using R Programming

Semester VI

Course Title: Visual Programming

Course Code: PEC-CSE-604

Course Outcomes

1. List the major elements of the .NET framework
2. Explain how C# fits into the .NET platform.
3. Analyze the basic structure of a C# application
4. Debug, compile, and run a simple application.
5. Develop programs using C# on .NET

Semester VI

Course Title: Computer Based Numerical Techniques

Course Code: PEC-CSE-605

Course Outcomes

At the end of this course, the students will be able to do the following:

1. Understand Various Numerical Techniques and their applications.
2. Implement various numerical solution algorithms using c programming.
3. Be familiar with calculations and interpretation of errors in numerical method.
4. To learn various integration and differentiation formulas in the field of computer science and engineering.
5. Understanding the implications of approximations.

Semester VI

Course Title: Grid Computing

Course Code: PEC- CSE-606

Course Outcomes

At the end of this course, the students will be able to do the following:

1. Understand the need for and evolution of Grids in the context of processor- and data-intensive applications
2. Be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery
3. To understand the technology and tool kits for facilitating grid computing
4. Design and implement Grid computing applications using Globus or similar toolkits
5. Justify the applicability or non-applicability of Grid technologies for a specific application

Semester VI

Course Title: Distributed Database System

Course Code: PEC-CSE-607

Course Outcomes

At the end of this course, the students will be able to do the following:

1. Differentiate the centralized and distributed database, its architecture. and other differences
2. Get knowledge of Query optimization, query trees and graphs.
3. How relational schema is fragmented for different locations and various methods to retrieve data from distributed location over a network.
4. Understand the various techniques of deadlocks recovery in a distributed database.
5. Understand the various techniques to handle transactions in a distributed database.

Semester VI

Course Title: Cyber Crime and Laws

Course Code: PEC-CSE-608

Course Outcomes

On successful completion of this course students will be able to

1. Understand basic concepts of cyber laws, ethical hacking and various investigation techniques
2. Understand the various types of cyber-crime.
3. Understand the concept of cyber security and methods for Collecting and preserving Evidence.
4. Understand the definition of Freedom of Speech and Expression in Cyberspace

5. Understand why the cyber acts and laws are required.

Semester VI

Course Title: Wireless Networks

Course Code: PEC- CSE-609

Course Outcomes

On successful completion of this unit students will be able to:

1. Identify the basic concept of wireless networks, channel coding, and cellular concepts;
2. Compare and contrast LEO, MEO and GEO. Routing and handover in satellite communication
3. Understand various wireless LAN technologies
4. Understand the terminologies in mobile network layers and the process of packet discovery and registration in network layer.
5. Compare and contrast between cellular and Ad Hoc wireless networks, areas of its applications and challenge

Semester VI

Course Title: Engineering Geology

Course Code: OEC-CSE-601/PCC-CE-404

Course Outcomes

After completing subject, Students will be able to

1. Understand the role of geology in the design and construction process of underground openings in rock.
2. Understand about types of weathering, fault, fold, joints in rock.
3. Understand about ground water recharge, rain water harvesting and also about the seismic zones in India.
4. Use the geologic literature to establish the Geo technical framework needed to properly design and construct heavy civil works rock projects.
5. Introduction about soft computing tools used in geological investigation.

Semester VI

Course Title: Building Materials & Construction

Course Code: OEC-CSE-602/PCC-CE-405

Course Outcomes

After successful completion of the course, student will be able to

1. Identify various construction materials like stone and bricks
2. Know and differentiate elemental properties of construction materials
3. Know about the different types of materials used in construction such as steel timber polymers
4. Demonstrate an appropriate application of construction material.
5. Know about the different components in construction building.

Semester VI

Course Title: Building Materials & Construction

Course Code: OEC-CSE-603/PCC-EE-401

Course Outcomes

After learning the subject, student will be able to:

1. Appreciate the importance of energy crises and consequent growth of the power generation from the renewable energy sources

2. Demonstrate the knowledge of physics of solar power generation and the associated issues.
3. Demonstrate the knowledge of the physics of wind power generation and all associated issues.
4. Understand the utilization of Bio Gas Plants, Tidal, MHD, Fuel Cells by identifying the sites where their production is feasible.
5. Demonstrate the ways by which energy can be stored in different forms.

#### Semester VI

Course Title: Electrical Measurement-I

Course Code: OEC-CSE-604/PCC-EE-405

Course Outcomes

The student will learn:

1. Introduction to Measurement System & Characteristics of Instruments.
2. Exposure to the Bridge Circuits and to learn various measurements techniques used for the measurement of capacitance and inductance.
3. Exposure to Electromechanical Indicating Instruments.
4. Exposure to various types of Ammeters and Voltmeters.
5. Exposure to different methods used in the measurements of Energy & Power.

#### Semester VI

Course Title: Analog Communication Systems

Course Code: OEC-CSE-605/PCC-ECE-403

Course Outcomes

After completion of the course student will be able to:

1. Characterize different components of communication systems and find time domain and frequency domain representation of different signals.
2. Apply concept of modulation and carry out power calculations & spectral analysis of AM wave.
3. Carry out power calculations, Bandwidth calculations and Spectral analysis of FM wave.
4. Calculate Noise figure, signal to noise ratio (SNR) in AM/FM systems and analyze different noises present in communication systems.

#### Semester VI

Course Title: Linear Integrated circuits & Pulse Switching

Course Code: OEC-CSE-606/PCC-ECE-404

Course Outcomes

After completion of the course student will be able to:

1. Solve Input and output voltage, CMRR and PSRR, offset voltages and currents, Input and output impedance, Slew rate of op-amps.
2. Analyze and design Voltage Followers, Non-inverting & Inverting amplifiers, Summing amplifiers, Instrumentation amplifier, AC amplifier, V to I, I to V converters using Op-Amps
3. Analyze and design zero crossing detector, Inverting and non-inverting Schmitt trigger circuits, Monostable & Astable multivibrator, Triangular and Square wave generators, Log and Anti log amplifiers, Precision rectifiers using Op-amps
4. Analyze Time-base Generators, Timers, Blocking Oscillator and Phase Locked Loops



Semester VII

Course Title: Fundamentals of Digital Image Processing

Course Code: PCC-CSE-701

Course Outcomes

At the end of this course, students will demonstrate the ability to:

1. Have an understanding of various steps of Digital image Processing and image representation.
2. Understand and implement image enhancement in spatial domain and in frequency domain.
3. Understand image compression algorithms and choose an appropriate algorithm for specific application needs.
4. Understand and implement basic Morphological operation on Image.
5. Understand and implement image segmentation, representation and description.

Semester VII

Course Title: Artificial Intelligence

Course Code: PCC-CSE-702

Course Outcomes

1. Understand basics of artificial intelligence.
2. Design of various neural networks
3. Use fuzzy logic to solve non crisp problems.
4. Understand genetic programming.
5. Apply various soft computing frameworks.

Semester VII

Course Title: Cryptography and Network Security

Course Code: PEC-CSE-701

Course Outcomes At the end of the course the students will be able to do following:

1. Understand cryptography and network security concepts and application.
2. Apply security principles to system design.
3. Identify and investigate network security threat.
4. Analyses and design network security protocols.
5. Conduct research in network security.

Semester VII

Course Title: Internet of Things

Course Code: PEC-CSE-702

Course Outcomes

After completion of this course, the students will able to do following:

1. Interpret the vision of IoT from a global context.
2. Compare and contrast the use of Devices, Gateways and Data Management in IoT.
3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
4. To study and analyze data and to understand the security issues in IoT

5. To study IoT physical devices and end points and to understand the communications between components

#### Semester VII

Course Title: Distributed Computing

Course Code: PEC-CSE-703

#### Course Outcomes

At the end of this course, the student will be able to do the following:

1. Study software components of distributed computing systems.
2. Know about the communication and interconnection architecture of multiple computer systems.
3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
4. Understanding of networks & protocols, mobile & wireless computing and their applications to real-world problems.
5. To be familiar with the design, implementation and security issues of distributed systems.

#### Semester VII

Course Title: Natural Language Processing

Course Code: PEC-CSE-704

#### Course Outcomes

After completing this course, the student should be able to:

1. Understand the basic concepts of language for processing
2. Implement different data models for language processing
3. Understand parsing techniques related to English language
4. Process and analyze the language semantically
5. Understand the application of NLP

#### Semester VII

Course Title: Embedded Systems

Course Code: PEC-CSE-705

#### Course Outcomes

After completion of the course student will be able to:

1. Describe the differences between the general computing system and the embedded system.
2. Become aware of the architecture of the ATOM processor and its programming aspects (assembly level).
3. Become aware of interrupts, hyper threading and software optimization.
4. Design real-time embedded systems using the concepts of RTOS.
5. Analyze various examples of embedded systems based on ATOM processor

#### Semester VII

Course Title: Software Testing

Course Code: PEC-CSE-706

#### Course Outcomes

At the end of the course the students will be able to

1. Design test cases suitable for a software development for different domains.
2. Identify suitable tests to be carried out.
3. Prepare test planning based on the document.

4. Document test plans and test cases designed.
5. Develop and validate a test plan, use of automatic testing tools.

#### Semester VII

Course Title: Advanced Multimedia System

Course Code: PEC-CSE-707

Course Outcomes

At the end of this course, the student able to do the following:

1. Understand the fundamental of multimedia system
2. Understanding and application of various data compression techniques
3. Design an interactive application using multimedia techniques
4. Designing of a multimedia system for the distributed environment
5. Understanding architecture and issues for multimedia

#### Semester VII

Course Title: Cloud Computing

Course Code: PEC-CSE-708

Course outcomes

After completing the course, students will able to:

1. Develop and deploy cloud application using popular cloud platforms.
2. Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud.
3. Explain and identify the techniques of big data analysis in cloud.
4. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
5. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

#### Semester VII

Course Title: Fault Tolerant Computing

Course Code: PEC-CSE-709

Course Outcomes

At the end of this course, the students will able to do following:

1. Understanding the basic principle of fault tolerant, and techniques
2. Understanding of various models
3. Feasibility study to design a fault tolerant application
4. Design technique for parallel and distributed system
5. Handling the security issue in fault tolerant networks

#### Semester VII

Course Title: Big Data Analysis

Course Code: PEC-CSE-710

Course Outcomes

After completing this course, the student should be able to:

1. Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data
2. Gain hands-on experience on large-scale analytic tools
3. Understand and study Hadoop ecosystem
4. Study R for text mining and to analyze data
5. Understand data visualization and to study python programming

#### Semester VII

Course Title: Real Time Operating Systems

Course Code: PEC-CSE-711

Course Outcomes

At the end of this course, the students will able to do the following:

1. Understand the basic concept of RTOS and its usefulness for embedded systems
2. Understand Theoretical background and practical knowledge of real-time operating systems.
3. Understand multitasking techniques in real-time systems.
4. Understand the impact of real time operating systems on application area.
5. Understanding Several Timing services

#### Semester VII

Course Title: Communication Systems

Course Code: PEC-CSE-712

Course Outcomes

At the end of this course students will demonstrate the ability to,

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance
5. Analyzing and understanding several Pulse modulation techniques.

#### Semester-VII

Course Title: Environmental Engineering.

Course Code: OEC-CSE-701/PCC-CE-502

Course Outcomes

After successfully studying this course, students will:

1. Understand the impact of humans on environment and environment on humans
2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
3. Be able to plan strategies to control, reduce and monitor pollution.
4. Be able to select the most appropriate technique for the treatment of water, waste water solid waste and contaminated air.
5. Be conversant with basic environmental legislation

## Semester VII

Course Title: Concrete Technology

Course Code: OEC-CSE-702/PCC-CE-505

### Course Outcomes

After successfully studying this course, students will

1. Identify the suitability of materials for the construction works.
2. Able to understand the properties of concrete
3. Able to design the concrete mix design with using different methods of mix design.
4. Implement the special concreting methods required for Cold weather and Hot weather regions.
5. Able to understand the importance of admixture in concrete design.

## Semester VII

Course Title: Power Engineering

Course Code: - OEC-CSE-703/PEC-EE-501

### Course outcomes

This subject exposes. After the completion of this course student will be able to:

1. Understand economic aspects of power generation, transmission & transmission along with the advantages of power factor improvement.
2. Analyze different costs associated with power systems and ways to reduce it analyze various tariff schemes.
3. Understand the layout and design considerations of thermal and nuclear plants.
4. Understand the layout and design considerations of hydroelectric plants.
5. Understand various types of substation groundings.

## Semester VII

Course Title: Engineering Material Science

Course Code: - OEC-CSE-704/PEC-EE-503

### Course Outcomes

1. Given a type of material, the students will be able to qualitatively describe the bonding scheme and its general physical properties, as well as possible applications in electrical engineering.
2. This will be helpful for the students to understand about the insulating properties of the materials.
3. This will be helpful for the students to understand about the Dielectric properties of the materials.
4. Students will be able to do comparative analysis of magnetic materials based upon their properties.
5. Students will be able to differentiate among various materials such as conductor and semiconductor based upon the internal composition and conductivity.

## Semester VII

Course Title: Electromagnetic Wave Theory

Course Code: OEC-CSE-705/PCC-ECE-503

### Course Outcomes

After completion of the course student will be able to:

1. Apply vector calculus to static electric-magnetic fields in different engineering situations

2. To understand behavior of Electric field.
3. To understand behavior of Magnetic field.
4. Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems.
5. Analyze the nature of electromagnetic wave propagation in guided medium.

#### Semester VII

Course Title: Biomedical Instrumentation

Course Code: OEC-CSE-706/PEC-ECE-707

Course Outcomes

After completion of the course student will be able to:

1. Understand biomedical instrumentation, propagation of action potential.
2. Acquire knowledge of electrodes, transducers & amplifiers used in biomedical instrumentation.
3. Apply the knowledge of science, engineering fundamentals & engineering specialization for electrode potential recording.
4. Understand different human assist devices.
5. Gain knowledge of different imaging techniques used in medical science.

#### Semester VIII

Course Title: Advanced Computer Architecture

Course Code: PEC-CSE-801

Course Outcomes

On successful completion of this course you will be able to:

1. Understand the principles of computer system design
2. Distinguish the various instruction set architectures
3. Understand the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors
4. Describe modern architectures such as RISC, Super Scalar, VLIW (very large instruction word), multi-core and multi-cpu systems
5. Compare the performance of the existing architectures

#### Semester VIII

Course Title: Expert Systems

Course Code: PEC-CSE-802

Course Outcomes

After completing this course, the student should be able to:

1. Apply the methodology to transfer human knowledge into an expert system
2. Apply knowledge representation and Design a knowledge base
3. Understand Natural language processing tools and techniques
4. Understand planning and explanation in expert system
5. Evaluate Expert System tools

#### Semester VIII

Course Title: Green Computing

Course Code: PEC-CSE-803

Course Outcomes

At the end of this course, the students will be able to do the following:

1. Understand the fundamental of Green Computing Technology
2. Knowledge of middleware support for the green computing
3. Understanding of various tool and techniques used in green computing
4. Understanding the data management of green computing
5. How embedded system are involved with green computing

#### Semester VIII

Course Title: Neural Networks

Course Code: PEC-CSE-804

Course Outcomes

At the end of the course, students should be able to understand and appreciate:

1. The role of neural networks in engineering, artificial intelligence, and other areas.
2. Understanding of basic neural network
3. Understanding of the concepts and techniques of neural networks through the study of the most important neural network models.
4. Able to evaluate whether neural networks are appropriate to a particular application.
5. Able to apply neural networks to particular applications, and to know what steps to take to improve performance.

#### Semester VIII

Course Title: Pattern Recognition

Course Code: PEC-CSE-805

Course Outcomes

1. Summarize the various techniques involved in pattern recognition
2. Categorize the various pattern recognition techniques into supervised and unsupervised
3. Illustrate the artificial neural network based pattern recognition
4. Discuss the applications of pattern recognition in various applications
5. Discuss several web applications

#### Semester VIII

Course Title: Bio-Informatics

Course Code: PEC-CSE-806

Course Outcomes

At the end of this course, the students will be able to do the following:

1. Explain the basic principles that underpin Bio informatics analyses, and apply these principles when analyzing biological data;
2. Survey a selected field within Bio informatics, synthesize information from primary literature, and coherently report your findings in a written document;
3. Analyze biological data using a variety of Bio informatics tools; and
4. Interpret correctly the outputs from tools used to analyze biological data and make meaningful predictions from these outputs.
5. Usage of several Algorithms.

### Semester-VIII

Course Title: Construction Engg. & Management

Course Code: OEC-CSE-801/PEC-CE-641

Course Outcomes

After successfully studying this course, students will have:

1. An understanding of modern construction practices
2. A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resource required and project economics.
3. A basic ability to plan, control and monitor construction projects with respect to time and cost and an idea of how to optimize construction projects based on costs
4. An idea how construction projects are administered with respect to contract structures and issues.

### Semester VIII

Course Title: Industrial Waste Treatment

Course Code: OEC-CSE-802/PEC-CE-648

Course Outcomes

The students would be able to

1. Characterize and quantify of wastewater generated from the various industry,
2. Knowledge of sources and characteristic of industrial waste waters
3. Knowledge of different methods of treatments of waste water
4. Knowledge of different methods of treatments of waste water
5. Design the various processes for the treatment of the Industrial wastewater.

### Semester VIII

Course Title: Control Systems Design

Course Code: OEC-CSE-803/PCC-EE-603

Course Outcomes

At the end of this course,

1. Students will demonstrate the ability to understand various design specifications.
2. To understand the role of compensation in classical control system.
3. To study design of compensators in frequency domain using bode plot.
4. Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators).Design controllers using the state-space approach.
5. To understand state space design of control system.

### Semester VIII

Course Title: Energy Audit and Management

Course Code: OEC-CSE-804/PEC-EE-603

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Understand the current energy scenario and realize the need for new reforms to efficiently manage the energy resources.
2. Learn various auditing techniques used for proper energy management.
3. Realize how energy conservation could be done in Electrical Systems by managing the energy losses and malpractices.
4. Realize how energy conservation could be done in Industrial Systems by finding out the factor affecting the performance of various industrial devices and mitigating the same.
5. How electrical energy management could be achieved using new energy efficient devices.



### Semester VIII

Course Title: Mobile and Wireless Communication

Code: OEC-CSE-805/PEC-ECE-601

#### Course Outcomes

After completion of the course student will be able to:

1. Understand cellular mobile system, formulate its performance criteria.
2. Characterize the trade-off among frequency reuse, signal to interference ratio, capacity & able to understand interference in cellular communication.
3. Apply the knowledge of mathematics to find out the average received signal strength at a distance from the transmitter using different propagation model.
4. Identify the advantages & disadvantages of different mobile antennas.
5. Understand multiple access method, spread spectrum techniques, wireless communication system.

### Semester VIII

Course Title: Digital Signal Processing

Code: OEC-CSE-806/PCC-ECE-601

#### Course Outcomes

After completion of the course student will be able to:

1. Understand the basic concepts of Discrete Fourier transform and its application to linear filtering.
2. Understand and explain FFT algorithms and their computational efficiency in comparison to DFT.
3. Understand and explain the design of IIR filters by approximation of derivatives, impulse in variance and bi linear transformation.
4. Understand and explain the design of FIR filters by windowing and frequency sampling technique and provide a basic overview of special type of FIR filters.
5. Understand and explain the realization of filters using cascade and parallel structures as well as signal flow graphs and provide brief overview of the application areas of DSP.

## **Programme: B.Tech (CE)**

### **Programme Outcomes**

#### **P01**

**Engineering knowledge:** Apply the knowledge of mathematics, science, Engineering fundamentals, and computer engineering to the solution of engineering problems.

#### **P02**

**Problem analysis:** Identify, formulate, review research literature, and analyze engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

#### **P03**

**Design/development of solutions:** Design solutions for engineering problems related to engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

#### **P04**

**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

#### **P05**

**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

#### **P06**

**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the engineering practice.

#### **P07**

**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**P08**

**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**P09**

**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**P010**

**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**P011**

**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**P012**

**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes in Engineering.

**Programme specific outcomes:**

Upon successful completion of the B.Tech Civil Engineering programme, the students will be able to:

1. Plan, analyze, design, prepare cost estimates and execute different types of civil engineering projects using modern tools.
2. Apply the techniques, skills, and modern tools to complete the construction projects within given time frame and estimated cost.
3. Enhancing the competency in professional, industrial and research areas.

**Course Title: Mathematics-I**

**Course Code: BSC-CE-101**

**COURSE OUTCOMES:**

1. Understand the significance of Rolle's Theorem, Mean Value theorem, Taylor's and Maclaurin's series for differentiable functions.
2. Identify the extreme of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.
3. Use basic the integral rules to evaluate both definite and indefinite integrals and apply the same to find areas and volume of revolutions. Apart from these, they have a basic understanding of Beta and Gamma functions.
4. Apply the tools of power series and Fourier series to deal with functions of several variables that are essentials in most branches of engineering.
5. Learn the essential tools of matrices and linear algebra in a comprehensive manner.

**Course Title: Basic Electrical Engineering**

**Course Code: ESC-CE-101**

**COURSE OUTCOME:** At the end of course, the student will be able to

1. To understand the concepts and applications of different laws used in the circuits and network.
2. To study and analyze the D.C. Circuits with different theorem.
3. To study and analyze the A.C. Circuits with different theorem.
4. To study the concepts related to Electromagnetism.
5. To study and understand the working of transformers incorporating with different types of Basic Electrical Installations

**Course Title: Engineering Chemistry**

**Course Code: BSC-CE-102**

**COURSE OUTCOME:** At the end of course, the student will be able to

1. Apply the methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce cheaper bio-degradable polymers to reduce environmental pollution,

3. Apply knowledge about photochemical and photo physical processes and the reactivity of excited states to explain applications in photochemical energy conversion.
4. Understand structure of organic compounds and transition metal compound synthesis,
5. Understand the manufacturing process of cement and lime.

**Course Title: Engineering Physics**

**Course Code: BSC-CE-103**

**COURSE OUTCOMES:** At the end of course, the student will be able to

1. Understand the importance of Applied Physics in describing the technology we are using today in different engineering fields
2. Acquired knowledge of Waves, Vibration and acoustics, helps the students to develop the acoustically good hall.
3. Knowledge of basic Quantum Mechanics can help the students for further research applications as they can be applied to any quantum, mechanical situation to find energy, momentum etc.
4. Acquired knowledge of Optics help the students to Know more about propagation of light and wave optics.

**Course Title: Environmental Science**

**Course Code: MC-CE-101**

**COURSE OUTCOMES:** Upon the completion of the course, students will able to:

1. Learn about the environment and ecology.
2. Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.
3. Understand biogeochemical cycles and human contribution in it.
4. Learn succession and various types of succession.

**Course Title: Basic Electrical Engineering Lab**

**Course Code: ESC-CE-111**

**Laboratory Outcomes**

1. To study and analyze different circuit elements.
2. To study and implements different laws and theorems of electrical circuits.

3. To make the students aware about the principles and applications of basic electrical laws.
4. To measure the power using two wattmeter method.
5. To study and analyze the phenomenon of Resonance in Series and Parallel circuits

**Course Title: Engineering Chemistry Lab**

**Course Code: BSC-CE-111**

**Laboratory Outcomes** At the end of practical course the students will be familiarized about Titrations, Synthesis of organic compounds, protein determination and viscosity of solutions and temperature dependent properties of lubricant.

**Course Title: Engineering Physics Lab**

**Course Code: BSC-CE-112**

**Laboratory Outcomes:** On Completion of this course, students are able to –

1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.
5. Understand measurement technology, usage of new instruments and real time applications in engineering studies.

**Course Title: Engineering Graphics**

**Course Code: ESC-CE-112**

**Lab. Outcomes:** On completion of course students must be able

1. To read Engineering Drawing and execute the construction work with the help of available drawing
2. To represent three dimensional objects by two dimensional views.
3. Students must be in a position to show hidden details of objects or underground constructions work by drawing sectional views.
4. Exposure to creating working drawings

5. Exposure to the visual aspects of engineering design.

**Course Title: Mathematics-II**

**Course Code: BSC-CE-201**

**Course Outcomes:** Upon the completion of this course, the students will be able to:

- Compute double and triple integrals over rectangular and spherical domains and memorize important theorems: Green, Gauss divergence and Stokes with their applications in various engineering problems.
  - Distinguish between linear and non-linear equations. Recognize and solve equations of Bernoulli, Euler and Clairaut.
  - Solve partial differential equations of various kinds and apply the same to solve problems of real world
- Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and conformal mapping.
- Apply the Cauchy Residue theorem to evaluate definite integrals, compute the Taylor and Laurent expansions of simple functions and determine the nature of the singularities and calculating residues.

**Course Title: Basic Electronics Engineering**

**Course Code: ESC-CE-201**

**Course outcomes:** At the end of the course, the student will be able to

1. Describe the energy bands and the scientific principles behind controlled conductivity in semiconductors.
2. Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.
3. Analyze the working of the traditional transistor BJT and as well as the concept of biasing.
4. Understand the operation of MOSFET and various issues of scaling in MOSFET.
5. Design basic analog circuits

**Course Title: Engineering Mechanics**

**Course Code: ESC-CE-202**

**Course Out-come:** Upon successful completion of the course, student should be able to:



1. Understand and determine the engineering properties for metals and non-metals.
2. Understand basic concepts of centroid and center of gravity of various sections and deformation in bars
3. To understand the various type of truss and their analysis by various method
4. To understand the principal stresses and strains and their transformation by analytical and graphical
5. Understand the concepts of shear force, bending moment, axial force for statically determinate beams

**Course Title: Communication Skills**

**Course Code: HSMC-CE-201**

**Course Outcomes:** Upon the completion of the course, the students will be able:

1. To acquire basic proficiency in English including reading, listening comprehension, writing and speaking skills.
2. To make the students authoritative in self-expression in their day to day life in this fast-changing world.
3. To identify the common errors involved in writing.
4. To understand the nature and style of sensible writing.
5. To write effective and coherent paragraphs

**Course Title: Computer Fundamentals & Programming**

**Course Code: ESC-CE-203**

**Course Outcomes:** The student will be able:

1. To assemble a computer system and troubleshoot problems.
2. To formulate simple algorithms for arithmetic and logical problems.
3. To translate the algorithms to programs (in C language).
4. To test and execute the programs and correct syntax and logical errors.
5. To solve the problems using control statements.

**Course Title: Indian Constitution**

**Course Code:MC-CE-201**

**COURSE OUTCOME: Upon the completion of this, the students will able to know:**

1. About the constitutional framework.
2. About the government system
3. Various type of government
4. About Constitutional bodies: Election commission, UPSC, SPSC, Commission for ST/SC and many others.
5. Non-constitutional bodies: Planning Commission, NDC, NHRC, SHRC, CBI, Vigilance Commission and other dimensions of constitution.

**Course Title: Engineering Mechanics Lab**

**Course Code: ESC-CE-212**

**Lab. Outcomes:** After the completion of lab course students will be

1. Able to understand different engineering mechanics apparatus.
2. Able to understand the mechanical properties of materials.
3. Able to understand the moment of inertia of various shapes.
4. Get the practical idea of frictional forces.
5. Get working principle of screw jack.

**Course Title: Communication skills Lab**

**Course Code: HSMC-CE-211**

**Lab. Outcomes:** Upon the completion of the lab, the students will be able to:

1. Developing intellectual, personal and professional abilities.
2. On completion of the course, the students will be accurate in communication.
3. The students will be able to communicate effectively on complex engineering activities with the engineering community and with the society at large.

4. Able to comprehend and write effective reports and design documentation,
5. It will make effective presentations and give and receive clear instructions.

**Course Title: Basic Electronics Lab**

**Course Code: ESC-CE-211**

**Lab. outcomes:** At the end of the course, the student will be able to

1. Describe the energy bands and the scientific principles behind controlled conductivity in semiconductors.
2. Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.
3. Analyze the working of the traditional transistor BJT and as well as the concept of biasing.
4. Understand the operation of MOSFET and various issues of scaling in MOSFET.
5. Design basic analog circuits

**Course Title: Mathematics-III**

**Course Code: BSC-CE-301**

**Course Outcomes:** After the completion of this course, the students will be able to:

1. Understand the basic concepts and techniques to solve Laplace transform and also learn to apply the same to solve various problems of engineering which are modeled through differential equations
2. Demonstrate the ability to understand the basic concepts and techniques to solve Fourier's transform and also learn to apply the same to find solutions of boundary value problems (BVP).
3. Apply the concepts of the z-transform in solving difference equations and other discrete signal system.
4. Learn the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
5. Understand the basic ideas of statistics including measures of central tendency, correlation and regression and apply various statistical methods in engineering problems.

**Course Title: Introduction to Solid Mechanics**

**Course Code: PCC-CE-302**

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

1. Understand about the Longitudinal and hoop stresses, volumetric strains of Thin and Thick Cylinders;
2. Draw SF and BM Diagrams for simply supported, over-hanged and cantilever beams subjected to moments and various types loads;
3. Understand Bending theory, bending equation, bending stresses in rolled steel and built up sections;
4. Find out Slope and Deflection for simply supported and cantilever beams subjected to moment and various type of beam.
5. Understand the different end conditions of Columns and struts subjected to compression and bending, difference of short and long column, core or kernel of sections.

**Course Title: Introduction to Fluid Mechanics**

**Course Code: PCC-CE-303**

**Course Outcomes:** After the completion of the course the students will be able to

1. Understand type of fluid, behavior of fluid, basic concept and theorem used in fluid Mechanics and apply their knowledge of fluid mechanics in addressing problems in Hydraulics.
2. They will possess the skills to solve problems in laminar flow, Turbulent flow, boundary layer thickness calculation and for better understanding of this all application.
3. They will gain knowledge in Types of models, Application of dimensional analysis and model studies to fluid flow problem.
4. The basic of The Laminar Flow and turbulent flow and concept of boundary layer theory 5. The Dimensional analysis and model studies to the flow problems

**Course Title: Surveying -I**

**Course Code: PCC-CE-304**

**Course Outcomes:** The course will enable the students to:

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
2. Translate the knowledge gained for the implementation of Civil infrastructure facilities.
3. Identify and calculate the errors in measurements and to develop corrected values for differential level circuits, horizontal distances and angles for open or closed-loop traverses,
4. Operate an automatic level to perform differential and profile leveling; properly record notes; mathematically reduce and check levelling measurements,
5. Effectively communicate with team members during field activities; identify appropriate safety procedures for personal protection; properly handle and use measurement instruments. Be able to identify hazardous environments and take measures to insure one's personal and team safety

**Course Title: Disaster Preparedness & Planning**

**Course Code: PCC-CE-305**

**Course Outcomes:** At the end of completion of subject students will able to understand:

1. Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
2. Capacity to describe, analyse and evaluate the environmental, social, cultural, economic, legal and organisational aspects influencing vulnerabilities and capacities to face disasters.
3. Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
4. Capacity to manage the Public Health aspects of the disasters.
5. Capacity to obtain, analyse, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

**Course Title: Biology& Life Science**

**Course Code: PCC-CE-306**

**Course Outcomes:**

1. Students will understand the Basic of Cell.
2. To familiarize the students with the basic organization of organisms and subsequent building to a living being.
3. To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.
4. To provide knowledge about biological problems that requires engineering expertise to solve them.
5. To provide knowledge Nervous System, Immune System, and Cell Signaling

**Course Title: Solid Mechanics Lab.**

**Course Code: PCCC-CE-311**

**Course Outcomes:** After the completion of the course the students will be able to

1. Material property like elastic behavior, hardness, toughness and use UTM.
2. Understand the hooks law and plot the graph.
3. Measure the deflections of beam and verify the Maxwell's reciprocal theorem.
4. Understanding the modulus of rigidity of materials.
5. Understanding the impact strength of steel

**Course Title: Fluid Mechanics Lab**

**Course Code: PCC-CE-312**

**Course Outcomes:** After the completion of the course the students will be able to

1. Understand about metacenter and measure meta centric height.
2. Measure the coefficients of contraction, discharge, velocity.
3. Carry out the flow measurements by orificemeter & venturimeter.
4. Understand about the boundary layers.
5. Measure the friction factor for commercial pipes.

**Course Title: Surveying Lab**

**Course Code: PCC-CE-313**

**Course Outcomes:** At the end of experiment student will able to

1. Use the surveying instruments like chain, tape, staff, compass etc
2. Measure angle by compass and plot an area.
3. Use plane table and understand the advantage of plane table surveying.
4. Measure differences elevations, draw and utilize contour plots and calculate volumes for earthwork.

**Course Title: Numerical Techniques**

**Course Code: BSC-CE -401**

**Course Outcomes:** Upon the completion of this course, the students will:

1. Comprehend of the Power of Numerical Techniques, and Ideas.
2. Apply these techniques to problems drawn from Industry, Management and other engineering fields.
3. Demonstrate the ability to solve linear system of equations.
4. Solve various problem of linear and nonlinear differential equations by using numerical methods.

**Course Title: Theory of Structures**

**Course Code: PCC-CE-402**

**Course Outcomes:** Students who successfully complete this course will be able to:

1. Upon compilation of this course students should have acquired adequate knowledge of advanced concepts in strength of materials
2. Able to understand deflection, energy principles, stability criteria, theories of failure, unsymmetrical bending.
3. Able to know the concept of behavior of curved bars and locating shear centre. Influence Line for Statically determinate structures.
4. Influence Lines, Influence Lines for Beams, Qualitative Influence Lines.
5. Influence Lines for trusses and three-hinged arches.

**Course Title: Hydraulic Engineering**

**Course Code: PCC-CE-403**

**Course Outcomes:** The students will be able to

1. Apply their knowledge of fluid mechanics in addressing problems in flow through pipes.
2. Apply their knowledge of fluid mechanics in addressing problems in open channels.
3. Possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
4. Understand about the pressure diagram and analysis of surge tank.
5. Have knowledge in hydraulic machineries (pumps and turbines).

**Course Title: Surveying-II**

**Course Code: PCC-CE-404**

**Course Outcomes:** At the end of the course, the student will be able to:

1. Theodolite and its use.
2. About tachometric survey.
3. Understand different types of curves and their design.
4. Understand triangulation and their application.

**Course Title: Building Materials & Construction**

**Course Code: PCC-CE-405**

**Course Outcomes:** After successful completion of the course, student will be able to

1. Identify various construction materials like stone and bricks
2. Know and differentiate elemental properties of construction materials
3. Know about the different types of materials used in construction such as steel timber polymers
4. Demonstrate an appropriate application of construction material
5. Know about the different components in construction building.

**Course Title: Estimating & Costing**

**Course Code: PCC-CE-406**

**Course Outcomes:** After successfully studying this course, students will:



1. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
2. Able to determine rates of different items in engineering works.
3. Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
4. Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
5. Be able to quantify road estimation and valuation.

**Course Title: Hydraulic Engineering Lab**

**Course Code: PCC-CE-411**

**Course outcomes:** End of the course the students will be able to

1. Find loss coefficient for various pipe fittings.
2. Understand velocity distribution in a pipe and open channel.
3. Determine Manning's coefficient of roughness  $N$ .
4. Measure the hydraulic jump.
5. Able to understand open channel flow.

**Course Title: Structural Analysis Lab**

**Course Code: PCC-CE-412**

**Course Outcomes:** After successful completion of the course, the students will be able to:

1. Understand the concept of Moment area method to find slopes and deflection.
2. Understand Verify Maxwell's theorem of reciprocal deflection.
3. Understand elastic displacement of curved members
4. Determine deflection at given joint of the truss
5. Understand Maxwell's theorem of reciprocal deflection by means of truss

**Course Title: Surveying-II (Lab.)**

**Course Code: PCC-CE - 413**

**Course Outcomes:** On completion of this course, the students will be able to

1. Able to understand different types of Theodolite and its use.
2. Understand about theodolite and its use.
3. Perform Tachometric surveying in the field

**Course Title: Geotechnical Engineering**

**Course Code: PCC-CE-501**

**Course Outcomes:** After successfully studying this course, students will:

1. Understand the different types of soil based on their formation mechanism and understand the various phase diagrams and derive various phase relationships of the soil
2. Understand the physical significance of effective stress and its relation with pore Pressure and Plot various stress distribution diagrams along the depth of the soil mass
3. Understand field compaction and different stresses in soil due to different types of loadings.
4. Understand about theory of consolidation and soil settlements.
5. Understand the shear strength parameters of soil and different types of shear strength tests on soil.

**Course Title: Environmental Engineering.**

**Course Code: PCC-CE-502**

**Course Outcomes:** After successfully studying this course, students will:

1. Understand the impact of humans on environment and environment on humans
2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
3. Be able to plan strategies to control, reduce and monitor pollution.
4. Be able to select the most appropriate technique for the treatment of water, waste water solid waste and contaminated air.
5. Be conversant with basic environmental legislation.

**Course Title: Design of Concrete Structure**

**Course Code: PCC-CE-503**

**Course Outcomes:** After successfully studying this course, students will:

1. Understand the different methods of designing concrete structures.

2. Able to design a beam.
3. Understand the concept of bond stresses in reinforced concrete structures.
4. Able to design one-way slab and two-way slab.
5. Students are able to understand the design of columns and foundation.

**Course Title: Concrete Technology**

**Course Code: PCC-CE-504**

**Outcome:** After successfully studying this course, students will

1. Identify the suitability of materials for the construction works.
2. Able to understand the properties of concrete
3. Able to design the concrete mix design with using different methods of mix design.
4. Implement the special concreting methods required for Cold weather and Hot weather regions.
5. Able to understand the importance of admixture in concrete design.

**Course Title: Hydrology & Water Resource Engineering**

**Course Code: PCC-CE-505**

**Outcomes:** At the end of the course, students are in a position to learn:

1. Various components of hydrologic cycle that affect the movement of water in the earth.
2. Techniques of measurement of precipitation and presentation of rainfall data
3. Concept of abstraction of precipitation and Techniques for measurement of Evaporation, Evapotranspiration, infiltration.
4. The concept of movement of ground water beneath the earth
5. The technical knowhow of reservoirs and the method for determining the storage capacity of reservoirs.

**Course Title: Geotechnical Engineering Lab**

**Course Code: PCC-CE-512**

**Outcomes:** Students know the techniques to determine index properties and engineering properties such as shear strength, compressibility and permeability by conducting appropriate tests

**Course Title: Environmental Engineering Lab**

**Course Code: PCC-CE-513**

**Laboratory Outcomes:**

1. Students will be trained in analytical and conceptual skills required for environmental engineering research.
2. Students will be able to correlate environmental impacts and field processes.
3. Able to determine physico chemical characteristics of water.
4. Able to know air pollution standards.
5. Analyze water and waste water.

**Course Title: Civil Engineering Material**

**Course Code: PCC-CE-514**

**Outcomes:** .Students will able to learn:

1. The behavior and properties of structural materials, e.g. concrete, cement and steel can be better understood by detailed, well-designed, first-hand experience with these materials
2. The students will become familiar with the nature and properties of these materials by conducting laboratory tests.
3. To prepare the students to solve problems including design elements and related to their course work.
4. To encourage the students to use computers in analyzing the data.
5. To emphasize the knowledge and application of safety regulations

**Course Title: Power Engineering**

**Course Code: OEC-CE-563/PEC-EE-501**

**Course outcome This subject exposes.** After the completion of this course student will be able to:

1. Understand economic aspects of power generation, transmission & transmission along with the advantages of power factor improvement.
2. Analyze different costs associated with power systems and ways to reduce it analyze various tariffs schemes.

3. Understand the layout and design considerations of thermal and nuclear plants.
4. Understand the layout and design considerations of hydroelectric plants.
5. Understand various types of substation groundings

**Course Title: Transportation Engineering**

**Course Code: PCC-CE-601**

**Course outcome:** The students will be able to:

1. Carry out surveys involved in planning and highway alignment
2. Design the geometric elements of highways and expressways
3. Carry out traffic studies and implement traffic regulation and control measures and intersection design
4. Learn Characterize pavement materials
5. Design flexible and rigid pavements as per IRC

**Course Title: Irrigation Engineering**

**Course Code: PCC-CE-602**

**Outcomes:** At the end of the course, students will be able to:

1. Understand the irrigation system, types, methods and its advantages
2. Design of channels
3. Understand the different types of diversion headwork.
4. Understand the different types of cross drainage works and able to design them.
5. Understand the concept of floods and its control.

**Course Title: Design of steel structures**

**Course Code: PCC-CE-603**

**Course Outcomes:** At the end of the course, students will be able to:

1. Understand the properties of structural steel and different rolled steel sections
2. Design the connection between different structural elements
3. Design the tension members

4. Design the compression members
5. Design the laterally restrained and unrestrained beams.

**Course Title: Transportation Engg. Lab.**

**Course Code: PCC-CE-611**

**Course Outcomes:** The students will be able to find out the different properties of aggregate, bitumen and subgrade soil.

**Course Title: Survey Camp**

**Course Code: PCC-CE-612**

**Course Outcomes:** The students will know how to set out curves and prepare a contour map.

**Course Title: Construction Engg. & Management**

**Course Code: PEC-CE-641**

**Course Outcomes:** After successfully studying this course, students will have:

1. An understanding of modern construction practices
2. A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resource required and project economics.
3. A basic ability to plan, control and monitor construction projects with respect to time and cost and an idea of how to optimise construction projects based on costs
4. An idea how construction projects are administered with respect to contract structure and issues

**Course Title: Pavement Material and Geometric Design of Highway**

**Course Code: PEC-CE-642**

**Course Outcomes:** The students will be able to understand:

1. The different type of pavement materials.
2. Different properties of bitumen and cement concrete pavement.
3. The geometric design of highways
4. The different design elements of highways.
5. The design consideration of roads and design of intersection.

**Course Title: Rural water supply**

**Course Code: PE-645**

**Course Outcomes:** At the end of this course, students will be able to:

1. Understand the different attributes of water supply system.
2. Understand the different treatment system
3. Have knowledge about different disinfection systems.
4. Design the different treatment units and know the different on-site sanitation systems
5. Knowledge about the treatment units and design of septic tank..

**Course Title: Professional practice law and ethics**

**Course Code: PEC-CE-648**

**Course Outcomes:**

1. To familiarise the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
2. To give a good insight into contracts and contracts management in civil engineering dispute resolution mechanisms; laws governing engagement of labour
3. To give an understanding of Intellectual Property Rights, Patents.
4. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
5. To develop good ideas of the legal and practical aspects of their profession.

**Course Title: Data Base Management System**

**Course Code: OEC-CE-661/PCC-IT-401**

**COURSE OUTCOMES:**

1. For a given query write relational algebra expressions for that query and optimize the developed expressions

2. For a given specification of the requirement design the databases using E R method and Normalization.
3. For a given specification construct the SQL queries for Open source and Commercial DBMS MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

**Course Title: Energy management in Buildings**

**Course Code:PCC-CE-702**

**Course Outcomes:** Upon the completion of the course, the students will be able:

1. To understand the energy use and conservation options in buildings.
2. To understand the concepts of heat transmission in building
3. To learn the lightning fundamentals and day lightning use and estimation.
4. To understand the ASHRAE Methods and standards for estimates of Heating and cooling and Ventilation
5. To designs the Selected Buildings in various Climatic Zone

**Course Title: Entrepreneurship Development &Management**

**Course Code:HSMC-CE-703**

**Course Outcome** After completion of this subject student will be able to:

1. Understand the meaning, objectives and types of entrepreneurs
2. Understand the Entrepreneurship Support System.
3. Prepare to Project Report.
4. Analyze business opportunities, technical feasibility and financial viability in context to



entrepreneurship.

5. Plan the business.

**Course Title: Foundation Engineering**

**Course Code: PEC-CE-741**

**Course Outcomes:**-On completion of this course, the students will be able to

1. Comprehend and utilize the geotechnical literature to establish the framework for foundation design.
2. Plan and implement a site investigation program including subsurface exploration to evaluate soil/structure behavior and to obtain the necessary design parameters.
3. Carry out slope stability analysis for various fills and slopes.
4. Determine allowable bearing pressures and load carrying capabilities of different foundation systems.
5. Understand theories of earth pressures and designing of retaining walls.

**Course Title: Pre-stressed Concrete and Bridge Design**

**Course Code: PEC-CE-748**

**Course Outcomes:**-On completion of this course, the students will be able to

1. Analyze sections for flexure and deflection.
2. Analyze the Losses of pre stressed members.
3. Analyze the Transfer of Prestress in Pre tensioned Members and Anchorage Zone Stresses in Post Tensioned Members.
4. Understand IRC Code and Design and detailing of plate girder and steel truss bridges.
5. Design the different types of bridges.

**Course Title: Traffic Engineering and Management**

**Course Code: PEC-CE-749**

**Course Outcomes:** On completion of this course, the students will be able to

1. Perform traffic studies.
2. Know importance of traffic management.
3. Identify the specification of traffic facilities.
4. Design the flexible pavement.
5. Design the rigid pavements

**Course Title: Optical Communication**

**Course Code: OEC-CE-761/PEC-ECE-704**

**Course Outcomes:** After completion of the course student will be able to:

- CO1. Recognize and classify the structures of Optical fiber networks and their types
- CO2. Discuss the channel impediments like losses, interference and dispersion.
- CO3. Describe the Optical sources and detectors and thus able to illustrate their working principle.
- CO4. Familiar with Design considerations of fiber optic systems.
- CO5. perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyse the results to provide valid conclusions

**Course Title: Advance Structural Design**

**Course Code: PEC-CE-841**

**Course Outcomes:** After studying the course student will:

1. Able to design the isolated and combined footing.
2. Able to design the retaining walls and analyse them for stability.
3. Capable of designing the different water tanks.
4. Able to do the membrane analysis of domes and design them.
5. Understand the methods of pre-stressing and able to calculate losses in pre-stress member.

**Course Title: Earthquake Engineering**

**Course Code: PEC-CE-842**

**Course Outcomes:** On completion of this course, the students will be able to

1. Understand SDOF system and MDOF system.
2. Know about the multiple degree of freedom of different systems.
3. Understand about the elements of seismology.
4. Understand the basics of liquefaction.
5. Understand the basic design codes.

**Course Title: Ground Water Hydrology**

**Course Code: PEC-CE-843**

**Course outcome:** The student will be able to:

1. Explain the types and different parameters of aquifers, and permeability of aquifers.
2. Compute flow in aquifers and explain the salient features of various types of wells including the losses.
3. Derive the unsteady flow equation by various methods and obtain the solutions.
4. Explain the types and construction of wells, pumping tests in wells, working principles, and estimate power requirements of pumps and yield of wells.
5. Explain ground water recharge, ground water runoff, ground water budget, and harvesting techniques

**Course Title: Architecture and Town Planning**

**Course Code: PEC-CE-844**

**Couse Outcome:-** After completion of course students will be able to

1. Know about the history of Architecture.
2. Understand the basic principle of Architecture.
3. Understand the different phases in town planning.

4. Know about the different settlements.
5. Acquire knowledge about the building by law and regulations.

**Course Title Geographical Information System and Science**

**Course Code: PEC-CE-845**

**Course Outcome:-** After completion of course student Will be able to

1. Describe what geography and GIS are;
2. Understand the importance of scale, projection, and coordinate systems in GIS;
3. Understand vector and raster data structures and the appropriate use of each of these data structures;
4. Understand the basics of data capture, storage, analysis, and output in a GIS; and
5. Understand typical uses of GIS in business, government, and resource management.

**Course Title: Structural Geology**

**Course Code: PEC-CE-846**

**Course Outcome:** Students will be able to

1. Acquire knowledge on the geometry and type of structures present in earth.
2. Understand and describe the features formed in rocks when subjected to stress.
3. Understand the impact of structural geology to active tectonic settings
4. Understand micro and macro scale deformation mechanisms (viz., brittle, ductile).
5. Portray 2D and 3D strain analysis for various deformation behaviours.

**Course Title: Water Resources Field Methods**

**Course Code: PEC-CE-847**

**Course Outcomes:** Students will be able to

1. Use the various optimization methods for future water demand allocation under different scenarios.
2. Efficient water use to satisfy rising water demands using optimization techniques can

be inherently applied by

3. Students for any irrigation, industrial cluster, municipal or watershed water distribution project.
4. Real life field application challenges like reservoir water allocation for different activities like irrigation, bio diversity maintenance, and environmental flows can be addressed with knowledge of optimization methods.
5. Students will be skilled so that they assess and evaluate water demand in such a way that all water resources

**Course Title: : Environmental Impact Assessment**

**Course Code: PEC-CE-848**

**Course Outcome:-**Students will be able to

1. Explain the major principles of environmental impact assessment in Australia
2. Understand the different steps within environmental impact assessment
3. Discuss the implications of current jurisdictional and institutional arrangements in relation to environmental impact assessment
4. Communicate both orally and in written form the key aspects of environmental impact assessment
5. Understand how to liaise with and the importance of stakeholders in the EIA process

**Programme: B.Tech (ITE)**

**Programme Outcome :**

**PO1**

Engineering knowledge: Apply the knowledge of mathematics, science, Engineering fundamentals, and computer engineering to the solution of engineering problems.

**PO2**

Problem analysis: Identify, formulate, review research literature, and analyze engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3**

Design/development of solutions: Design solutions for engineering problems related to engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4**

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5**

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6**

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the engineering practice.

**PO7**

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8**

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9**

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10**

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11**

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12**

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes in Engineering.

**Programme Specific Outcome:**

**PSO-1:** Detailed Knowledge of contemporary issues in Information Technology.

**PSO-2:** Strong skills in learning new programming environments.

**PSO-3:** Ability to analyze, design, model, develop, test and manage complex software and information management systems.

**PSO-4:** Analyzing the impact of IT solutions in the societal and human context

**Course Title: Mathematics-I Course Code: BSC-ITE-101**

**Course Outcomes:**

Upon the successful completion of the course, the student will be able to:

1. Understand the significance of Rolle's Theorem, Mean Value theorem, Taylor's and Maclaurin's series for differentiable functions.
2. Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.
3. Use basic the integral rules to evaluate both definite and indefinite integrals and apply the same to find areas and volume of revolutions. Apart from these, they have a basic understanding of Beta and Gamma functions.
4. Apply the tools of power series and Fourier series to deal with functions of several variables that are essentials in most branches of engineering.
5. Learn the essential tools of matrices and linear algebra in a comprehensive manner.

**Course Title: Basic Electrical Engineering Course Code: ESC-ITE-101**

**COURSE OUTCOMES:**

At the end of this course, students will demonstrate the ability

1. To understand the concepts and applications of different laws used in the circuits and network.
2. To study and analyze the D.C. Circuits with different theorem.
3. To study and analyze the A.C. Circuits with different theorem.
4. To study the concepts related to Electromagnetism.
5. To study and understand the working of transformers
6. incorporating with different types of Basic Electrical Installations.

**Course Title: Engineering Chemistry Course Code: BSC-ITE-102**

**COURSE OUTCOMES:**

At the end of course, the student will be able to

1. Apply the methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce



cheaper bio-degradable polymers to reduce environmental pollution,

3. Apply knowledge about photochemical and photo physical processes and the reactivity of excited states to explain applications in photochemical energy conversion.
4. Understand structure of organic compounds and transition metalcompound synthesis,
5. Understand the manufacturing process of cement and lime.

**Course Title: Engineering PhysicsCourse Code: BSC-ITE-103**

COURSE OUTCOMES:

**After completing of the course, the students will:**

1. Understand the importance of Applied Physics in describing the technology we are using today in different engineering fields
2. Acquired knowledge of Waves, Vibration and acoustics, helps the students to develop the acoustically good hall.
3. Knowledge of basic Quantum Mechanics can help the students for further research applications as they can be applied to any quantum, mechanical situation to find energy, momentum etc.
4. Acquired knowledge of Optics help the students to
  - a) Know more about propagation of light and wave optics.
  - b) Describe the requirements for a system to act as a laser.
  - c) Differentiate the various types of lasers and their means of excitation.
  - d) Able to explain, which laser would best meet the need for a industrial or research task.
  - e) Demonstrate an awareness of the safety responsibilities involved in working with lasers.

**Course Title: Environmental ScienceCourse Code: MC-ITE-101**

COURSE OUTCOMES:

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

1. Learn about the environment and ecology.
2. Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.
3. Understand biogeochemical cycles and human contribution in it.
4. Learn succession and various types of succession.
5. Demonstrate the ability to understand the biomes of world and its importance in human survival.

**Course Title: Basic Electrical Lab Course Code: ESC-ITE-111**

**Course Outcomes:**

1. To study and analyze different circuit elements.
2. To study and implements different laws and theorems of electrical circuits.
3. To make the students aware about the principles and applications of basic electrical laws.
4. To measure the power using two wattmeter method.
5. To study and analyze the phenomenon of Resonance in Series and Parallel circuits.

**Course Title: Engineering Chemistry Course Code: BSC-ITE-111**

**Laboratory Outcome:**

- At the end of practical course the students will be familiarized about**
- CO1.** Titrations,
  - CO2.** Synthesis of organic compounds,
  - CO3.** protein determination and viscosity of solutions and
  - CO4.** temperature dependent properties of lubricant.

**Course Title: Engineering. Physics Course Code: BSC-ITE-112**

**COURSE OBJECTIVE:**

The course is designed to provide experimental foundation for the theoretical concepts and to familiarize students with experimental apparatus, the scientific method and method of data analysis.

**Course Title:** Engineering. Graphics  
**Course Code:** ESC-ITE-112

**Laboratory Outcome:**

**On completion of course students must be able**

- CO1.** To read Engineering Drawing and execute the construction work with the help of available drawing
- CO2.** To represent three dimensional objects by two dimensional views.
- CO3.** Students must be in a position to show hidden details of objects or underground constructions work by drawing sectional views.

**CO4.** Exposure to creating working drawings

**CO5.** Exposure to the visual aspects of engineering design.

**Course Title:** Induction Program

**Course Code:** MC-ITE-111

### **INDUCTION PROGRAM**

Induction program for students to be offered right at the start of the first year. It should include but not limited to following Activities

1. Physical activity
2. Creative Arts
3. Universal Human Values
4. Literary
5. Proficiency Modules
6. Lectures by Eminent People
7. Visits to local Areas
8. Familiarization to Dept./Branch & Innovations

**Course Title: MATHEMATICS-II Course Code: BSC-ITE-201**

### **Course Outcomes:**

Upon the completion of this course, the students will be able to:

1. Compute double and triple integrals over rectangular and spherical domains and memorize important theorems: Green, Gauss divergence and Stokes with their applications in various engineering problems.
2. Distinguish between linear and non-linear equations. Recognize and solve equations of Bernoulli, Euler and Clairaut.
3. Solve partial differential equations of various kinds and apply the same to solve problems of real world.
4. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and conformal mapping.
5. Apply the Cauchy Residue theorem to evaluate definite integrals, compute the Taylor and Laurent expansions of simple functions and determine the nature of the singularities and calculating residues.

**Course Title:** Basic Electronics

**Course Code:** ESC-ITE-201

**COURSE OUTCOMES:**

At the end of the course, the student will be able to

- 1 Describe the energy bands and the scientific principles behind controlled conductivity in semiconductors.
- 2 Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.
- 3 Analyze the working of the traditional transistor BJT and as well as the concept of biasing.
- 4 Understand the operation of MOSFET and various issues of scaling in MOSFET.
- 5 Design basic analog circuits.

**Course Title:** Engineering Mechanics

**Course Code:** ESC-ITE-202

**COURSE OUTCOME:**

Upon successful completion of the course, student should be able to:

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
2. Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts);
3. Understand basic dynamics concepts – force, momentum, work and energy;
4. Understand and be able to apply Newton's laws of motion;
5. Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy;

**Course Title:** Communication Skills

**Course Code:** HSMC-ITE-201

**COURSE OUTCOMES:**

Upon the completion of the course, the students will be able:

1. To acquire basic proficiency in English including reading, listening comprehension, writing and speaking skills.
2. To make the students authoritative in self-expression in their day to day life in this fast-changing world.
3. To identify the common errors involved in writing.

4. To understand the nature and style of sensible writing.
5. To write effective and coherent paragraphs.

**Course Title: Computer Fundamental and Programming Course Code: ESC-ITE-203**

COURSE OUTCOMES:

The student will be able:

1. To assemble a computer system and troubleshoot problems.
2. To formulate simple algorithms for arithmetic and logical problems.
3. To translate the algorithms to programs (in C language).
4. To test and execute the programs and correct syntax and logical errors.
5. To solve the problems using control statements.
6. To decompose a problem into functions and synthesize a complete program.
7. To use arrays, pointers and structures to formulate algorithms and programs.
8. To be familiar with the concept of computer networking.

**Course Title:** Indian Constitution

**Course Code:** MC-ITE-201

**COURSE OUTCOME:**

Upon the completion of this, the students will able to know:

1. About the constitutional framework.
2. About the government system
3. Various type of government
4. About Constitutional bodies: Election commission, UPSC, SPSC, Commissionfor ST/SC and many others.
5. Non-constitutional bodies: Planning Commission, NDC, NHRC, SHRC, CBI, Vigilance Commission and other dimensions of constitution.

**Course Title: Engineering Mechanics Lab Course Code: ESC-ITE-212**

**Course Outcome:**

**After the completion of lab course students will be-**

**CO1.** Able to understand different engineering mechanics apparatus.

**CO2.** Able to understand the mechanical properties of materials. **CO3.** Able to understand the moment of inertia of various shapes. **CO4.** Get the practical idea of frictional forces.

**CO5.** Get working principle of screw jack.

**Course Title:** Comm. Skills Lab

**Course Code:** HSMC-ITE-211

**Course Outcome:**

**Upon the completion of the lab, the students will be able to:**

**CO1.** Developing intellectual, personal and professional abilities.

**CO2.** On completion of the course, the students will be accurate in communication.

**CO3.** The students will be able to communicate effectively on complex engineering activities with the engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions

**Course Title: Basic Electronics Lab Course Code: ESC-ITE-211**

**Course Outcome:**

**Upon the completion of course, the students will be able to:**

**CO1.** Determine the characteristics of PN Junction and Zener diode.

**CO2.** Design various rectifiers configuration and evaluate its various performance parameters.

**CO3.** Design and analyze various wave shaping circuits.

**CO4.** Determine the characteristics of a BJT and MOSFET

**CO5.** Design and analyze the frequency response of RC Coupled Oscillators

**Course Title: Computer Fundamentals & Programming Lab**

**Course Code: ESC-ITE-213**

**Course Outcomes:**

1. To understand the working and troubleshooting of computer system.
2. To formulate the algorithms for simple problems
3. To be able to correct syntax and logical errors as reported by the compilers and run time.
4. To be able to write iterative as well as recursive programs
5. To be able to represent data in arrays, strings and structures and manipulate through a program
6. To be able to declare pointers of different types and use them in defining self-referential structures.

7. To be able to create, read and write to and from simple text files

**Course Title: Work Shop Practice Course Code: ESC-  
ITE-214**

**COURSE OUTCOMES:**

Upon completion of this course, the students will:

1. Gain knowledge of the different manufacturing processes which are commonly employed in the industry,
2. Be able to fabricate components using different materials.

**Course Title: Mathematics-III Course Code: BSC-  
ITE-301**

**COURSE OUTCOME:**

1. Understand special functions and series solutions
2. Applications of Laplace transform in solving differential and integro-differential equations.
3. Understand and apply Applications of F-transform and its applications.
4. Understand and apply Measurement of central tendency for problem solving.
5. Understand and apply laws of probability and various data distributions and its applications.

**Course Title: Digital Logic Design Course Code: ESC-  
ITE-301**

**COURSE OUTCOMES:**

At the end of this course, students will demonstrate the ability to

1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. To understand and examine the structure of various number systems and its application in digital design.
3. Ability to identify basic requirements for a design application and propose a cost effective solution.
4. The ability to identify and prevent various hazards and timing problems in a digital design.
5. To develop skill to build and trouble digital circuits.

**Course Title: Operating Systems Course Code: PCC-  
ITE-301**

**COURSE OUTCOMES:**

At the end of this course, the students will be able to do the following:

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

**Course Title: Data structure using C Course Code: PCC-**

**ITE-302**

**COURSE OUTCOMES:**

1. For a given algorithm student will be able to analyze the algorithms to determine the computational complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will be able to implement it.
3. For a given problem of Stacks, Queues and linked list student will be able to implement it and analyze the same to determine the computational complexity.
4. Student will be able to write an algorithm based on Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in terms of Space and Time complexity.
5. Student will be able to implement Graph search and traversal algorithms and determine the computational complexity.

**Course Title: Object Oriented Programming Course Code: PCC-**

**ITE-303**

**COURSE OUTCOMES:**

After taking the course, students will be able to:

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.



3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

**Course Title: Human Values and Professional Ethics****Course Code: HSMC-ITE-301**

**COURSE OUTCOMES:**

Upon completion of the course, the student should be able to

1. Recognize importance of human values
2. Harmony and ethical behaviour in real life situations
3. Apply ethics in society
4. Discuss the ethical issues related to engineering
5. Realize the responsibilities
6. Rights in the society

**Course Title: Data Structures using C Lab**  
**Course Code: PCC-ITE-311**

**COURSE OUTCOMES:**

1. Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
2. Understand basic data structures such as arrays, linked lists, stacks and queues. Describe the hash function and concepts of collision and its resolution methods
3. Solve problem involving graphs, trees and heaps.
4. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

**Course Title: Object Oriented Programming Lab****Course Code: PCC-ITE-312**

**COURSE OUTCOMES:**

At the end of this course, the student will able to do the following:

1. Understanding and implementation of various object oriented programming concepts like inheritance, polymorphism, object and classes etc.
2. Designing the application using the object oriented concepts

**Course Title: Digital Logic Design Lab****Course Code: ESC-ITE-311**

**COURSE OUTCOMES:**

At the end of this course, the students will be able to do the following:

1. Design and implementation of combinational circuits like adder, subtractor, encoder and decoder, multiplexer and De-multiplexer etc.
2. Able to simulate various circuit designs through circuit maker and electronics workbench or any other tools.

**Course Title: Database Management System Course Code: PCC-ITE-401**

**COURSE OUTCOMES:**

1. For a given query write relational algebra expressions for that query and optimize the developed expressions
2. For a given specification of the requirement design the databases using ER method and normalization.
3. For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

**Course Title: Computer Organization & Architecture Course Code: PCC-ITE-402**

**COURSE OUTCOMES:**

1. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
2. Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
3. Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.

5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

**Course Title: Design & Analysis of Algorithms****Course Code: PCC-ITE-403**

COURSE OUTCOMES:

1. For a given algorithm student will able to analyze the algorithms to determine the computational complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the computational complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

**Course Title: Discrete mathematics****Course Code: PCC-ITE-404**

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

1. Understand basic concept of functions and relations
2. Understand and use argument, evaluation, analysis, logic and truth tables.
3. Comprehend the basic terminology and analyze applications of graph theory in modern society.
4. Learn to model problems using graphs and understand some basic algorithms to solve these real world problems.
5. Understand relation between matrix theory and graph theory.

**Course Title: Computer Networks****Course Code: PCC-ITE-405**

COURSE OUTCOMES:

1. Explain the functions of the different layer of the OSI Protocol.

2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW,
6. HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

**Course Title: Python Programming Course Code: PCC-ITE-406**

#### **COURSE OUTCOMES:**

At the end of this course, the students will able to do the following:

1. To Understand data types (like character strings, integers, and real numbers)andthe Operations that can be applied to each data type
2. To write programs that get input, performcalculations, and provide output (using Conditional logic, loops, Functions).
3. To understand the OOPs concepts with respect to fourth generation language
4. To write well designed and well documented programs that is easily maintainable.
5. To test and debug programs (find out what is wrong and fix it).

**Course Title: Python programming lab Course Code: PCC-ITE-411**

#### **COURSE OUTCOMES:**

Upon completion of the course, students will be able to:

1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditionals and loops.
3. Develop Python programs step-wise by defining functions and calling them.
4. Use Python lists, tuples, dictionaries for representing compound data.
5. Read and write data from/to files in Python.

**Course Title: Database Management System Lab**

**Course Code: PCC-ITE-412**

**COURSE OUTCOMES:**

At the end of this course, the students will be able to do the following:

1. Understand the basis of SQL and PL/SQL.
2. Design and implementation of database for an application

**Course Title: Computer Networks Lab Course Code: PCC-ITE-413**

**COURSE OUTCOME:**

At the end of this course, the students will be able to do the following:

1. Understand fundamentals underlying of computer networks.
1. Understand details and functionality of computer network layered architecture
2. Compare routing networks.
3. Analyze performance of various communication protocols.

**Course Title: Theory of Automata Course Code: PCC-ITE-501**

**COURSE OUTCOMES:**

1. Write a formal notation for strings, languages and machines.
2. Design finite automata to accept a set of strings of a language.
3. For a given language determine whether the given language is regular or not.
4. Design context free grammars to generate strings of context free language
5. Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars.
6. Write the hierarchy of formal languages, grammars and machines.
7. Distinguish between computability and non-computability and Decidability and undecidability

**Course Title: Internet and Web Technologies Course Code: PCC-ITE-502**

COURSE OUTCOME:

1. Develop simple static websites.
2. Static websites with CSS.
3. Dynamic websites using Java Scripting.
4. Dynamic website with server side scripting using PHP.
5. Address various web security related issues

**Course Title: Software Engineering Course Code: PCC-ITE-503**

**COURSE OUTCOMES:**

At the end of this course, the students will able to,

1. Learn about the phases in software development cycle
2. To understand various types of models and requirements engineering
3. To understand the design principles.
4. Learn about the levels of testing and testing approaches
5. Learn about the maintenance model.

**Course Title: Java programming Course Code: PCC-ITE-504**

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

1. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
2. Write Java application programs using OOP principles and proper program structuring.
3. Demonstrate the concepts of polymorphism and inheritance.
4. Write Java programs to implement error handling techniques using exception handling.

**Course Title: Internet and Web Technologies Lab Course Code: PCC-ITE-511**

COURSE OUTCOME:

1. Analyze a web page and identify its elements and attributes.
2. Create web pages
3. Build dynamic web pages using java scripts
4. Create XML documents and schemes

**Course Title: Software Engineering Lab**  
**Course Code: PCC-ITE-512**

Course Outcomes:

1. Plan a software engineering process life cycle
2. Able to elicit, analyse and specify software requirements.
3. Analyse and translate a specification into design.
4. Realize design practically, using an appropriate software engineering methodology

**Course Title: Java programming lab**  
**Course Code: PCC-ITE-513**

COURSE OUTCOMES:

1. Implement Object Oriented Programming Concepts(class, constructor, overloading, inheritance, overriding) in Java.
2. Use and create packages and interfaces in a Java program
3. Implement exception handling in Java.
4. Implement Multithreading in Java.
5. Use of Input/output Streams in Java

**Course Title: Estimation and costing**  
**Course Code: OEC-ITE-501/PCC-CE-504**

**COURSE OUTCOME:**

The course will enable the students to:

1. Explain types of estimate and duties of an Estimator.
2. Undertake rate analysis of civil engineering works.
3. Determine the rates of various items of civil works.
4. Calculate estimated cost of civil construction projects.
5. Evaluate the actual value of any property.

**Course Title: Internet of Things**  
**Course Code: OEC-ITE-502/PCC-CSE-702**

**COURSE OUTCOMES:**

After completion of this course, the students will able to do following:

1. Interpret the vision of IoT from a global context.
2. Compare and contrast the use of Devices, Gateways and Data Management in IoT.
3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
4. To study and analyse data and to understand the security issues in IoT

5. To study IoT physical devices and end points and to understand the communications between components

**Course Title: Fundamentals Of Digital Image Processing Course Code: OEC-ITE-503/PCC-CSE-701**

**COURSE OUTCOME:**

At the end of this course, students will demonstrate the ability to:

1. Have an understanding of various steps of Digital image Processing and image representation.
2. Understand and implement image enhancement in spatial domain and in frequency domain.
3. Understand image compression algorithms and choose an appropriate algorithm for specific application needs.
4. Understand and implement basic Morphological operation on Image.
5. Understand and implement image segmentation, representation and description.

**Course Title: Engineering Material Science Course Code: OEC-ITE-504/PEC-EE-701**

**COURSE OUTCOMES:**

1. Given a type of material, the students will be able to qualitatively describe the bonding scheme and its general physical properties, as well as possible applications in electrical engineering.
2. This will be helpful for the students to understand about the insulating properties of the materials.
3. This will be helpful for the students to understand about the Dielectric properties of the materials.
4. Students will be able to do comparative analysis of magnetic materials based upon their properties.
5. Students will be able to differentiate among various materials such as conductor and Semiconductor based upon the internal composition and conductivities.

**Course Title: Visual Programming Course Code: PEC-ITE-501**



COURSE OUTCOMES:

1. List the major elements of the .NET frame work
2. Explain how C# fits into the .NET platform.
3. Analyze the basic structure of a C# application
4. Debug, compile, and run a simple application.
5. Develop programs using C# on .NET

**Course Title: Compiler Design Course Code: PEC-ITE-502**

COURSE OUTCOME:

1. Master using lexical analyzer and parser generator tools.
2. Master building symbol tables and generating intermediate code.
3. Master generating assembly code for a RISC machine.
4. Master programming in Java.
5. Be familiar with compiler architecture.
6. Be familiar with register allocation.
7. Be exposed to compiler optimization

**Course Title: Advance Algorithms Course Code: PEC-ITE-503**

COURSE OUTCOMES:

1. Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency.
2. Master a variety of advanced abstract data type (ADT) and data structures and their implementations.
3. Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc.)
4. Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

**Course Title: Computer Graphics & Multimedia Course Code: PCC-ITE-601**

COURSE OUTCOMES:

1. Explain various applications of computer Graphics.
2. To be able to understand a graphics processing system.
3. To able to under and implement computer graphics algorithms.
4. To be able to implement 3D graphics primitives

5. To be able to understand and use multimedia aids.

**Course Title: Network Security Course Code: PCC-ITE-602**

**COURSE OUTCOME:**

At the end of the course the students will be able to do following:

1. Understand cryptography and network security concepts and application.
2. Apply security principles to system design.
3. Identify and investigate network security threat.
4. Analyses and design network security protocols.
5. Conduct research in network security.

**Course Title: Unix/Linux and shell programming Course Code: PCC-ITE-603**

**COURSE OUTCOMES:**

At the end of this course, the students will able to do the following:

1. Understanding the concept of shell programming
2. Understanding the working of kernel and implementing them.
3. Implementing the system calls, process management, and inter process communication
4. Understand Shell Programming and its implementation.
5. Understanding Semaphores along with interprocess communication.

**Course Title: Computer Graphics & multimedia Lab Course Code: PCC-ITE-611**

**COURSE OUTCOME:**

At the end of this course, the students will able to do following:

1. Design and implementation of various algorithms to draw a number of shapes
2. Design and implementation of various algorithms for designing animation graphics and composite objects
3. Design and simulation of various algorithms using multimedia tools

**Course Title: Unix/Linux & Shell programming Lab  
Course Code: PCC-ITE-612**

## Course Outcomes:

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

1. You will be able to run various UNIX commands on a standard UNIX/LINUX Operating system (We will be using Ubuntu flavor of the Linux operating system).
2. You will be able to run C / C++ programs on UNIX.
3. You will be able to do shell programming on UNIXOS.
4. You will be able to understand and handle UNIX system calls.

**Course Title: Mobile and Wireless Communication Course Code: OEC-ITE-601/PEC-ECE-601**

COURSE OUTCOMES:

1. Understand cellular mobile system, formulate its performance criteria.
2. Characterize the trade-off among frequency reuse, signal to interference ratio, capacity & able to understand interference's in cellular communication.
3. Apply the knowledge of mathematics to find out the average received signal strength at a distance from the transmitter using different propagation model.
4. Identify the advantages & disadvantages of different mobile antennas.
5. Understand multiple access method, spread spectrum techniques, wireless communication system.

**Course Title: Neural Networks**

**Course Code: OEC-ITE-602/PEC-CSE-806**

COURSE OUTCOMES:

At the end of the course, students should be able to understand and appreciate:

1. The role of neural networks in engineering, artificial intelligence, and other areas.
2. Understanding of basic neural network
3. Understanding of the concepts and techniques of neural networks through the study of the most important neural network models.
4. Able to evaluate whether neural networks are appropriate to a particular application.
5. Able to apply neural networks to particular applications, and to know what steps to take to improve performance.

**Course Title: Energy Audit and Management Course Code: OEC-ITE-603/PEC-EE-603**

COURSE OBJECTIVES:

At the end of this course, students will demonstrate the ability to

1. Understand the current energy scenario and realize the need for new reforms to efficiently manage the energy resources.
2. Learn various auditing techniques used for proper energy management.
3. Realize how energy conservation could be done in Electrical Systems by managing the energy losses and malpractices.
4. Realize how energy conservation could be done in Industrial Systems by finding out the factor affecting the performance of various industrial devices and mitigating the same.
5. How electrical energy management could be achieved using new energy efficient devices.

**Course Title: VLSI Design**

**Course Code: OEC-ITE-604/PEC-ECE-602**

**COURSE OUTCOMES:**

After completion of the course student will be able to:

1. Describe the operational characteristics of MOSFET and its application as capacitor and switch.
2. Design CMOS Inverters and analyze its static and dynamic characteristics
3. Understand the complete CMOS fabrication process
4. Design various CMOS based logic gates and logic structures
5. Understand and draw the layout of basic CMOS based circuits.

**Course Title: Advance Computer Architecture Course Code: PEC-ITE-601**

COURSE OUTCOMES:

On successful completion of this course you will be able to:

1. Distinguish the various instruction set architectures
2. Understand the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors
3. Describe modern architectures such as RISC, Super Scalar, VLIW (very large instruction word), multi-core and multi-cpu systems
4. Compare the performance of the existing architectures

**Course Title: Cloud Computing Course Code: PEC-ITE-602**

**COURSE OUTCOMES:**

After completing the course, students will be able to:

1. Develop and deploy cloud application using popular cloud platforms.
2. Design and develop highly scalable cloud-based applications by creating and
3. Configuring virtual machines on the cloud and building private cloud.
4. Explain and identify the techniques of big data analysis in cloud.
5. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

**Course Title: Distributed Database System Course Code: PEC-ITE-603**

**COURSE OUTCOME:**

At the end of this course, the students will be able to do the following:

1. Differentiate the centralized and distributed database, its architecture. and other differences
2. Get knowledge of Query optimization, query trees and graphs.
3. How relational schema is fragmented for different locations and various methods to retrieve data from distributed location over a network.
4. Understand the various techniques of deadlocks recovery in a distributed database.
5. Understand the various techniques to handle transactions in a distributed database.

**Course Title: Advance Java Programming Course Code: PEC-ITE-604**

**COURSE OUTCOMES:**

At the end of this course, the students will be able to do the following:

1. Understanding and designing of GUI
2. Understanding the Java Database connectivity
3. Understanding and designing the distributed and web-based applications
4. Understanding the Server-side and client-side programming
5. Understand JSP and its usages

**Course Title: Software Testing Course Code: PEC-ITE-605**

COURSE OUTCOMES:

At the end of the course the students will be able to

1. Design test cases suitable for a software development for different domains.
2. Identify suitable tests to be carried out.
3. Prepare test planning based on the document.
4. Document test plans and test cases designed.
5. Use of automatic testing tools.
6. Develop and validate a test plan.

**Course Title: Data Mining & Warehousing Course Code: PEC-ITE-606**

COURSE OUTCOMES:

1. Students who complete this course should be able to
2. Describe the fundamental concepts, benefits and problem areas associated with data warehousing.
3. Describe the various architectures and main components of a data warehouse.
4. Design a data warehouse, and be able to address issues that arise when implementation data warehouse.
5. Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis.
6. Applicability of various classification algorithms in data mining for real-world problems.

**Course Title: Distributed Computing Course Code: PEC-ITE-607**

COURSE OUTCOMES:

At the end of this course, the student will able to do following:

1. Study software components of distributed computing systems.
2. Know about the communication and interconnection architecture of multiple computer systems.
3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
4. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.
5. To be familiar with the design, implementation and security issues of distributed system.

**Course Title: Machine Learning Course Code: PCC-ITE-701**

COURSE OUTCOMES:

1. Student should be we to understand the basic concepts such decision tree and neural networks.
2. Ability to formulate machine learning techniques to respective problems.
3. Apply machine learning algorithms to solve problems of moderate complexity.
4. Apply supervised and unsupervised learning to analyse data.
5. Apply genetic algorithms to solve problems.

**Course Title: Entrepreneurship Development & Management**

**Course Code: HSMC-ITE-701**

COURSE OUTCOMES:

At the end of this course, the students will able to do following:

1. Have the ability to discern distinct entrepreneurial traits
2. Understand the systematic process to select and screen a business idea
3. Understanding the market strategy and constraints for newbusiness ideas
4. Design strategies for successful implementation of ideas
5. Write a successful business plan

**Course Title: Application Development Using Android lab.**

**Course Code: PCC-ITE-711**

COURSE OUTCOMES:

1. Gain knowledge of installing Android Studio and Cross Platform Integrated Development Environment.
2. To learn designing of User Interface and Layouts for Android App.
3. To learn how to use intents to broadcast data within and between Applications.
4. To use Content providers and Handle Databases using SQLite.
5. To introduce Android APIs for Camera and Location Based Service.
6. To discuss various security issues with Android Platform.

**Course Title: Machine learning Lab.**

**Course Code: PCC-ITE-712**

COURSE OUTCOMES:

1. To develop a deeper understanding of several major topics in machine learning
2. To develop the design and programming skills that will help you to build intelligent, adaptive artefacts.
3. To develop the basic skills necessary to pursue research in machine learning.

**Course Title: Environmental Engineering Course Code: OEC-ITE-701/PCC-CE-502**

**COURSE OUTCOMES:**

After successfully studying this course, students will:

1. Understand the impact of humans on environment and environment on humans
2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
3. Be able to plan strategies to control, reduce and monitor pollution.
4. Be able to select the most appropriate technique for the treatment of water, waste water solid waste and contaminated air.
5. Be conversant with basic environmental legislation.

**Course Title: Communication System Course Code: OEC-ITE-702/PEC-CSE-713**

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to,

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance
5. Analyzing and understanding several Pulse modulation techniques.

**Course Title: Optical Communication Course Code: OEC-ITE-703/PEC-ECE-704**

**COURSE OUTCOMES:**

After completion of the course student will be able to:

1. Recognize and classify the structures of Optical fiber networks and their types.
2. Discuss the channel impediments like losses, interference and dispersion.



3. Describe the Optical sources and detectors and thus able to illustrate their working principle.
4. Familiar with Design considerations of fiber optic systems.
5. Perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyse the results to provide valid conclusions.

**Course Title: Software Project Management Course Code: PEC-ITE-701**

COURSE OUTCOMES:

1. To have an understanding of how Software Project Management is done.
2. How to Build the project schedule.
3. Understand how budgeting is done.
4. How to assure quality in a software through testing.
5. To have understanding of Planning and Scheduling Tools.

**Course Title: Computer Based Numerical Techniques Course Code: PEC-ITE-702**

COURSE OUTCOMES:

At the end of this course, the students will able to do the following:

1. Understand Various Numerical Techniques and their applications.
2. Implement various numerical solution algorithms using c programming.
3. Be familiar with calculations and interpretation of errors in numerical method.
4. To learn various integration and differentiation formulas in the field of computer science and engineering.
5. Understanding the implications of approximations.

**Course Title: Bio-Metrics and Network Security Course Code: PEC-ITE-703**

COURSE OBJECTIVES:

1. To have an understanding of biometric traits
2. To have an understanding of various biometric traits.
3. To have an understanding of automated biometric systems.
4. To have an understanding about how to secure a biometric system.
5. Understand privacy concerns and how to address them.

**Course Title: Artificial Intelligence Course Code: PEC-ITE-704**

**COURSE OUTCOMES:**

1. Understand basics of artificial intelligence.
2. Apply various soft computing frameworks.
3. Design of various neural networks
4. Use fuzzy logic to solve non crisp problems.
5. Understand genetic programming.
6. Apply and understand how to use hybrid technologies to solve problems.

**Course Title: Linux Administration Course Code: PEC-ITE-705**

**COURSE OUTCOMES:**

At the end of course students are expected to

1. Install, configure and manage enterprise systems/networks, including hardware/software.
2. Improve Linux thinking skills
3. Have an understanding of Linux basics.
4. Have an understanding of administrator duties and role.
5. Maintain and troubleshoot enterprise networks.
6. Able to deploy Linux for commercial environmental need in industry

**Course Title: Simulation and Modeling Course Code: PEC-ITE-706**

**COURSE OUTCOMES:**

1. Describe the role of important elements of discrete event simulation and modeling paradigm.
2. Conceptualize real world situations related to systems development decisions, originating from source requirements and goals.
3. Develop skills to apply simulation software to construct and execute goal-driven system models.

4. Interpret the model and apply the results to resolve critical issues in a real world environment.

**Course Title: Real Time Operating System Course Code: PEC-ITE-801**

COURSE OUTCOMES:

At the end of this course, the students will able to do the following:

1. Understand the basic concept of RTOS and its usefulness for embedded systems
2. Understand Theoretical background and practical knowledge of real-time operating systems.
3. Understand multitasking techniques in real-time systems.
4. Understand the impact of real time operating systems on application area.
5. Understanding Several Timing services

**Course Title: Big Data Anaytics  
Course Code: PEC-ITE-802**

COURSE OUTCOMES:

After completing this course, the student should be able to:

1. Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data
2. Gain hands-on experience on large-scale analytics tools
3. Understand and study Hadoop ecosystem
4. Study R for text mining and to analyze data
5. Understand data visualization and to study python programming

**Course Title: Distributed Systems  
Course Code: PEC-ITE-803**

COURSE OUTCOMES:

1. Study software components of distributed computing systems.
2. Know about the communication and interconnection architecture of multiple computer systems.
3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
4. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.
5. To be familiar with the design, implementation and security issues of distributed system.

**Course Title: Wireless Networks**

**Course Code: PEC-ITE-804**

COURSE OUTCOMES:

On successful completion of this unit students will be able to:

1. Identify the basic concept of wireless networks, channel coding, and cellular concepts;
2. Compare and contrast LEO, MEO and GEO. Routing and handover in satellite communication
3. Understand various wireless LAN technologies
4. Understand the terminologies in mobile network layers and the process of packet discovery and registration in network layer.
5. Compare and contrast between cellular and Ad Hoc wireless networks, areas of its applications and challenges

**Course Title: Deep Learning Course Code: PEC-ITE-805**

**COURSE OUTCOMES:**

Upon successful completion of the course, students should be able to:

1. Understand key concepts related to Deep Learning.
2. Derive a simple Feedforward Neural Network (DNN).
3. Understand DNN architecture and parameters.
4. Intuitively understand theory on why DNN works.
5. Be able to compare DNN to other Machine Learning techniques
6. Apply DNN to real-life problems.

**Course Title: Embedded Systems Course Code: PEC-ITE-806**

COURSE OUTCOMES:

1. Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
2. Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level)
3. Become aware of interrupts, hyper threading and software optimization.
4. Design real time embedded systems using the concepts of RTOS.
5. Analyze various examples of embedded systems based on ATOM processor

## **Programme: M. Sc. (BIOTECHNOLOGY)**

### **Programme Outcome:**

#### **1. Deeper understanding**

To have deeper understanding of a subject for its application in addressing social and scientific issues

#### **2. Research and development**

To prepare students for research and development in respective areas

#### **3. Problem solution**

Problem solving by applying reasoning and technical inputs

#### **4. Environment and sustainable development**

To study and understand the impact of development on environment safety and its significance for sustainable ways of development.

#### **5. Lifelong learning**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **6. Leadership and self-reliance**

Impact leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Programme specific outcomes:**

Upon successful completion of the M.Sc. Biotechnology programme, the students will be able to:

1. Use the scientific methods, and critical thinking skills to ask questions and solve problems
2. Follow a protocol independently, including locating materials and equipment, practicing good lab procedures and accurately performing all experimental procedures.
3. Analyze experimental results, differentiating between expected and unexpected results, trouble shooting, interpreting results and making conclusions.
4. Demonstrate proficiency in maintaining a safe work place, including observation of lab safety procedures, use of personal protective equipment, identification hazards and proper disposal of commonly used chemicals and biohazardous materials.
5. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.
6. Identify carriers in biotechnology and skills required for landing a job.

**Course title: Foundation Course**

**Course Code: Bio-1014**

### **Course outcome:**

1. The objective of this course is to provide the very basic knowledge of Physical Chemistry and Biology, which acts as foundation to imbibe the details of the specialized course as outlined in rest of the curriculum.
2. The course is interdisciplinary and describes interaction between various domains of natural sciences.
3. Furthermore, it will also provide basic knowledge of computer organization and functioning
4. It will introduce students to statistical methods in order to understand the underlying principles, as well as practical guidelines of “how to do it” and “how to interpret it” statistical data particularly for bio systems.
5. Students will be acquainted with the concept of biostatistics.

**Course title: Molecular Biology**

**Course Code: Bio-1024**

**Course outcome:**

1. The course has been devised to familiarize students with Molecular Biology which chiefly deals with interactions among various systems of the cell, including those between DNA, RNA and proteins and learning how these are regulated.
2. To gain an understanding of chemical and molecular processes that occurs in and between cells.
3. To gain insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.
4. Will be able to design and implement experimental procedures using relevant techniques.

**Course title: Molecular Biology**

**Course Code: Bio-1032**

**Course Outcome:**

1. The objectives of this course is to introduce students to field of microbiology with special emphasis on microbial diversity, morphology, physiology and nutrition; methods for control of microbes and host-microbe interactions.
2. Explain the principles of the energy-yielding and consuming reactions and mechanism of energy conservation in microbial metabolism.
3. Identify the various physiological groups of bacteria/archaea with their special features.
4. Execute various experiments commonly involved in microbial physiology research.

**Course title: Plant Bioresources**

**Course Code: Bio-1042**

**Course Outcome:**

1. This course has been designed to acquaint students with plant bioresources, their traditional and non-traditional uses, current status and recent developments in value addition and future prospects.
2. To know about origin and domestication of important food and medicinal plants.
3. To acquaint students with traditional uses of plant Bioresources.
4. To know about value addition of medicinal plants.

**Course title: Animal Bioresources**

**Course Code: Bio-1052**

**Course Outcome:**

1. The course is designed to acquaint students with biology of animals, their management and judicious utilization based on scientific principles.
2. To know the diversity of animal resources.
3. Provides students with a broad background in domestic animal biology.
4. The course focuses on animal products and their management.

**Course title: Cell Biology****Course Code: Bio-1062****Course Outcome:**

1. The present course has been devised to familiarize students with the structural and functional aspects of cell, the basic unit of life, and its different organelles. Knowing the components of cells and how they work is fundamental to all biological sciences.
2. Students will understand structure and function of different cell organelles.
3. Students will be able to understand the cyclic events of cell division and types of cell division.
4. Will understand cell signaling and processes of cell death and cellular aging.

**Course title: Biomolecules****Course Code: Bio-1072****Course Outcome:**

1. The course is designed to make students appreciate the structure and importance of various biomolecules involved in sustenance and perpetuation of living organisms.
2. Learn the elements that are present in biomolecules and different monomers and polymers.
3. To acquaint students with the shape, structure, function and importance of proteins.
4. Students will understand chemical properties, structure and function of Lipids and Proteins.

**Course title: Laboratory I****Course Code: Bio-1712****Course Outcome:**

1. The objective of this laboratory course is to provide the students practical skills in basic molecular biology and microbial bioresources.
2. Students will learn different techniques of molecular biology.
3. Enable students to acquire expertise in the field of microbiology.
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course title: Laboratory II****Course Code: Bio-1722****Course Outcome:**

1. The objective of this laboratory course is to teach basics of exploration, identification and conservation of plant and animal bioresources.
2. Students will learn different techniques for the collection and identification of Plants and animals.
3. Enable students to acquire expertise for domestication and introduction of economically important plants and animals.



4. Students will acquaint with different methods for the assessment and characterization of bioresources.

**Course title: Laboratory III**

**Course Code: Bio-1732**

**Course Outcome:**

1. The objective of this laboratory course is to provide the students with practical skills in basic biochemical calculations, identification of biomolecules and certain cell biology techniques.
2. Students will learn different techniques of Cell biology.
3. Enable students to acquire expertise in the field of microbiology.
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course title: Genetic Engineering**

**Course Code: Bio-2014**

**Course Outcome:**

1. The objectives of this course are to teach students with various approaches to conducting genetic engineering and their applications in biological research as well as in biotechnology industries.
2. Genetic engineering is a technology that has been developed based on our fundamental understanding of the principles of molecular biology and this is reflected in the contents of this course.
3. To know the basics and concepts of various genetic engineering terms.
4. Elucidate different techniques involved in genetic engineering.

**Course title: Genomics and Proteomics**

**Course Code: Bio-2022**

**1. Course Outcome:**

2. The objective of this course is to provide introductory knowledge concerning genomics, proteomics and their applications.
3. To know the basic concept of genomics and functional genomics.
4. Elucidate different techniques involved in Genomics and Functional Genomics.
5. Students will acquaint with different methods of genome sequencing and assembly.

**Course title: Enzymology and Metabolism**

**Course Code: Bio-2034**

**Course Outcome:**

1. The course is designed to make students learn and appreciate the importance of enzymes and enzyme catalyzed reactions.
2. Students will acquaint with mechanism and regulation of various biochemical reactions taking place in living systems.
3. Students will understand the laws of thermodynamics and conceptual knowledge of aerobic and anaerobic pathways.
4. Students will be able to understand different processes involved in nitrogen metabolism.

**Course title: Plant Biotechnology**

**Course Code: Bio-2052**

**Course Outcome:**

1. To impart theoretical knowledge on various techniques of plant biotechnology like tissue culture, plant genetic transformation and their application in industries.
2. To develop concepts, principles and processes in plant biotechnology.
3. Students will know about different types of plant tissue culture.
4. Elucidation of different methods for the improvement of plants, including plant taste, texture, fruit ripening, sweetness etc.

**Course title: Fundamentals of Biotechnology (Open Elective)**

**Course Code: Bio-2514**

**Course Outcome:**

1. The objective of this course is to familiarize students of other disciplines with principles and applications of modern biotechnology.
2. To give students basic concept of different branches of Biotechnology.
3. To acquaint students with basic principles of plant and animal biotechnology.
4. To familiarize students with some important genetic disorders, genetically modified organisms and bio-safety measures.

**Course title: Seminar/Journal Club**

**Course Code: Bio-2622**

**Course Outcome:**

1. The main objective of this course is to prepare students for PowerPoint presentation.
2. Students will be able to review the literature.
3. To acquaint students with recent developments in the concerned subject
4. To enhance their orientation skills.

**Course title: Laboratory IV**

**Course Code: Bio-2712**

**Course Outcome:**

1. The objective of this laboratory course is to provide some practical skills pertaining to enzymology.
2. Students will receive hands on experience of various biochemical assays to estimate some biomolecules and activities of various enzymes.
3. Students will learn different techniques pertaining to enzymology and metabolism.
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course title: Laboratory V**

**Course Code: Bio-2722**

**Course Outcome:**

1. The objective of this laboratory course is to provide practical skills on basic plant biotechnology and Genomics.
2. To elucidate students with basic training of plant tissue culture.

3. Students will learn different techniques pertaining to plant biotechnology.
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course title: Laboratory VI**

**Course Code: Bio-2732**

**Course Outcome:**

1. The objective of this laboratory course is to provide practical skills on basic genetic engineering techniques.
2. Train students with basic techniques in Genetic Engineering.
3. Students will learn basic steps of cloning
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course title: Animal Biotechnology**

**Course Code: Bio-3012**

**Course Outcome:**

1. To impart theoretical knowledge on various techniques of animal biotechnology and their application in industries.
2. To develop concepts, principles and processes in animal biotechnology.
3. Students will know about different techniques for in vitro fertilization.
4. Elucidation of different methods for the improvement of animals, including poultry production, milk quality, disease resistance etc.

**Course title: Genetics**

**Course Code: Bio-3022**

**Course Outcome:**

1. The objectives of this course are to take students through basics of genetics and classical genetics covering prokaryotic/ phage genetics to yeast and higher eukaryotic domains.
2. On covering all classical concepts of Mendelian genetics across these life-forms, students will be exposed to concepts of population genetics.
3. Students will also be exposed to quantitative genetics encompassing complex traits, clinical genetics and genetics of evolution.
4. To understand the genetics of model animal Drosophila.

**Course title: Industrial Biotechnology**

**Course Code: Bio-3032**

**Course Outcome:**

1. The objectives of this course are to educate students about fundamental concepts of bioprocess technology and its related applications, thus, preparing them to meet challenges of new and emerging areas of biotechnology industry.
2. Students will be able to understand fermentative productions of representative biomolecules like enzymes, antibodies, vitamins etc.

3. Understanding recovery and purification of biomolecules.
4. Quality control procedures like sterility, toxicity and carcinogenicity testing.

**Course title: Bioinformatics & Bioentrepreneurship**

**Course Code: Bio-3042**

**Course Outcome:**

1. The objective of this course is to introduce to provide students with theory and practical experience of use of common computational tools and databases, which facilitate investigation of molecular biology and evolution-related concepts.
2. Research and business belong together and both are needed. In a rapidly developing life science industry, there is an urgent need for people who combine business knowledge with the understanding of science & technology.
3. Bio-entrepreneurship, an interdisciplinary course, revolves around the central theme of how to manage and develop life science companies and projects.
4. The objectives of this course are to teach students about concepts of entrepreneurship including identifying a winning business opportunity, gathering funding and launching a business, growing and nurturing the organization and harvesting the rewards.

**Course title: Immunology**

**Course Code: Bio-3054**

**Course Outcome:**

1. The objectives of this course are to make students learn about the structural features of the components of the immune system as well as their function.
2. The major emphasis of this course will be on the development of the immune system and mechanisms by which our body elicit the immune response. This will be imperative for the students as it will help them to think like an immunologist and predict about the nature of immune response that develops against bacterial, viral or parasitic infection, and prove it by designing new experiments.
3. Students are able to understand basic concepts of Immunology, properties of immune system and types of immunity.
4. Elucidation of immunodiagnostic procedures and monoclonal antibodies.

**Course title: Analytical Techniques**

**Course Code: Bio-3062**

**Course Outcome:**

1. The objective of this course is to familiarize students with the basic concepts and applications of modern techniques used in Biochemistry, Biophysics, Cell and Molecular Biology.
2. The students will be able to understand the principle and working of different chromatography techniques.
3. The students will be able to understand the principle and working of different centrifugation techniques.
4. The students will be able to understand the principle and working of different Electrophoretic and molecular biology techniques.

**Course title: Crop Biotechnology (Elective)**

**Course Code: Bio-3512**

**Course Outcome:**

1. The crops produced need to increase with ever increasing population. Conventional methods for crop improvement are not able to deliver fully. Therefore, high use of throughput technologies is need of the hour. This course is intended to give some idea to students how crop plants can be improved quantitatively and qualitatively using biotechnological approaches.
2. Students are able to understand plant genome organization.
3. To acquaint students with recent techniques for crop improvement
4. Application of molecular markers for crop improvement.

**Course title: Human Genetic Disorders (Elective)**

**Course Code: Bio-3522**

**Course Outcome:**

1. The course deals with basic concepts of heredity and genetics. Students will be acquainted with genetics of single gene, polygenic and chromosomal disorders.
2. Genetic counseling in common genetic disorders will also be dealt with.
3. To understand the different types of genetic interaction, incomplete dominance, co-dominance, multiple alleles etc.
4. To study genetic disorders caused by structural and numerical chromosomal abnormalities

**Course title: Signal Transduction & Cancer Biology (Elective)**

**Course Code: Bio-3532**

**Course Outcome:**

1. The present course has been designed to expose the students to cell signaling, its components and relation with cancer.
2. To understand general principles of signaling and nuclear receptors.
3. To understand mechanism of action of signalling pathway mediated by protein cleavage.
4. To understand genetic basis of cancer cells: oncogenes, tumor suppressor genes and gain of function mutations.

**Course title: Protein Engineering (Elective)**

**Course Code: Bio-3542**

**Course Outcome:**

1. The aim of this course is to introduce methods and strategies commonly used in protein engineering.
2. At the end of the course, students should be able to understand and explain differences between rational design and directed evolution.
3. Students will acquire knowledge about miscellaneous topics such as searches in bioinformatics databases, isolation, expression and purification of novel proteins.
4. Students will also get an overview of several biophysical techniques used for analysis of secondary, tertiary and quaternary structure, as well as of screening methods used for selection of novel protein variants with improved properties.

**Course title: Laboratory VII**

**Course Code: Bio-3712**

**Course Outcome:**

1. The objective of this laboratory course is to provide practical skills on basic Bioinformatics.
2. Further, it will give students a practical exposure to various techniques used in industries.
3. It will provide training to students to isolate and manipulate industrially important microorganisms.
4. Students will be able to know about different databases.

**Course title: Laboratory VIII****Course Code: Bio-3722****Course Outcome**

1. The objectives of this laboratory course are to make students develop an understanding about practical aspects of the components of the immune system as well as their function.
2. Basic as well as advanced methods will be taught to detect different antigen and antibody interactions, isolation of different lymphocyte cells etc. and how they can be used in respective research work.
3. Students will also be acquainted with techniques in Animal Biotechnology.

**Course title: Laboratory IX****Course Code: Bio-3732****Course Outcome:**

1. The objective of this laboratory course is to provide the students practical skills in basic analytical techniques and genetics.
2. To determine an unknown protein concentration by plotting a standard graph of BSA using UV-Vis Spectrophotometer and validating the Beer- Lambert's Law.
3. To study Protein purification by metal chelate chromatography.
4. Demonstration of conjugation in bacteria.

**Course title: Laboratory X****Course Code: Bio-3742****Course Outcome:**

1. The objective of this laboratory course is to provide the students practical skills in discipline centric electives.
2. To understand the principle and working of Auto Weather Station: collection, collation and representation of data.
3. To Study genetic diversity by using CAPS markers.
4. To study Protein purification by metal chelate chromatography.

**Course title: Dissertation****Course Code: Bio-4824****Course Outcome:**

1. To give laboratory training to students.
2. Students will be able to handle research problems independently.
3. Vigorous laboratory training will help students to boost their research carrier.
4. Dissertation work is important component for admission in Ph.D course.

## **Programme: M.Phil. (Biotechnology)**

### **Programme Outcome:**

1. Deeper understanding  
To have deeper understanding of a subject for its application in addressing social and scientific issues
2. Research and development  
To prepare students for research and development in respective areas
3. Problem solution  
Problem solving by applying reasoning and technical inputs
4. Environment and sustainable development  
To study and understand the impact of development on environment safety and its significance for sustainable ways of development.
5. Lifelong learning  
Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
6. Leadership and self-reliance  
Impact leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Programme specific outcomes:**

Upon successful completion of the M.Phil Biotechnology course, the students will be able to:

1. Keep pace with the expanding frontiers of knowledge and provides research training relevant to the present social and economic objectives of the country.
2. Use the scientific methods, and critical thinking skills to ask questions and solve problems.
3. Write a good research report and acquires the skill of presenting data in graphical form.

4. Follow a protocol independently, including locating materials and equipment, practicing good lab procedures and accurately performing all experimental procedures.
5. Analyze experimental results, differentiating between expected and unexpected results, trouble shooting, interpreting results and making conclusions.
6. Demonstrate proficiency in maintaining a safe work place, including observation of lab safety procedures, use of personal protective equipment, identification hazards and proper disposal of commonly used chemicals and biohazardous materials.
7. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.
8. Identify carriers in biotechnology and skills required for landing a job.
9. Work in a government-based entity such as Universities, research institutes or at private centers as research scientists/assistant in the native country and outside as well.

**Course title: Research Methodology**

**Course Code: Paper-I**

**Course Outcome:**

1. To develop understanding of the basic framework of research process.
2. To develop an understanding of various research designs and techniques.
3. To identify various sources of information for literature review and data collection.
4. To develop an understanding of the ethical dimensions of conducting applied research
5. Appreciate the components of scholarly writing and evaluate its quality.

**Course title: Plant Biotechnology**

**Course Code: Paper-II**

**Course Outcome:**

1. To impart theoretical knowledge on various techniques of plant biotechnology like tissue culture, plant genetic transformation and their application in industries.
2. To develop concepts, principles and processes in plant biotechnology.
3. Students will know about different types of plant tissue culture.
4. Elucidation of different methods for the improvement of plants, including plant taste, texture, fruit ripening, sweetness etc.

**Course title: Inheritance Biology**

**Course Code: Paper-III**

**Course Outcome:**

1. The objectives of this course are to take students through basics of genetics and classical genetics covering prokaryotic/ phage genetics to yeast and higher eukaryotic domains.
2. On covering all classical concepts of Mendelian genetics across these life-forms, students will be exposed to concepts of population genetics.
3. Students will also be exposed to quantitative genetics encompassing complex traits, clinical genetics and genetics of evolution.
4. To understand the genetics of model animal *Drosophila*.



**Course title: Molecular Biology**

**Course Code: Paper-IV**

**Course outcome:**

1. The course has been devised to familiarize students with Molecular Biology which chiefly deals with interactions among various systems of the cell, including those between DNA, RNA and proteins and learning how these are regulated.
2. To gain an understanding of chemical and molecular processes that occurs in and between cells.
3. To gain insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.
4. Will be able to design and implement experimental procedures using relevant techniques.

**Pre-Ph.D**

**Programme Outcome:**

**5. Deeper understanding**

To have deeper understanding of a subject for its application in addressing social and scientific issues

**6. Research and development**

To prepare students for research and development in respective areas

**7. Problem solution**

Problem solving by applying reasoning and technical inputs

**8. Environment and sustainable development**

To study and understand the impact of development on environment safety and its significance for sustainable ways of development.

**9. Lifelong learning**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**10. Leadership and self-reliance**

Impact leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Programme specific outcomes:**

Upon successful completion of the Ph.D Biotechnology course, the students will be able to:

1. Keep pace with the expanding frontiers of knowledge and provides research training relevant to the present social and economic objectives of the country.
2. Use the scientific methods, and critical thinking skills to ask questions and solve problems.
3. Write a good research report and acquires the skill of presenting data in graphical form.
4. Follow a protocol independently, including locating materials and equipment, practicing good lab procedures and accurately performing all experimental procedures.
5. Analyze experimental results, differentiating between expected and unexpected results, trouble shooting, interpreting results and making conclusions.
6. Demonstrate proficiency in maintaining a safe work place, including observation of lab safety procedures, use of personal protective equipment, identification hazards and proper disposal of commonly used chemicals and biohazardous materials.
7. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.
8. Identify carriers in biotechnology and skills required for landing a job.
9. Work in a government-based entity such as Universities, research institutes or at private centers as research scientists/assistant in the native country and outside as well.

**Course title: Research Methodology**

**Course Code: Paper-I**

#### **Course Outcome:**

1. To develop understanding of the basic framework of research process.
2. To develop an understanding of various research designs and techniques.
3. To identify various sources of information for literature review and data collection.
4. To develop an understanding of the ethical dimensions of conducting applied research
5. Appreciate the components of scholarly writing and evaluate its quality.

**Course title: Fundamentals of Medical Genetics**

**Course Code: Paper-II**

#### **Course Outcome:**

1. The course deals with basic concepts of heredity and genetics. Students will be acquainted with genetics of single gene, polygenic and chromosomal disorders.
2. Genetic counseling in common genetic disorders will also be dealt with.
3. To understand the different types of genetic interaction, incomplete dominance, co-dominance, multiple alleles etc.
4. To study genetic disorders caused by structural and numerical chromosomal abnormalities

## **Programme: M.Sc (Botany)**

### **Program outcomes (PO's) of M. Sc Botany Program**

#### **PO1: Deeper understanding**

To have a deeper understanding of a subject by the student for its application in addressing societal and scientific issues

#### **PO2: Research and development**

To prepare students for research and development in respective areas

#### **PO3: Problem solution**

Problem solving by applying reasoning and technical inputs

#### **PO4: Environment and sustainable development**

To study and understand the impact of development on environment safety and its significance for sustainable ways of development

#### **PO5: Lifelong learning**

Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **PO6: Leadership and self-reliance**

Impart leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Program Specific Outcomes (PSO's) of M. Sc Botany Program**

**PSO 1:** Development of understanding about lower plant groups; Algae, Lichens, Bryophytes, Pteridophytes, and Bacteria and Viruses

**PSO 2:** Development of understanding about Fungi – the non-chlorophyllous plants

**PSO 3:** Development of understanding in the area of Molecular Biology (glance of Structure of nucleic acids, their replication, transcription, translation along with other important aspects of posttranscriptional and translational modifications)

**PSO 4:** Development of understanding in the area of Cell Biology (glance of cell structure, programming of cell cycle, study of cellular organelles, chromosomal structure & behavior and other important aspects pertaining to this)

**PSO 5:** Development of understanding in the area of Plant Physiology and Biochemistry (glance of physiological processes, adaptation of plants, their anatomy, biochemical aspects of different cellular processes)

**PSO 6:** Development of understanding in the area of reproductive behavior of flowering plants

**PSO 7:** Development of understanding in the area of principles of taxonomy and systematics in plants, plant identification methods and their utilization

**PSO 8:** Development of understanding on ecology and environmental biology

**PSO 9:** Development of understanding of statistical tools and their application in biological sciences

**PSO 10:** Development of understanding about different components of forest ecology, ecological processes and their relation with different biodiversity elements

**PSO 11:** Development of understanding about plant biotechnology and applications of genetic engineering in both plants and microbes

**Course title: Algae & Lichens: Structure & Diversity**

**Course Code: Bot-150**

**Course Outcomes:**

1. Teach students identification, structure, function and ecology of algae and lichens.
2. Demonstrate the use of algae and lichens as economically important organisms.
3. Develop hands-on approaches to study algae and lichens populations and their growth forms in the surrounding environment.
4. Economic importance of algae (a general account), algae as pollutants and pollution

Indicators.

**Course title: Bryophytes and Pteridophytes: Structure and Diversity**

**Course Code: Bot-151**

**Course Outcomes:**

1. To provide theoretical and practical knowledge on biology and diversity of Bryophytes and Pteridophytes to the students.
2. To develop understanding on the range of variation in structural and reproductive diversities of Bryophytes and Pteridophytes
3. To impart knowledge on the distribution, conservation status and economic and ecological importance of Bryophytes and Pteridophytes.
4. To understand the significance of bryophytes as pioneer plants on land and their role in the origin of Pteridophytes.
5. To understand the role of Pteridophytes in the origin of seed plants and or seed habit.

**Course title: Anatomy and Developmental Biology**

**Course Code: Bot-152**

**Course Outcomes:**

1. The syllabus is designed to know the structure of the different tissues and how these tissues differ from one another and their role in plant biology. Studying anatomy allows students to know the structure, function, ecology and development
2. Flowers role in reproduction and end product of flower (fruits) are also included which include the key fruits use in daily life and their morphology, anatomy and part used to create awareness among students
3. To study the effects of environmental pollutants on the morphology and anatomical features of diverse plant groups and the damage caused by these pollutants
4. To aware students about the seed dormancy and associated phytohormones in dormancy.

**Course title: Cell Biology**

**Course Code: Bot-153**

**Course Outcomes:**

1. Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially membranes, and organelles
2. To study the cell their composition and role govern by them and know the technique to study the diverse cells
3. To introduce the different organelles in a cell their individual role and composition any symptoms associated with the deficiency of any proteins/genes
4. To know the process of apoptosis and role of it.
5. Students will understand how these cellular components are used to generate and utilize energy in cells.

**Course title: Molecular Biology**

**Course Code: Bot-154**

**Course Outcomes:**

1. Paper provides basic concepts on the functioning of cell.
2. Familiarize students about different aspects of nucleic acids and their interaction with surrounding cellular system.
3. Helps student in developing abilities to understand the fascinating aspects of hereditary material and information of gene functioning.
4. Increases interest of students to unravel mysteries regarding DNA and RNA functioning and their correlation with the protein functions in cell.

**Course title: Lab Course on Bot-150, Bot-151 & Bot-152**

**Course Code: Bot-160**

**Course outcomes**

5. The objective of this laboratory course is to provide the students practical skills in discipline centric electives.
6. The objective of this laboratory course is to provide the students practical skills in studying reproductive biology of different plant sp.
7. Students will also be acquainted with techniques used in the identification and characterization of lichens
8. Students will learn the dissection procedures used in the preparation of samples for studying their structures.
9. It will provide training to students in performing anatomical studies pertaining to different plant sp.

**Course title: Lab Course on Bot-153 & Bot-154**

**Course Code: Bot-161**

**Course outcomes**

10. The objective of this laboratory course is to provide the students practical skills in discipline centric electives.
11. The objective of this laboratory course is to provide the students practical skills in basic molecular biology
12. Demonstrate practical skills in different laboratory equipment's and their handling  
The objective of this laboratory course is to provide some practical skills pertaining to different techniques of molecular biology

**Course title: Gymnosperms: Structure and Diversity**

**Course Code: Bot-250**

**Course Outcomes:**

1. The general aim of this course is to provide theoretical and practical knowledge on biology and diversity of Gymnosperms to the students. The specific objectives are to:

2. To understand the range of variation in structural and reproductive diversities of among different gymnosperm groups.
3. To impart knowledge on the distribution, conservation status and economic and ecological importance of Gymnosperms.
4. Discuss the type of seeds produced by the gymnosperms
5. State which period saw the first appearance of gymnosperms and explain when they were the dominant plant life.

**Course title: Mycology and Plant Pathology**

**Course Code: Bot-251**

**Course Outcomes:**

1. Make students understand the diversity, structure and reproduction in the kingdom Fungi.
2. To provide an insight to the students about the technique to isolate and identify fungi and maintain them in pure cultures.
3. Study the diseases caused by biotic and abiotic agent in plants.
4. Study the mechanism of disease development by pathogens.
5. Understand the interaction between plant and pathogen in relation to the overall environment.
6. Demonstrate an understanding of the principles of plant pathology and the application of these principles for the control of plant disease.
7. Demonstrate skills in laboratory and field related to mycology and plant pathology.

**Course title: Plant Taxonomy**

**Course Code: Bot-252**

**Course Objectives:**

1. The course of Plant Taxonomy deals with history and importance of taxonomy
2. It deals with classification of angiosperms and enables the students to understand different systems of classifications, both classical and modern.
3. The students are made to understand principles and methods of identification including construction of keys, plant nomenclature and ICN.
4. The course will enable students to understand the role of other approaches of biology to unravel mysteries of Plant Taxonomy.
5. The course will also enable students to understand the various concepts of origin of variation and speciation.
6. The students will be able to learn about primitive and advanced angiosperm families both in mono- as well as dicots.
7. Overall the course content will enable the students learn all the basic and advanced concepts of Plant taxonomy and their extension to field studies.

**Course title: Bacteria and Viruses: Structure and Diversity**

**Course Code: Bot-253**

**Course Outcomes:**

1. Make students understand the diversity in structure and functioning of prokaryotes.

2. Study the mechanism of disease development by pathogens.
3. To provide insight of the technique in isolation, identification and maintenance of pure cultures.
4. Understand the interaction of pathogen with host in relation to infectivity.
5. Demonstrate skills in controlling microbial diseases in day to day life.

**Course title: Lab Course based on Bot-250**

**Course Code: Bot-260**

**Course outcomes**

1. The objective of this laboratory course is to provide the students practical skills in discipline centric electives.
2. The objective of this course is to familiarize students with the basic concepts and applications of performing taxonomic studies
3. The students will be able to understand and differentiate the vegetative and reproductive structures of different plant group
4. Students will have in-depth knowledge of different gymnosperms regarding anatomy of root, stem and leaf.

**Course title: Lab Course based on Bot-251**

**Course Code: Bot-261**

**Course outcomes**

1. The objective of this laboratory course is to provide the students practical skills in discipline centric electives.
2. The objective of this laboratory course is to provide practical skills on basic microbiological techniques
3. Enable students to acquire expertise in the field of microbiology.
4. Demonstrate practical skills in different laboratory equipment's and their handling
5. It will provide training to students to isolate and manipulate industrially important microorganisms.

**Course title: Cytology and Cytogenetics**

**Course Code: Bot-350**

**Course Outcomes:**

1. The course will be focusing to develop the understanding on Chromosome, structure, forms, special types and study of asymmetry in the karyotypes.
2. It also will deal with the development of understanding on different types of structural chromosomal aberrations and their consequences on the growth and development of the Cell and Organism.
3. The course will enable students to learn about numerical chromosomal changes and the evolutionary consequences.
4. The course will help students understand and appreciate the anomalies in chromosomal behavior and their impact on the survival of species.
5. The students will be made to understand the Molecular approaches for study of Cytology and Cytogenetics.

**Course title: Reproductive Biology of Angiosperms**

**Course Code: Bot-351**

**Course Outcomes:**



1. The course will make the students to understand the concept of sex expression, factors controlling differentiation of sex, costs and benefits of sex in flowering plants.
2. The students will be able to understand the development of male and female gametes both classical as well as molecular concepts.
3. The course will enable the students to understand the mechanisms of pollination, contrivances of self and cross pollination in flowering plants.
4. The course will also enable the students to understand the signaling mechanisms of pollen tube guidance to ovary.
5. It will also make the students to learn about the process of fertilization, double fertilization, embryo and endosperm development.
6. The course will make the students understand the concepts of sexual incompatibility, both classical and molecular and its significance in generation of variation.

**Course title: Plant Resources and Utilization**

**Course Code: Bot-352**

**Course Outcomes:**

1. Paper will help to understand different kinds of bioresources.
2. Evolution and domestication (how domestication started)
3. It will help to understand the beginning of agriculture and its diversification and center of origin of different bioresources.
4. As paper directly related with the various bioresources it will also make student aware about the different types of bioresources e.g. in service of mankind (as medicine, as fuel, as fodder, as timber, as fiber, as dye yielding plants, as bio flavour, bio-gum, bio preservatives and as bio-cosmetics)
5. Paper also projects the use of bioresources for bioprospection.

**Course title: Biostatistics and Bioinformatics**

**Course Code: Bot-353**

**Course Outcomes:**

1. Develop curiosity about Computers, Bioinformatics and Biostatistics to students who can build on this later in life.
2. Construct knowledge about the various applications of Mathematics and Statistics to the students.
3. Solve mathematical and statistical problems with fellow class mates as well as individually.
4. Analyze information based on mathematical data rather than accumulating and memorizing it.

**Course title: Recombinant DNA Technology (Elective)**

**Course Code: Bot-354**

**Course Outcomes:**

1. The course acquaints the students with concepts of Recombinant DNA technology.
2. The course content is so designed as to make students aware about the materials and methods being used in the transfer of DNA and its expression in the target organisms.
3. Also students will learn about the vast scope of the subject.
4. The students will acquaint with applications of Recombinant technology.

**Course title: Forest Ecology-I (Elective)**

**Course Code: Bot-355**

**Course Outcomes:**

1. Paper provides basic concepts regarding the different ecological process
2. Interaction between different components that occurs within a forest ecosystem over a period of time.
3. Highlights the need of forest ecosystem and ecosystem services in present scenario.
4. Paper highlighted the structure and function of the forest ecosystem.
5. Different aspect of this paper will help in to know health of the forest ecosystem.

**Course title: Plant Biotechnology-I (Elective)**

**Course Code: Bot-356**

**Course Outcomes:**

1. Provide students an insight of the non - conventional methods of plant propagation.
2. Develop curiosity about use of non - conventional methods in storage and conservation of germplasm.
3. Acquaint students with knowledge pertaining to Biotechnology and genetic engineering of plants.
4. Realize the role of various International Organizations for the protection and safeguard of environment.

**Course title: Biodiversity and Conservation-I (Elective)**

**Course Code: Bot-357**

**Course Outcomes:**

1. Provide essential knowledge and cutting edge practical methodologies that are fundamental to the study of biodiversity.
2. Demonstrate the distribution of biodiversity at the genetic, organismal, community, and global scales to the students.
3. Understand the methods of measurement of the Biodiversity to the students.
4. Describe the uses and valuation procedures of biodiversity to the students to realize their importance.

**Course title: Lab Course based on Bot-350; Bot-351 & Bot- 352**

**Course Code: Bot-360**

**Course outcomes:**

1. The course helps student in developing understanding of Chromosome, their structure and forms, special types and study of asymmetry in the karyotypes.
2. It helps students in understanding different types of chromosomal aberrations and their consequences on the growth and development.
3. The course helps students to understand and appreciate the anomalies in chromosomal behavior and their impact on the survival of species.
4. The course helps students in performing study of nuclear and cellular endosperm through dissections and staining.
5. Helps students to identify and classify different wild Bioresources.

**Course title: Lab Course based on Bot-353; Bot-354; Bot- 355; Bot- 355; Bot- 357**  
**Course Code: Bot-361**

### **Course outcomes**

1. Students will acquire knowledge about miscellaneous topics such as searches in bioinformatics databases
2. The course help students in determining the biomass and regeneration status of the important tree species
3. The objective of this laboratory course is to provide practical skills on basic Bioinformatics.
4. Demonstrate practical skills in different laboratory equipment's and their handling.
5. The students will be able to understand the principle and working procedures of performing tissue culture of different plant samples.

**Course title: Ecology and Environmental Biology**

**Course Code: Bot-450**

### **Course Outcomes:**

1. Understand mechanisms by which organisms interact with other organisms and with their physical environment.
2. Describe biotic and abiotic factors that influence the dynamics of populations.
3. Appreciate the inter-relationship between organism in population and communities.
4. Understand principles of toxicology and the harmful effects of toxic metals on humans and environment.
5. Realize the role of various International Organizations for the protection and safeguard of environment.

**Course title: Plant Physiology and Biochemistry**

**Course Code: Bot-451**

### **Course Outcomes:**

1. The course is designed to know the role of macronutrients and micronutrients in the soil and deficiencies caused by excess/low of these nutrients. And the transport of protein/nutrient in the cell and their utility towards the agricultural benefits
2. Students will be able to explain how plants acquire and use the energy and material resources needed to complete their life cycle, highlighting relationships between structure and function, and coordination of development, resource acquisition and environmental responses within and across cells, tissues and organs.
3. To know the general process of photosynthesis in all the plants on the earth and know the efficient plant, as higher photosynthesis leads to higher productivity
4. To know the general metabolism in plants such as respiration, lipid biosynthesis and other key process such as nitrogen metabolism

**Course title: Plant Biotechnology and Genetic Engineering of Plants**

**Course Code: Bot-452**

### **Course Outcomes:**

1. Acquaint students with the enormous diversity that microbes exhibit and equip them with the understanding of their structure and biology.
2. Understand mechanisms by which organisms interact with other organisms and with the environment.
3. Describe biotic and abiotic factors and appreciate inter-relationship between organisms in communities.
4. Understand concerns with the manipulation of genetic material for improvement of bioresources for human welfare.
5. Help students learn the science and basic techniques of genetic manipulation and educate them with the scope of the subject.

**Course title: Dissertation**

**Course Code: Bot-453**

**Course Outcome:**

1. To give laboratory training to students.
2. Students will be able to handle research problems independently.
3. Vigorous laboratory training will help students to boost their research carrier.  
Dissertation work is important component for admission in PhD course.

**Course title: Stress Biology**

**Course Code: Bot-454**

1. Studies on the physiology and mechanism of induction of abiotic stresses in plants with particular reference to deficiencies and toxicities of metals, ozone, salt stress water stress, and methods to overcome these stresses.
2. Aware students for the production of improved transgenic varieties via regulating osmolytes and to know about GM crops and strategies for its tolerance.
3. Methods for tolerance against biotic stress via signaling molecules such as salicylic acid and jasmonic acid and role display by alkaloid
4. To aware the students regarding the phytohormones and their implication towards agricultural point of views.

**Course title: Forest Ecology-II**

**Course Code: Bot-455**

**Course Outcomes:**

1. Paper describes various forests of India in general and Jammu and Kashmir in particular.
2. Paper highlighted forest policies of the India and J&K state.
3. Paper provides information on various factors responsible for forest ecosystem.
4. It also deals with the different issues, policies and laws related to the management and conservation.

**Course title: Plant Biotechnology-II**

**Course Code: Bot-456**

**Course Outcomes:**

1. The course is intended to impart to students essential knowledge pertaining to use of plant resources in fulfilling the demand of increasing population.
2. Provide essential knowledge and cutting edge practical methodologies that are fundamental to the study of plants.
3. Demonstrate the need of high throughput technologies over conventional methods for plant improvement.
4. Demonstrate the strategies and measures for manipulation of genome by incorporating desirable genes pertaining to specific traits.
5. Intends to give students an understanding of plants (crop) yield and stress tolerance.
6. Explain the measures in transforming plants with desired traits for quality improvement through biotechnological interventions.

**Course title: Biodiversity and Conservation- II**

**Course Code: Bot-457**

**Course Outcomes:**

1. The course is intended to impart to students essential knowledge pertaining to loss of biodiversity and threats it faces.
2. Explain the consequences of human activity (current economic and social issues) on the loss of biodiversity.
3. Demonstrate the strategies and measures in place for the conservation of biodiversity.
4. Explain the conservation and management of biodiversity at global level and the role of Conservation Organisations as well.
5. Understand the legislative implications for the conservation and management of biodiversity in India.

**Course title: Lab Course based on Bot-454, Bot-455, Bot-456 , Bot-457**

**Course Code: Bot-460**

**Course outcomes:**

1. To elucidate students with basic training of plant tissue culture.
2. Students will learn different techniques pertaining to plant biotechnology.
3. Demonstrate practical skills in different laboratory equipment's and their handling.
4. The objective of this laboratory course is to provide practical skills on basic genetic engineering techniques.
5. Train students with basic techniques in Genetic Engineering.

**Course title: Lab Course based on Bot-451, Bot-452**

**Course Code: Bot-461**

**Course outcomes:**

1. The objective of this laboratory course is to provide the students practical skills in discipline centric electives.
2. The objective of this course is to familiarize students with the basic concepts and applications of modern techniques used in Cell and Molecular Biology.

3. The students will be able to understand the principle and working of different centrifugation techniques.
4. The students will be able to understand the principle and working of different Electrophoretic and molecular biology techniques.

## **M. Phil Botany**

### **Program outcomes (PO's) of M. Phil Botany Program**

#### **PO1: Deeper understanding**

To have a deeper understanding of a subject by the student for its application in addressing societal and scientific issues

#### **PO2: Research and development**

To prepare students for research and development in respective areas

#### **PO3: Problem solution**

Problem solving by applying reasoning and technical inputs

#### **PO4: Environment and sustainable development**

To study and understand the impact of development on environment safety and its significance for sustainable ways of development

#### **PO5: Lifelong learning**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **PO6: Leadership and self-reliance**

Impart leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Program Specific Outcomes (PSO's) of M. Phil Botany Program**

Upon successful completion of the M.Phil Botany course, the students will be able to:

7. Keep pace with the expanding frontiers of knowledge and provides research training relevant to the present social and economic objectives of the country.
8. Use the scientific methods, and critical thinking skills for solving the problems.
9. Write a good research report and acquires the skill of data presenting.
10. Follow a protocol independently, perform lab procedures more precisely and accurately perform independently all experimental procedures.
11. Analyze experimental results to make a clear distinction between expected and unexpected results and perform trouble shooting, wherever necessary.
12. Demonstrate proficiency in maintaining a safe work place, including observation of lab safety procedures, use of equipment, identification hazards and proper disposal of commonly used chemicals and bio-hazardous materials.
13. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.

**Course Title: Research Methodology & Techniques**

**Course Code: M.Phil Bot-1**

**Course outcomes:**

1. To develop understanding of the basic framework of research process.
2. To develop an understanding of various research designs and techniques.
3. To identify various sources of information for literature review and data collection.
4. To develop an understanding of the ethical dimensions of conducting applied research
5. Appreciate the components of scholarly writing and evaluate its quality.

**Course Title: Lichen Systematics techniques & importance**

**Course Code: M.Phil Bot-2**

**Course outcomes:**

1. The course enables the students to understand the basic and advanced concepts of lichen taxonomy and their extension to field studies.
2. Teach students identification, structure, function and ecology of lichens.
3. Demonstrate the use of lichens as economically important organisms
4. Develop hands-on approaches to study lichens populations and their growth forms in the surrounding environment.

**Course Title: Modern Biology**

**Course Code: M.Phil Bot-3**

**Course outcomes:**

1. To impart theoretical knowledge on various techniques of plant biotechnology like tissue culture, plant genetic transformation and their application in industries.
2. To develop concepts, principles and processes in plant biotechnology.
3. Students will know about different types of plant tissue culture.
4. Elucidation of different methods for the improvement of plants, including plant taste, texture, fruit ripening, sweetness etc.

**Course Title: Microbiology, Mycology & Plant Pathology**

**Course Code: M.Phil Bot-4**

**Course outcomes:**

1. Make students understand the diversity in structure and functioning of prokaryotes.
2. Make students understand the diversity, structure and reproduction in the kingdom Fungi.
3. To provide an insight to the students about the technique to isolate and identify fungi and maintain them in pure cultures
4. Study the diseases caused by biotic and abiotic agent in plants.
5. Study the mechanism of disease development by pathogens.
6. Understand the interaction between plant and pathogen in relation to the overall environment.
7. Demonstrate an understanding of the principles of plant pathology and the application of these principles for the control of plant disease.
8. Demonstrate skills in laboratory and field related to mycology and plant pathology.

**Pre Ph. D Botany**

**Program outcomes (PO's) of Pre Ph.D Botany Program**

**PO1: Deeper understanding**

To have a deeper understanding of a subject by the student for its application in addressing societal and scientific issues

**PO2: Research and development**

To prepare students for research and development in respective areas

**PO3: Problem solution**

Problem solving by applying reasoning and technical inputs



**PO4: Environment and sustainable development**

To study and understand the impact of development on environment safety and its significance for sustainable ways of development

**PO5: Lifelong learning**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PO6: Leadership and self-reliance**

Impart leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

**Program Specific Outcomes (PSO's) of Pre Ph. D Botany Program**

Upon successful completion of the Pre Ph. D Botany course, the students will be able to:

1. Keep pace with the expanding frontiers of knowledge and provides research training relevant to the present social and economic objectives of the country.
2. Use the scientific methods, and critical thinking skills for solving the problems.
3. Write a good research report and acquires the skill of data presenting.
4. Follow a protocol independently, perform lab procedures more precisely and accurately perform independently all experimental procedures.
5. Analyze experimental results to make a clear distinction between expected and unexpected results and perform trouble shooting, wherever necessary.
6. Demonstrate proficiency in maintaining a safe work place, including observation of lab safety procedures, use of equipment, identification hazards and proper disposal of commonly used chemicals and bio-hazardous materials.
7. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.

**Course Title: Research Methodology and Techniques**

**Course Code: Pre-Ph.D Bot-1**

**Course outcomes:**

1. To develop understanding of the basic framework of research process.
2. To develop an understanding of various research designs and techniques.

3. To identify various sources of information for literature review and data collection.
4. To develop an understanding of the ethical dimensions of conducting applied research
5. Appreciate the components of scholarly writing and evaluate its quality.

**Course Title: Modern Biology**

**Course Code: Pre-Ph.D Bot-2**

**Course outcomes:**

1. To impart theoretical knowledge on various techniques of plant biotechnology like tissue culture, plant genetic transformation and their application in industries.
2. To develop concepts, principles and processes in plant biotechnology.
3. Students will know about different types of plant tissue culture.
4. Elucidation of different methods for the improvement of plants, including plant taste, texture, fruit ripening, sweetness etc.

**Course Title: Origin, evolution & utility of plant resources Course Code: Pre-Ph.D Bot-3**

**Course outcomes:**

1. Paper will help to understand different kinds of bioresources.
2. Evolution and domestication (how domestication started)
3. It will help to understand the beginning of agriculture and its diversification and Centre of origin of different bioresources.
4. As paper directly related with the various bioresources it will also make student aware about the different types of bioresources e.g. in service of mankind (as medicine, as fuel, as fodder, as timber, as fiber, as dye yielding plants, as bio flavour, bio-gum, bio preservatives and as bio-cosmetics)
5. Paper also projects the use of bioresources for bioprospection

## **Programme: M. Sc. ZOOLOGY**

### **Programme Outcome:**

#### **1. Deeper understanding**

To have deeper understanding of a subject for its application in addressing social and scientific issues

#### **2. Research and development**

To prepare students for research and development in respective areas

#### **3. Problem solution**

#### **4. Problem solving by applying reasoning and technical inputs**

#### **5. Environment and sustainable development**

To study and understand the impact of development on environment safety and its significance for sustainable ways of development.

#### **6. Lifelong learning**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **7. Leadership and self-reliance**

Impact leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Programme specific outcomes:**

Upon successful completion of the M.Sc. Zoology programme, the students will be able to:

1. Use the scientific methods, and critical thinking skills to ask questions and solve problems
2. Follow a protocol independently, including locating materials and equipment, practicing good lab procedures and accurately performing all experimental procedures.
3. Analyze experimental results, differentiating between expected and unexpected results, trouble shooting, interpreting results and making conclusions.
4. Demonstrate proficiency in maintaining a safe workplace, including observation of lab safety procedures, use of personal protective equipment, identification hazards and proper disposal of commonly used chemicals and biohazardous materials.
5. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.

**Course Title: Principles of Animal Taxonomy**

**Course Code: Zol-150**

**Course Outcome:**

1. The course is designed to make students aware of the great diversity displayed by animals around us.
2. Prepare the students theoretically and practically to study and analyze this diversity scientifically.
3. The theoretical background of systematics and taxonomy will go long way in elucidating the natural grouping of animals which exists in the biodiversity around us and also help in sustained utilization of bioresources for human welfare.
4. Students will learn how to identify, classify and place an organism in a correct order.

**Course Title: Animal resources and their Utilization**

**Course Code: Zol-151**

**Course outcome**

1. Since the dawn of civilization, humankind realized the importance of animals, domesticated them and utilized their services in one way or the other.
2. The present course is designed to acquaint students with the biology of these animals, their management and judicious utilization based on scientific principles.
3. Provides students with a broad background in domestic animal biology.
4. The course focuses on animal products and their management.

**Course Title: Invertebrates: structure and function**

**Course Code: Zol-152**

**Course Outcome:**

1. In keeping with the enormous diversity of form in animals, the course has been designed to provide the students with sufficient information about how the structure of organs and organ systems is correlated with their function.
2. The course has been designed to provide understanding of structure-function complementarities of invertebrates which will build edifice for undertaking studies on their biology and utilization.
3. Mechanism & significance of hydrostatic skeleton in movements.
4. Reproduction, larval forms and Nervous system of invertebrates.

**Course Title: Cell Biology**

**Course Code: Zol-153**

**Course outcome:**

1. The present course has been devised to familiarize students with the basic unit of life, the cell and its different organelle, particularly with structural and functional aspects.
2. Knowing the components of cells and how they work is fundamental to all biological sciences
3. Students will understand structure and function of different cell organelles.
4. Students will be able to understand the cyclic events of cell division and types of cell division.
5. Will understand cell signaling and processes of cell death and cellular aging.

**Course Title: Molecular Biology**

**Course Code: Zol-154**

**Course Outcome:**

1. The course has been devised to familiarize students with various macromolecules (DNA, RNA)

- within the cell: their structure, regulation and interactions.
2. To gain an understanding of chemical and molecular processes that occurs in and between cells.
  3. To gain insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.
  4. Will be able to design and implement experimental procedures using relevant techniques.

**Course Title: Elements of Toxicology**

**Course Code: Zol-155**

**Course outcome:**

1. The course is designed to help students in understanding influence of toxic elements on the environment and human health.
2. To know about the different sources that causes air, water and noise pollution.
3. To gain an understanding about radiations and their impact on human health.
4. Acquainted with effects of water pollution on human and animal health.

**Course Title: Lab course on Animal Taxonomy and**

**Course Code: Zol-160**

**Course Outcome:**

1. The objective of this laboratory course is to provide the students practical skills in basic Taxonomy and Bioresources.
2. Students will learn different techniques of rearing useful animals
3. Enable students to acquire expertise in the field of Taxonomy and Applied Biology.
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course Title: Lab course on Cell Biology and Elements of Toxicology**

**Course Code: Zol-161**

**Course Outcome:**

1. The objective of this laboratory course is to provide the students practical information about different microscopes
2. Enable students to acquire expertise in the field of Toxicology and cell biology.
3. Demonstrate practical skills in different laboratory equipment's and their handling.
4. Identify and enlist the different types of contaminants and their sources, that pollute the air.

**Course Title: Lab course on Invertebrates:  
Structure & Function and Molecular Biology**

**Course Code: Zol-162**

**Course Outcome:**

1. The objective of this laboratory course is to provide the students practical skills in molecular biology and invertebrates.
2. Students will learn different techniques of molecular biology
3. Enable students to acquire expertise in the field of Molecular biology
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course Title: Vertebrates: structure and function**

**Course Code: Zol-250**

**Course outcome:**

1. In keeping with the enormous diversity of form in animals, the course has been designed to provide the students with sufficient information about how the structure of organs and organ systems is correlated with their function.
2. The course has been designed to provide understanding of structure-function complementarities of Vertebrates which will build edifice for undertaking studies on their biology and utilization.
3. Students will learn comparative anatomy of gastrointestinal tract in vertebrates.
4. Will know about Nervous system and sense organism vertebrates.

**Course Title: Genetic Engineering**

**Course Code: Zol-251**

**Course outcome**

1. Genetic Engineering involves manipulation of genetic material for improvement and value addition of bioresources.
2. This course will help students to learn the basic techniques of gene manipulation.
3. To gain an understanding about the process of recombinant DNA technology.
4. How gene therapy is applied to overcome diseases.

**Course Title: Fundamentals of Biochemistry**

**Course Code: Zol-252**

**Course outcome**

1. The course is designed to make students learn the chemical nature of biomolecules and their involvement in chemical reactions in living cells in order to maintain homeostasis.
2. Students will acquaint with the knowledge of Enzymes: classification, nomenclature, mechanism of action.
3. Oxidation of lipids: beta oxidation, oxidation of unsaturated and odd chain fatty  
a. acids and formation of ketone bodies.
4. Biosynthesis of essential (leucine, isoleucine and valine) and non-essential  
a. (alanine, asparagine and glutamine) amino acids.

**Course Title: Bioinformatics and Biostatistics**

**Course Code: Zol-253**

**Course outcome**

1. Mathematics and statistics are making deep in - roads into biology and it is therefore necessary to provide sound foundations of these subjects to students who can build on these later in life.
2. Evolution of computers; different generations of computers; classification of Computers.
3. Statistics: definition, history, applications and limitations; concept of Biometry, population and sample.
4. Introduction to bioinformatics, skills, application and uses.

**Course Title: Lab course on Structure & Function  
of Vertebrates & Bioinformatics and Biostatistics**

**Course Code: Zol-260**

**Course Outcome:**

1. The objective of this laboratory course is to provide some practical skills pertaining to vertebrate structure and functions.
2. The objective of this laboratory course is to provide practical skills on basic Bioinformatics.
3. Students will learn different species of vertebrates
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course Title: Lab course on Genetic Engineering & Biochemistry**

**Course Code: Zol-261**

**Course Outcome:**

1. The objective of this laboratory course is to provide practical skills on basic genetic engineering techniques.
2. Train students with basic techniques in Genetic Engineering.
3. Students will learn basic steps of cloning
4. Demonstrate practical skills in different laboratory equipment's and their handling.

**Course Title: Animal Biotechnology**

**Course Code: Zol-350**

**Course Outcome:**

1. Human population is increasing at fast rate.
2. The resources required to sustain the ever increasing population are not increasing at the same pace. Conventional methods for animal improvement are not able to deliver fully.
3. Manipulation of genome by incorporating desirable genes is the option available. This course is intended to give some idea to students how animal bioresources can be improved through biotechnology.
4. Introduction to stem cells, stem cell systems: basic principles and methodologies.

**Course Title: Animal Resources: Assessment and Conservation**

**Course Code: Zol-351**

**Course Outcome:**

1. The present course is based on the realization of the importance of domesticated and wild animals for meeting various needs of mankind.
2. Economic importance of fishes; larvivores fishes and public health; important cold water fish resources.
3. Important wild life species in different regions of India, endangered and endemic wildlife species of India.
4. Biodiversity-its measurement, assessment and conservation, Major threats to biodiversity: Habitat loss, poaching of wildlife, biological invasions.

**Course Title: Biology of Immune System**

**Course Code: Zol-352**

**Course outcomes:**

1. This course introduces students to molecular and cellular components of the immune system.
2. How the immune system protect from the pathogens by discriminating self from non-self antigens, thereby keeping the individuals healthy.
3. The major emphasis of this course will be on the development of the immune system and mechanisms by which our body elicit the immune response. This will be imperative for the students as it will help them to think like an immunologist and predict about the nature of immune response that develops against bacterial, viral or parasitic infection, and prove it by designing new experiments.
4. Students are able to understand basic concepts of Immunology, properties of immune system and types of immunity.
5. Elucidation of immunodiagnostic procedures and monoclonal antibodies.

**Course Title: Cytogenetics****Course Code: Zol-353****Course Outcome:**

1. The course is designed to make students aware about the structure and functions of chromosomes and chromosomal aberrations both numerical and structural.
2. It will help the students understand and appreciate the anomalies in the chromosomal behavior and their impact on the survival of species.
3. Genic balance theory of sex determination.
4. Students will be understand basics of Molecular Cytogenetic.

**Course Title: Embryology and Histology****Course Code: Zol-354****Course Outcome:**

1. The course is designed to familiarize the students a brief understanding of the tissue and embryo.
2. Study of tissues and embryo can be useful as they can understand the intricacies of the tissue and organs formed during the development.
3. Study Elements of Embryology
4. Study Tools and techniques in Histology.

**Course Title: Principles of Parasitology (Elective)****Course Code: Zol-355****Course Outcome:**

1. The course has been designed to understand the parasite biology, life cycles, host–parasite relationship, environmental and host factors regulating parasitic diseases and to recognize the general outlines of parasite treatment and control.
2. Study Parasite and host relationship; parasitic adaptations and parasitic Zoonoses.
3. Study Protozoology and helminthology
4. Study Parasite Biochemistry and Immunology.

**Course Title: Insect Morphology & physiology (Elective)****Course Code: Zol-356**



**Course Outcome:**

1. The course has been designed to provide students with sufficient information about the morphology, diversity and physiology of insects which form the basis for undertaking entomological studies by the students subsequently.
2. Students will learn General structure of insect body.
3. Study Digestive, Excretory, Circulatory and Respiratory system.
4. Learn Nervous and Reproductive system and Sense organs.

**Course Title: Elements of Ichthyology (Elective)****Course Code: Zol-357****Course Outcome:**

1. The course has been designed to provide students sufficient information regarding fish classification.
2. Structure and adaptation to various ecological conditions along with feeding, nutrition and reproduction so that they can appreciate the significance of this fascinating and useful group of aquatic animals.
3. Study Morphology and Anatomy of digestive, respiratory and circulatory systems of Fishes.

**Course Title: Lab course based on Animal Biotechnology,  
Biology of Immune System and Embryology & Histology****Course Code: Zol-360****Course Outcome:**

1. The objectives of this laboratory course are to make students develop an understanding about practical aspects of the components of the immune system as well as their function.
2. Basic as well as advanced methods will be taught to detect different antigen and antibody interactions, isolation of different lymphocyte cells etc. and how they can be used in respective research work.
3. Students will also be acquainted with techniques in Animal Biotechnology.

**Course Title: Lab exercises based on Elective course,  
Animal Resources, Threats & Conservation & Cytogenetics****Course Code: Zol-361****Course Outcome**

1. The objective of this laboratory course is to provide some practical skills pertaining to Cytogenetics
2. The objective of this laboratory course is to provide practical skills on Human resource development and capacity building
3. Demonstrate practical skills in different laboratory techniques and field surveys methodology
4. The objective of this laboratory course is to provide some practical skills pertaining to different parasites, fishes and insects
5. The objective of this laboratory course is to provide collection and preservation techniques of Parasites and insects
6. Students will learn dissection methodology and anatomical features

**Course Title: Ecology and Environmental Biology**

**Course Code: Zol-450**

**Course Outcome:**

1. The course is designed to help students in understanding principles of ecology, environmental biology, and the relationship between man and nature.
2. Students will learn Ecology: Autecological and Synecological concepts.
3. Study Community Dynamics.
4. Study Major vegetations and soil types of the world.

**Course Title: Animal Physiology**

**Course Code: Zol-451**

**Course Outcome:**

1. The course has been designed to make students understand the functioning of organs/ systems of animals so that students can further appreciate the knowledge of biochemistry and endocrinology acquired during the previous/current semesters.
2. Introduction to animal physiology, scope and significance. Body organization.
3. Study Digestion: Types of digestion, ingestion, motility of alimentary canal (Peristalsis and control of motility).
4. Study Respiratory and Circulatory systems.

**Course Title: Fundamentals of Endocrinology**

**Course Code: Zol-452**

**Course Outcome:**

1. The course is designed to afford the student a broad understanding of the important branch of animal physiology.
2. A comparative approach is useful to understand as to how different hormones regulate a particular physiological activity, irrespective of their diversity in order to maintain homeostasis.
3. Besides this, adequate knowledge of endocrinology is quite imperative because it constitutes a very vital field of contemporary human medicine.
4. Study Endocrine glands-structure and function-II Adrenals and Gonads.

**Course Title: Project Work**

**Course Code: Zol-453**

**Course Outcome:**

1. To give Field and laboratory training to students.
2. Students will be able to handle research problems independently.
3. Vigorous field and laboratory training will help students to boost their research carrier.
4. Dissertation work is important component for admission in Mphil and Ph.D course.

**Course Title: Fundamentals of Nematode Genomics (Elective)**

**Course Code: Zol-454**

**Course Outcome:**

1. The principal objective of this course is to impart knowledge about basics of nematode genomics.
2. In addition it will enable students to comprehend, analyze, evaluate and intelligently critique different aspects in this field and appreciate the nematodes as an important organism.
3. Students will learn General structure and morphology of nematodes, general taxonomic characters involved in identification of nematodes.
4. Students will learn Functional genomics: DNA barcoding and phylogenetic analysis.

**Course Title: Human Genetics (Elective)****Course Code: Zol-455****Course Outcome:**

1. The course is designed to afford the student a broad understanding of the important branch of genetics.
2. Study of human genetics can be useful as it can answer questions about human nature, understand the diseases and development of effective disease treatment and to better understand and improve the quality of human life.
3. Students will be acquainted with Behavioral and Clinical Genetics.
4. Students will be exposed with Population Genetics.

**Course Title: Wildlife Biology, Conservation (Elective)****Course Code: Zol-456****Course Outcome:**

1. There is a growing need for knowing what wildlife means and what is its importance in the balance of nature.
2. The course has been designed to convey the information regarding wildlife in India to desirous students so that they can understand its management along biological lines and the techniques associated with it.
3. Introduction and history of wildlife conservation: Global and Indian perspectives.
4. Gene banks, ex-situ and in-situ conservation.

**Course Title: Lab course based on Ecology & Environment  
Biology and Elective papers****Course Code: Zol-460****Course Outcome**

1. The objective of this laboratory course is to provide some practical skills on ecological and environmental studies
2. Students will learn different conservation techniques of saving wild fauna and flora
3. Students will learn how to handle small creatures like nematodes and studying their different morphological and genetic features.
4. Identification of avian fauna of Rajouri region.

**Course Title: Lab course on Animal Physiology and  
Fundamentals of Endocrinology****Course Code: Zol-461**

## **Course Outcome**

1. The objective of this laboratory course is to provide some practical skills on different endocrine organs like making of permanent slides of different endocrine tissues.
2. Students will learn different stages during the embryonic development.
3. Students will learn how to become self-reliant on making diagnostic laboratories.
4. Recording of blood pressure using sphygmomanometer.

## **M. Phil Zoology**

### **Programme Outcome:**

1. Deeper understanding: To have deeper understanding of a subject for its application in addressing social and scientific issues
2. Research and development: To prepare students for research and development in respective areas
3. Problem solution: Problem solving by applying reasoning and technical inputs
4. Environment and sustainable development: To study and understand the impact of development on environment safety and its significance for sustainable ways of development.
5. Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
6. Leadership and self-reliance: Impact leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Programme specific outcomes:**

Upon successful completion of the M.Phil. Zoology course, the students will be able to:

1. Keep pace with the expanding frontiers of knowledge and provides research training relevant to the present social and economic objectives of the country.
2. Use the scientific methods, and critical thinking skills to ask questions and solve problems.
3. Write a good research report and acquires the skill of presenting data in graphical form.
4. Follow a protocol independently, including locating materials and equipment, practicing good lab procedures and accurately performing all experimental procedures.

5. Analyze experimental results, differentiating between expected and unexpected results, trouble shooting, interpreting results and making conclusions.
6. Demonstrate proficiency in maintaining a safe work place, including observation of lab safety procedures, use of personal protective equipment, identification hazards and proper disposal of commonly used chemicals and biohazardous materials.
7. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.
8. Identify carriers in biotechnology and skills required for landing a job.
9. Work in a government-based entity such as Universities, research institutes or at private centers as research scientists/assistant in the native country and outside as well.

**Course Title: Research methodology**

**Course Code: Paper**

**I**

**Course Outcome:**

1. To develop understanding of the basic framework of research process.
2. To develop an understanding of various research designs and techniques.
3. To identify various sources of information for literature review and data collection.
4. To develop an understanding of the ethical dimensions of conducting applied research
5. Appreciate the components of scholarly writing and evaluate its quality.

**Course Title: Animal Biotechnology**

**Course Code: Paper II**

**Course Outcome:**

1. To develop understanding of the basic techniques of biotechnology and Genetic engineering .
2. To prepare study invitro cell, tissue and organ cultures
3. To train the students in gene therapy applications
4. Students will learn Molecular techniques for disease diagnosis.

**Course Title: Immunology, Microbiology and Biochemistry**

**Course Code: Paper III**

**Course Outcome:**

1. To impart theoretical knowledge on various techniques of Microbiology and immunology
2. To learn and train new modern laboratory techniques like PCR, ELISA, gel Doc
3. To visualize the important cell membrane structures by using different techniques and protocols.
4. To study Structure of proteins, primary, secondary, tertiary and quaternary.

## **Ph.D Programme (Zoology)**

### **Programme Outcome:**

#### **1. Deeper understanding**

To have deeper understanding of a subject for its application in addressing social and scientific issues

#### **2. Research and development**

To prepare students for research and development in respective areas

#### **3. Problem solution**

Problem solving by applying reasoning and technical inputs

#### **4. Environment and sustainable development**

To study and understand the impact of development on environment safety and its significance for sustainable ways of development.

#### **5. Lifelong learning**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **6. Leadership and self-reliance**

Impact leadership abilities to the students to lead and excel in their respective fields. Also, the training will make students self-reliant.

### **Programme specific outcomes:**

Upon successful completion of the Ph.D Zoology course, the students will be able to:

1. Keep pace with the expanding frontiers of knowledge and provides research training relevant to the present social and economic objectives of the country.
2. Use the scientific methods, and critical thinking skills to ask questions and solve problems.

3. Write a good research report and acquires the skill of presenting data in graphical form.
4. Follow a protocol independently, including locating materials and equipment, practicing good lab procedures and accurately performing all experimental procedures.
5. Analyze experimental results, differentiating between expected and unexpected results, trouble shooting, interpreting results and making conclusions.
6. Demonstrate proficiency in maintaining a safe work place, including observation of lab safety procedures, use of personal protective equipment, identification hazards and proper disposal of commonly used chemicals and biohazardous materials.
7. Demonstrate improvement in communication skills, including maintenance of laboratory notebooks, oral presentations and written reports.
8. Identify carriers in biotechnology and skills required for landing a job.
9. Work in a government-based entity such as Universities, research institutes or at private centers as research scientists/assistant in the native country and outside as well.

**Course Title: Research methodology**

**Course Code: Paper I**

**Course Outcome:**

1. To develop understanding of the basic framework of research process.
2. To develop an understanding of various research designs and techniques.
3. To identify various sources of information for literature review and data collection.
4. To develop an understanding of the ethical dimensions of conducting applied research
5. To learn different statistical methods of data interpretation
6. Appreciate the components of scholarly writing and evaluate its quality

**Course Title: Introduction to general nematology**

**Course Code: Paper II**

**Course Outcome:**

1. To develop understanding of the basic framework of Nematode structure
2. To study different nematode orders
3. To learn the techniques of Nematode identification and fixing
4. To study Principles of sampling for nematodes

## **Programme: MBA (Hospitality and Tourism)**

**PO1: Management knowledge:** Apply the knowledge of Management principles and techniques to the solution of complex Management problems in business organization.

**PO2: Environment Scanning:** to Identify and analyse the potential opportunities and challenges for a business enterprise by scanning the Political, economic, social, Legal and technical environmental factors specific to Tourism Industry.

**PO3: Design/Development of Business models:** Design business models solutions for tourism industry by taking into consideration the public health and safety, and the cultural, societal, and environmental considerations.

**PO4: Skills Enhancement:** interpret practical, theoretical and personal skills required for various management Roles within a variety of various International Hotels and Tourism organization.

**PO5: Strategic Framework:** Synthesise strategic, organizational and marketing processes of a commercial hospitality enterprise within the context of the global nature of the business.

**PO6: Professional Attitude:** Cultivate a professional management attitude by nurturing the creative development of innovative ideas and solution.

**PO7: Sustainability:** Understand the impact of the Business practices in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the Business practices.

**PO9: Team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of global business change.



### **Programme Specific Outcomes Of MBA(H&T):**

**PSO1:** Interpret practical, theoretical and personal skills required for senior management roles with in a variety of international hotel and tourism organisations.

**PSO2:** Synthesise strategic, organisational and marketing processes of a commercial hospitality enterprise within the context of the global nature of business.

**PSO3:** Cultivate a professional management attitude by nurturing the creative development of innovative ideas and solutions and confidentially debate, research and synthesis theories while evaluating organisational learning.

**PSO4:** Critically analyse different multilateral institutions and transnational organisations including an evaluation of their impacts on international tourism and other tangents of tourism management.

## **MBA (Hospitality and Tourism)**

**Course Title: Management Perspective & Organizational Behaviour**

**Course Code: MBAHTM -101**

### **Course outcomes**

**CO1:** This unit provides a systemic and logical way of analysing business decisions based on economic fundamentals.

**CO2:** This unit analysis demand and supply concept , which are key factors in all economic activities.

**CO3:** this unit deals with cost analysis which serves as a basis for management decisions.

**CO4:** this unit deals with market structures, their types and importance to predict market outcomes.

**CO5:** this unit deals with macro economic analysis to gain an insight about the macroeconomic fundamentals critical to the economy of country as a whole.

**Course Title: Managerial Economics**

**Course Code: MBAHTM-102**

### **Course outcomes**

**CO1:** To make students able to understand the meaning of central tendencies & dispersion and to make them capable of finding the various measures of central tendencies & dispersion.

**CO2:** To make students able to understand the concept of correlation & regression analysis for finding the relationship between the variables to predict the future values of one variable on the basis of the past information available on the two variables.

**CO3:** Know about the concept of sampling, its methods, applications and various data sources. Understand the concept of hypothesis and errors involved in hypothesis testing.

**CO4:** test the dependencies of variables through Chi-Square test and to test the significance of differences among the means of the three or more than three samples.

**CO5:** Understand the concept of time series analysis and index numbers and how they can be used.

**Course Title: Statistical Methods**

**Course Code: MBAHTM-103**

### **Course outcomes**

**CO1:** To make students able to understand the meaning of central tendencies & dispersion and to make them capable of finding the various measures of central tendencies & dispersion.

**CO2:** To make students able to understand the concept of correlation & regression analysis for finding the relationship between the variables to predict the future values of one variable on the basis of the past information available on the two variables.

**CO3:** Know about the concept of sampling, its methods, applications and various data sources. Understand the concept of hypothesis and errors involved in hypothesis testing.

**CO4:** test the dependencies of variables through Chi-Square test and to test the significance of differences among the means of the three or more than three samples.

**CO5:** Understand the concept of time series analysis and index numbers and how they can be used.

**Course Title: Basics of Hospitality Management**

**Course Code: MBAHTM-104**

**Course outcomes**

**CO1:** Acquaint with the basics regarding accommodation industry, their classification and organisation.

**CO2:** Get awareness regarding division of work in a hotel.

**CO3:** Understand the qualities of front office staff.

**CO4:** Understand the concept of housekeeping including layout, competencies & duties of housekeeping staff.

**CO5:** Analyse the functioning of restaurant management and make them aware of various food services offered by the industry

**Course Title: Computer Applications in Hospitality and Tourism Industry**

**Course Code: MBAHTM-105**

**Course outcomes**

**CO1:** Understand the basic organization of computer, its components and will gain knowledge of functionalities of different devices in context with the terminals and other hardware elements.

**CO2:** Analyze the concept of automation in hospitality industry by Incorporating the knowledge of computer applications and worldwide web.

**CO3:** Examine the role of Information Technology in Tourism and travel Services like car rentals, railways and airlines.

**CO4:** Understand the importance of promotion of tourism through media Components and use of ICT in various tourism services.

**CO5:** Analyze different topologies of E-Tourism, understand various billing and settlement plans and payment systems included in different E-Tourism Applications.

**Course Title: Communication Skills**

**Course Code: MBAHTM-106**

#### **Course outcomes**

**CO1:** understand the skills and knowledge of communication in the Business environment.

**CO2:** equip the students with the basic tools show to make their Communication effective and suitable based on their professional fields by using persuasive and Professional language in speech and writing.

**CO3:** develop communication skills among the students in such a way that it will help them in communicating effectively across various cultures. It will further help students in learning constructive negotiation and conflict management skills.

**CO4:** Provide knowledge to the students in planning and managing business projects for the business by learning well organized communication strategy.

**CO5:** develop effective business writing skills and to build a knowledge base in writing projects and letters targeted towards mass audience.

**Course Title: Basics of Tourism.**

**Course Code: MBAHTM-220**

#### **COURSE OUTCOMES**

**CO1:** Understand the basic concepts of tourism, basic definitions and the basic terminologies.

**CO2:** Analyses the people's motivation for travel.

**CO3:** Access various factors that affect development of tourism. Also it helps in knowing the various positive and negative impacts of tourism.

**CO4:** Understand the future of tourism development, concept of sustainability, eco-tourism and destination protection helps in new destination development concepts.

**CO5:** Access the role of world organization in development of tourism globally.

**Course Title: Marketing for Hospitality and Tourism**

**Course Code: MBAHTM-221**

## **COURSE OUTCOMES**

**CO1:** To familiarize students with marketing Environment.

**CO2:** To familiarize students with the techniques of marketing Research.

**CO3:** To familiarize students with basic marketing strategies.

**CO4:** To familiarize students with basic marketing strategies specific to Tourism and Hospitality.

**CO5:** To familiarize students with basics of Destination marketing Strategies.

**Course Title: Financial Management and Accounting**

**Course Code: MBAHTM-222**

### **Course outcomes**

**CO1:** the objective of this unit is to give students an Introduction to Financial Management, its meaning, scope and importance.

**CO2:** the objective of this unit is to give students an insight about working capital management, its role and importance.

**CO3:** the objective of this unit is to give students an insight about sources of capital and the various costs associated with raising the capital.

**CO4:** the objective of this unit is to give students an insight about capital budgeting, its techniques and usage.

**CO5:** the objective of this unit is to give students an insight about the accounting techniques and principle

**Course Title: Human Resource Management**

**Course Code: MBAHTM-223**

### **Course outcomes**

**CO1:** Understand the role of Hr practices in the global scenario and to have a strong theoretical understanding of its evolution.

**CO2:** Contribute to the development, implementation and evaluation of employee's recruitment, selection and retention plans and policies.

**CO3:** understand the organizational, societal and individual costs and benefits of training and development. Develop analysis and apply advanced strategies and specifications for the delivery of training programmes.

**CO4:** understand the significance of employee benefits to both employers and employees. Understand the administrative complexities of providing a full array of benefits to employees and the ways and means of delivering these benefits.

**CO5:** Assess the manner in which good employee relations can contribute to business goals and how employee assistance programs can help resolve personal problems that usually interfere with job performance.

**Course Title: Research Methodology and Paper Presentation Skills.**

**Course Code: MBAHTM-224**

**Course outcomes**

**CO1:** to develop & understanding of the basic framework of research process.

**CO2:** to develop & understanding of various research design and techniques.

**CO3:** to identify various sources of information for literature review and data collection.

**CO4:** to develop and understanding of the ethical dimensions of conducting of applied research.

**CO5:** Appreciate the components of scholarly writing and evaluate its quality by using various statistical software's like SPSS

**Course Title: Basics of Tourism and Travel Agencies.**

**Course Code: HT-212**

**Course outcomes**

**CO1:** To familiarize students with the concepts of Strategic Management.

**CO2:** To make them understand the different motivational factors for travel and to familiar with different forms of tourism.

**CO3:** To determine the effect of barriers to tourism growth at domestic and international level.

**CO4:** To make them understand the concept and importance of carrying capacity and sustainable eco-tourism development.

**CO5:** To study the role and functions of international tourism organization.

**Course Title: Tourism Resources of Jammu and Kashmir**

**Course Code: HT-213**

**Course outcomes**

**CO1:** Familiarise students about the conceptual understanding of the nature and scope of tourism products.

**CO2:** Create awareness about the various architectural heritage of India which includes an in-depth understanding about the culture, traditions, customs and handicrafts of India.

**CO3:** Develop knowledge about the various landforms of India with respect to tourism development and have a critical understanding about the conservation, synergy and symbiosis of tourism resources with special references to Jammu and Kashmir.

**CO4:** Have the explicit knowledge about the various wildlife sanctuaries and national parks of India with special reference to Jammu and Kashmir.

**CO5:** Familiarise students about the various religious and socio cultural resources of India with special reference to J&K and provide knowledge about the various tourism policies.

**Course Title: Strategic Management.**

**Course Code: MBAHTM-301**

**Course outcomes**

**CO1:** To familiarize students with the concepts of Strategic Management.

**CO2:** To familiarize students with the micro and Macro Strategic Environment.

**CO3:** To familiarize students with the formulation of strategies.

**CO4:** To familiarize students with the implementation of strategies.

**CO5:** To familiarize students with the strategies specific to Entrepreneurship

**Course Title: Tourism Resources of Jammu and Kashmir**

**Course Code: MBAHTM-303**

**Course outcomes**

**CO1:** Familiarise students about the conceptual understanding of the nature and scope of tourism products.

**CO2:** Create awareness about the various architectural heritage of India which includes an in-depth understanding about the culture, traditions, customs and handicrafts of India.

**CO3:** Develop knowledge about the various landforms of India with respect to tourism development and have a critical understanding about the conservation, synergy and symbiosis of tourism resources with special references to Jammu and Kashmir.

**CO4:** Have the explicit knowledge about the various wildlife sanctuaries and national parks of India with special reference to Jammu and Kashmir.

**CO5:** Familiarise students about the various religious and socio cultural resources of India with special reference to J&K and provide knowledge about the various tourism policies.

**Course Title: Front Office**

**Course Code: MBAHTM-304**

**Course outcomes**

**CO1:** Understand the development of hotel and basic introduction to the tourism industry. Introduction to the front office department of hotel.

**CO2:** Understand modes and sources of reservations, bookings, and computer based reservation system.

**CO3:** Analyses interpersonal skills, interacting with the guests, and knowledge of reception section of hotels.

**CO4:** Handle different unusual situations and the procedures by hotel employs.

**CO5:** Handle accounts in front office section, knowledge of basics of accounts and introduction to different types of transactions that occur between hotels and guests.

**Course Title: Basics of Event Management**

**Course Code: MBAHTM-305**

**Course outcomes**

**CO1:** Apply systematic approach to design, planning, implementation and evaluation of various types of events

**CO2:** Understand various components of MICE and its importance in the tourism industry. It will further help students to apply principles of marketing to the process of event production.

**CO3:** Provide Knowledge about the managing of conferences and the viability of an event during the early stages of planning.

**CO4:** Provide knowledge about the strategies used to raise funds and generate event revenue.

**CO5:** Provide knowledge about application of ICT in event planning and how to coordinate sound human resource management techniques in order to organise and motivate staff.

**Course Title: Tour Guiding & Escorting Skills**

**Course Code: MBAHTM-306**

**Course outcomes**

**CO1:** understand the various concepts related to tours and tour guiding, tour guiding as an emerging business and role and importance of hygiene in conducting operations as a tour guide.

**CO2:** Various techniques used by the tour operators during conduct of the tours and how can he emerge as a leader in the process.

**CO3:** Understand the social responsibilities and their importance in various tour operations.

**CO4:** Understand the various procedures to be carried out for conducting successful tour, planning and organising of tours.

**CO5:** Have an in-depth and practical knowledge about the tour escorting and guiding through exposure to various case studies.

**Course Title: Geography of Tourism and Destination Development.**



**Course Code- MBAHTM-307**

**Course outcomes**

**CO1:** To study the scope, approaches and methodology of tourism geography.

**CO2:** To understand the different physical dimensions of earth and its need in geography of tourism.

**CO3:** Discuss the changes in climatic and weather condition of the world and its impact on tourist destination.

**CO4:** To study the different physical and political features of Indian subcontinent.

**CO5:** Imparting knowledge among the students about the role, importance and need of Destination management.

**Course Title: Tourism Resources & Geography of India**

**Course Code: MBAHTM-401**

**Course outcomes**

**CO1:** To Understand the scope, approaches and methodology of tourism geography.

**CO2:** To understand the different physical dimensions of earth and its need in geography of tourism.

**CO3:** Discuss the changes in climatic and weather condition of the world and its impact on tourist destination.

**CO4:** To study the different physical and political features of Indian subcontinent.

**CO5 :**To study the different physical and political features of world geography.

**Course Title: Travel Agency and Tour Operations**

**Course Code- MBAHTM-402**

**Course outcomes**

**CO1:** knowledge and skills on the operations and management of tour and travel segments of tourism industry including trends and contemporary issues in the travel industry.

**CO2:** knowledge about the various factors influencing the tour operator industry including setting up of travel agencies and legal aspects in travel and tour operations.

**CO3:** knowledge and skills of tour operator's products which includes travel, transfer and accommodation planning.

**CO4:** knowledge about the various active organisations involved in the active development of the travel and tour operations across the globe.

**CO5:** Equip them with skills of how to manage tour and travel related procedures and activities enabling them to become effective managers.

**Course Title: Tour Policy, Planning & Development**

**Course Code: MBAHTM-403**

**Course outcomes**

**CO1:** Expose the students how to formulate the tourism policy.

**CO2:** Discuss the different phases of Indian tourism policy making journey.

**CO3:** Provide Knowledge of making plans and steps of planning for tourism development.

**CO4:** To make the students understand the nature of international tourism agreements.

**CO5:** To critical examine the role and need of public, private partnership in tourism sector.

**Course Title: Tourism Management in India**

**Course Code: MBAHTM-404**

**Course outcomes**

**CO1:** To make student familiar with historical development of tourism and its growth in India.

**CO2:** To discuss the need and essentials of tourism planning for the sustainable growth of tourism industry.

**CO3:** To understand the nature of demand and supply factor in tourism business.

**CO4:** To discuss the critical analysis of different tourism impact on society, culture and environment.

**CO5:** to understand the functions of international tourism institutions and organisations in tourism industry.

**Course Title: Entrepreneurship Development in Hospitality and Tourism**

**Course Code: MBAHTM-405**

**Course outcomes**

**CO1:** understand basic concepts, characteristics and functions of entrepreneurship and need of tourism entrepreneurship.

**CO2:** know about various types of entrepreneurship, various factors that affect growth of entrepreneurship.

**CO3:** understand various governmental and non-governmental organisations working for entrepreneurship.

**CO4:** introduce start-ups, venture promoting, idea generation for prosperous business.

**CO5:** have an empirical knowledge of project development and detailed knowledge about projects, understand project management techniques like PERT, CPM, SWOT analysis.

**Course Title: Food & Beverage Management**

**Course Code: MBAHTM-406**

**Course outcomes**

**CO1:** Understand basics concepts of kitchen planning and operations, role and responsibilities of Kitchen staff in catering industry.

**CO2:** understand various concepts of Menu-planning, designing and merchandising in various catering types of outlets.

**CO3:** Understand about the procedure of food purchasing and storage and stocking methods.

**CO4:** Evaluate various types of services, roles and responsibilities of staff in F&B department. And special service methods.

**CO5:** understand basics and various types of catering establishments: control and performance management

**Course Title: Accommodation Management**

**Course Code: MBAHTM-407**

**Course outcomes**

**CO1:** Understand the basic conception of accommodation industry.

**CO2:** Analyse concept of hotel industry in India and also understand the duties and responsibilities of housekeeping department.

**CO3:** Understand the concept of interior decoration and design as well as operations involved in uniform.

**CO4:** Acquaint with the basic components of managing human resources in hospitality industry.

**CO5:** Evaluate about the emerging trend of the subject of Green hospitality.

## **Programme: MCA**

### **Course Code MC-141**

#### **COURSE OUTCOMES:-**

After completing this course a student:

**CO1:** Should be able to explain the concepts of Sets, Relation and Functions.

**CO2:** Should Know various types of Sets, relations and functions.

**CO3:** Should be able to explain the concept of matrix, its types and various operations on Matrices.

**CO4:** Should be able to explain the concept of proposition, logical connectives and their various properties.

**CO5:** Should be able to explain fundamental principles of counting, the concept of permutation and combination.

**CO6:** Should be able to explain the concepts of Graph, Euler Graph, Planar Graph, Hamiltonian Path and Matrix representation of Graphs.

**CO7:** Should Know some applications of Graph Theory such as Travelling Salesman

Problem. **CO8:** Should be able to Explain the Concept of tree, Kuratowski's Two graphs, Coloring of Graphs and Directed Graphs.

### **Title: Digital Electronics**

#### **Course Code: MC-142**

#### **COURSE OUTCOMES:-**

**CO1.** Students will be able to understand Number Systems, Computer Arithmetic and the Various Coding Schemes.

**CO2.** Students will be able to understand the Logic Gates, Various Logic Simplification Methods and get familiarized with the combinational Circuits.

**CO3.** Students will get to know, the working of different kinds of Flip Flops and their Conversions in-between.

**CO4.** Students will get to understand the Counters (Synchronous and Asynchronous).

**CO5.** Students will be able to know the shift registers and the Data Movements within and between the Registers besides the various logic Families.

**Title: Operating Systems**

**Course Code :MC-143**

**COURSE OUTCOMES:-**

**CO1.** Student will be able to Understand the concepts of Evolution, types and structure of Operating System.

**CO2.** Student will understand the concepts of Process management in Operating System.

**CO3.** Student will be able to understand Inter-process Communication & Synchronization & Deadlocks in Operating System.

**CO4.** Student will be able to understand the memory management concepts like Multiprogramming, Paging, TLB, Segmentation..

**CO5.** Student will be able to understand the memory management concepts like Virtual Memory Demand Paging, Page Replacement algorithms and Disk management concepts

**Title: Principles of Programming & Problem Solving using C**

**Course Code: MC-144**

**COURSE OUTCOMES:-**

**CO1.** Define problem, outline solution, develop the algorithm and test the algorithm for correctness. Acquire knowledge about the basic concept of writing a program.

**CO3.** Understand the role of constants, variables, identifiers, operators, type conversion and why different constructs are available for iteration, such as "for" loops, "do...while" loops.

**CO5.** Identify the difference between iteration and recursion in terms of C programming.

**CO6.** Understand the application of Arrays (Linear & Multi-dimensional), Strings, Functions, Pointers, Recursive Functions.

**CO7.** Develop C programs for different sorting techniques (Bubble Sort, Insertion Sort and Selection Sort).

**CO8.** Understand role of Functions involving the idea of modularity, User defined data types like Structures and Union, Pointers, Array of pointers, Call by Value and Call by Reference.

**CO9.** Develop C programs for File Management

**Title: Lab 1: PC Software**

**Course Code: MC-171**

**COURSE OUTCOMES: -**

**CO1.** Student will able to understand the basic concepts of computers and Disk Operating System. Students will able to perform different DOS commands.

**CO2.** Students will able to identify different windows components and change settings (display, set screen sav- ers, date and time, appearance, etc.). Students will practice handling mouse and typing on keyboard.

**CO3.** Students will be able to understand and practice different word processing options and use them in day to day office related work (letter typing, creating project reports, notices).

**CO4.** Student will understand and practice MS-Excel and able to use it in creating results, analyzing data, etc. students will able to create presentations having animations.

**CO5.** Student will understand the concept of Internet and use browser to explore internet, create Email account, compose, attach files and send Emails.

**Title: Lab 2: C Programming**

**Course Code: MC-172**

**COURSE OUTCOMES:-**

**CO1.** Design algorithms for the given problem specifications.

**CO2.** Write C programs for the designed algorithm specification.

**CO3.** Write C programs to implement Arrays (Linear & Multi-dimensional), Strings, Functions, Pointers, Recursive Functions.

**CO4.** Write C programs to implement using Functions, User defined data types like Structures and Union, Pointers, Array of pointers, Call by Value and Call by Reference.

**CO5.** Write C programs for File Management

**Title: Software Engineering****Course Code: MC-241****COURSE OUTCOMES:-**

**CO1:** This unit explains basic concepts of System Analysis and Design and at the same time introduces Software Engineering along with its challenges. The student shall be acquainted with the difference, similarities and relation among the two subjects.

**CO2:** The student shall be able to know various software process models and the scenarios during which these models suit the best. The student would also be able to perform Software Project Cost Estimation, Project Scheduling and Project Staffing.

**CO3:** The goal of this unit is to acquaint the student to design and develop Software Requirement Specification Document and various techniques of Problem analysis.

**CO4:** The Students will be able to know various concepts of Function oriented approach of System Design along with Module level concepts and notations and charts that are used for developing a function oriented design.

**CO5:** This unit enables the student to develop Object Oriented Software Design and notations and charts that are used for developing the same. This unit also introduces various Software Test Techniques that are used for testing the newly software.

**Title: Computer System Architecture****Course Code: MC-242****COURSE OUTCOMES:-**

**CO1.** Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, addressing modes, instruction set.

**CO2.** Students will be able to explain the working of ALU for addition, subtraction, multiplication and division for signed and floating-point numbers.

**CO3.** Students will be able to explain the working of different types of memory, their advantages and disadvantages.

**CO4.** Students will be able to explain the input-output interface and issues related with data transfer between I/O device and memory.

**CO5.** Student will acquire the knowledge of working of parallel processing.

**Title: Data & File Structures using C++**

**Course Code: MC-243**

**COURSE OUTCOMES:-**

**CO1.** Understand the concept of Data Structure, Abstract Data Type, Arrays & its representation, Operations on Arrays, Sparse Arrays, Pointers, Linked List (Singly, Double & Circular), Operations on Linked List (Traversing, Insertion, Deletion etc.).

**CO2.** Implement a solution for a given Search problem (Linear Search and Binary Search).

**CO3.** For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.

**CO4.** Write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

**CO5.** Implement Graph search and traversal algorithms and determine the time and computation complexity.

**CO6.** Write C++ programs for File Management

**Title: Lab 3: C++**

**Course Code: MC-271**

**COURSE COUTCOMES:-**

**CO1.** Understanding of Object Oriented concepts with knowledge of differentiation between C++, ANSI & standard C.

**CO2.** To demonstrate the concept of class, object constructor, destructor, abstraction, inheritance, and polymorphism. And also different types of variables, functions and operators.

**CO3.** Students will be able to develop programs for implementing different data structures

**CO4.** Gain knowledge of file, streams, Template and exception handling and implement the same.

**Title Lab 4: Data and File Structures using C++**

**Course Code: MC-272**

**COURSE OUTCOMES:-**

**CO1:** Write C++ programs to implement linear data structures: Stack and Queue using arrays and linked list in an application context

**CO2:** Implement Non-linear data structures: Graph, Trees, Hash table in an application context



**CO3:** Implement specific sort algorithms in application context.

**CO4:** Write C++ programs to implement Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort

**CO5:** Write C++ Programs to Implement Graph search and traversal algorithms.

**Title: Choice Based Open Elective**

**Course Code: CBCS**

**COURSE OUTCOMES:-**

**CO1.** Students will be able to understand the basic internal and external components of computer systems and types of information formats such as Text, Audio, Video, and Image.

**CO2.** Students will be able to work with Office Automation such as MS Office, WPS etc.

**CO3.** Students will be aware about Networking, Internet and Computer System Protection.

**CO4.** Students will be able to understand the various types of Communication Systems such as 2G, 3G, Bluetooth, GPRS and Wi-Fi technologies.

**CO5.** Students might be aware and able to work with various Internet Applications such as Social Net Workings and E-Learning resources.

**Title: Analysis & Design of Algorithm**

**Course Code: MC-341**

**COURSE OUTCOMES:-**

**CO1.** For a given algorithm student will able to analyze the algorithms to determine the computational complexity and justify the correctness.

**CO2.** For a given sorting techniques (Count, Radix, Bucket, Merge, Quick) student will able to write algorithm and calculate time complexity.

**CO3.** Student will be able to solve different kind problems using Divide and Conquer algorithm, Greedy approaches and Dynamic programming.

**CO4.** Student will be familiarize with Advance Data Structures such as Hashing and different Hashing techniques.

**CO5.** Student will able to understand, distinguish and solve P, NP and NP-complete problems

**Title: Data Communication & Computer Networks****Course Code: MC-342****COURSE OUTCOMES:-**

**CO1.** Student will be able to understand the Concept of analog and digital signals including encoding techniques.

**CO2.** Student will be able to understand the Concept of conversion techniques line, Digital to Analog, Analog to Digital, Digital to Digital, Analog to Analog.

**CO3.** Student will be able to understand the Concept of techniques involved in Data Link Layer like CSMA/CD, Error detection & error correction.

**CO4.** Student will be able to understand the Concept of Computer Networks like transmission media, Network topologies, Wireless and Network Models like OSI and TCP-IP..

**CO5.** Student will be able to understand the Concept of Network, Transport and Application Layer.

**Title: Relational Database Management System****Course Code: MC-343****COURSE OUTCOMES:-**

**CO1.** Distinguish database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit. The student shall also be able to define the terminology, features, classifications, and characteristics embodied in database systems.

**CO2.** Model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model and also demonstrate an understanding of the relational data model and also Formulate, using relational algebra, solutions to a broad range of query problems.

**CO3.** Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. The students shall know why normalization and what role it plays in the database design process and also its various normal forms 1NF, 2NF, 3NF,BCNF, and 4NF.

**CO4.** Determine the Acid properties (Atomicity, Consistency, Isolation and Durability) of a given Transaction and also explore the various locking protocols and database backup and recovery mechanisms so as to implement the same in the real world.

**CO5.** write various DDL/DML/DCL SQL commands to insert/update/delete data, and query data in a relational DBMS. Students shall solve a broad range of query and data update problems.

**Title: Java Programming**

**Course Code: MC-344**

**COURSE OUTCOMES:-**

**CO1.** Students will be able to understand the features of java and how does work with data types, variables and operators in Java Virtual Machine (JVM) Environment.

**CO2.** Students shall be able to work with Arrays, Use of Control Statements and Fundamentals of Class & Objects.

**CO3.** Students will be to implement the features of Inheritance, Packages, Interfaces and Exception Handling in Java programming.

**CO4.** Students shallt be able to program with multithreading programming style, Lang Package and Handling of Strings in Java.

**CO5.** Students shall be able to program with Input Output (I/O) Streams and development of Applets

**Title: Lab 5: Relational Database Management System**

**Course Code: MC-371**

**COURSE OUTCOMES:-**

**CO1:** Student shall be able to write various DDL/DML/DCL SQL commands to insert/update/delete data in/from the table(s).

**CO2:** Student shall be able to write various queries to extract the data from the table(s) based on the problem in hand.

**CO3:** Student shall be able to Implement locking techniques on the databases.

**CO4:** Student shall be able to write various PL/ SQL Blocks to work on Functions, Cursors, and Triggers.

**Title: Lab 6: Java Programming**

**Course Code: MC-372**

**COURSE OUTCOMES:-**

**CO1.** The Technical and Programming skills of students will develop in java programming.

**CO2.** Students will be able to develop the Application Software.

**CO3.** Students will be able to work with pure object oriented programming environment.

**CO4.** Students will be able to develop multi-threaded Application Programs.

**CO5.** Students will be able to work with Applets.

**Title: Theory of Computation**

**Course Code: MC-441**

**COURSE OUTCOMES:-**

**CO1.** Students will be aware about the concepts of Automaton Theory and Formal Languages such as Alphabets, Strings and Regular Expressions.

**CO2.** Students might be able to understand the working of different types of Finite Automaton and these models such as Mealy and Moore Machine.

**CO3.** Students will be aware about the Grammars of Automaton and its normal forms.

**CO4.** Students will be able to understand the concept of Context Free Language and Pushdown Automaton.

**CO5.** Students might be aware about the concepts of Turing Machines and its various types and applications.

**Title: Dot Net Technologies using C#**

**Course Code: MC-442**

**COURSE OUTCOMES:-**

**CO1.** Student will be able to understand the concept of .NET Framework and its architecture.

Student will be able to develop small application using controls present in Visual Studio.

**CO2.** Student will be able to understand the basic concepts of C# programming language and implement OOPs concepts in C#.

**CO3.** Students will be able to understand and implement the concept of event handling using delegates in C#.

**CO4.** Student will be familiarizing with the concept of String manipulations, Generics and threading in C#. Student will also be able to handle exceptions generated by different errors.

**CO5.** Student will be able to work with different databases, retrieve, manipulate and view data in different data controls using ADO.

**Title: Minor Project**

**Course Code: MC-443**

**COURSES OUTCOMES:-**

**CO1.** The students will be carrying out the project within the department.

**CO2.** The students will be able to learn and have a feel on hands-on Project in which he will be made based on his/her understanding on the Analysis and design of the problem.

**CO3.** This exercise will help the student to be ready for the Major Project in 6th Semester of MCA Programme.

**Title: Management Information System**

**Course Code: MC-444**

**COURSE OUTCOMES:-**

**CO1:** Understand and implement the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making.

**CO2:** Analyze and Evaluate the Information System Resources like (People, Hardware, software, Data, Network) and the Strategic uses of Information technology

**CO3.**Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives and Effectively communicate strategic alternatives to facilitate decision making.

**CO4:** System Development and life cycle of Management Information System and the requisite testing strategies.

**CO5:** Evaluate the Management challenges and security issues to tackle the information system issues and concerns.

**Title: Operations Research**

**Course Code: MC-445**

**COURSE OUTCOMES:-**

**CO1.** For a given optimization problem, students will be able to solve it using graphical and simplex methods and other techniques.

**CO2.** For a given transportation problem and assignment problems, students will be able to solve these problems using MODI method and Hungarian method respectively.

**CO3.** Student will be able to solve different kind of problems using Game theory and replacement theory.

**CO4.** Student will be familiarized with queuing problems and queuing models.

**CO5.** Student will be able to understand project management using CPM and PERT techniques.

**Title: Wireless & Mobile Communication**

**Course Code: MC-446**

**COURSE OUTCOMES:-**

**CO1.** Students will be able to explain different wireless technologies, their applications and future trends.

**CO2.** Students will be able to explain the working of cellular networks, frequency reuse, handoff techniques etc.

**CO3.** Students will be able to explain the wireless transmission concepts such as antennas, Modulation techniques, and spread spectrum etc.

**CO4.** Students will be able to understand and explain the CDMA technology concepts.

**CO5.** Students will be able to understand and explain the GSM technology concepts.

**Title: Simulation & Modeling**

**Course Code: MC-447**

**COURSE OUTCOMES:-**

**CO1.** Identify the different approaches used in designing the simulation models.

**CO2.** Implement the input modeling using different design strategies.

**CO3.** Analyze different types of simulation output.

**CO4.** Understand different types of Queuing models and Random Number Generation.

**CO5.** Write Programs in GPSS for various simulations e.g., Simulation of a Supermarket.

**Title: Data Storage and Management**

**Course Code: MC-448**

**COURSE OUTCOMES:-**

**CO1:** Students shall be able to understand Data proliferation, evolution of various storage technologies and the Information Lifecycle Management.

**CO2:** Students shall be able to understand and evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, CAS

**CO3:** Students shall be able to understand the various Networked Storage components.

**CO4:** Students shall be able to understand the Hybrid Storage solutions and the corresponding Backup & Disaster techniques, business continuity, and replication and also identify different storage virtualization technologies.

**CO5:** Identify components of managing and monitoring the data with special emphasis on storage on Cloud, Cloud Security and integration.

**Title: Object Oriented Analysis & Design**

**Course Code: MC-449**

**COURSE OUTCOMES:-**

**CO1.** Student will know about object oriented approach. Object Orientation, Analysis and Problem

**CO2.** Student will be able to know about advance, dynamic and functional modeling..

**CO3.** Student will be able to know about System design and Object design.

**CO4.** Student will do Implementation using Programming Language and Database System.

**CO5.** Student will able to understand the basics of UML.

**Title: Computer Graphics**

**Course Code: MC-450**

**COUSRE OUTCOMES:-**

**CO1.** The student will get familiar with the basic concept of application of computer graphics, input devices and graphic display.

**CO2.** The student will learn about graphical user interfaces and study various graphics drawing algorithm.

**CO3.** Student will be able to fill figures using various graphics filling algorithm and perform window to view point transformation and applied clipping techniques to clipping objects against display window

**CO4.** Student will be familiarizing with transformation techniques which include 2D and 3D rotation translation and scaling and also perform parallel and perspective projection.

**CO5.** Student will able to understand the various hidden surface techniques and get the knowledge about the basic concept of image processing and storage

**Title: Software Testing**

**Course Code: MC-451**

**COURSE OUTCOMES:-**

**CO1:** Distinguish between the various test processes based on testing criterion and the practice on various testing strategies for continuous quality improvement of the software product.

**CO2:** Understand and implement the testing tactics for detection of errors and fault(s) in software models

**CO3:** Understand and implement Risk management strategies (Risk Mitigation, Monitoring and Management)

**CO4:** Design and develop correct and robust software products, going beyond the conventional levels of programming.

**CO5:** Understand and implement the Quality assurance techniques and Quality standards.

**Title: Lab 7: Dot Net Technologies using C#**

**Course Code: MC-471**

**COURSE OUTCOMES:-**

**CO1.** Student will be able to develop small application using Standard controls present in Visual Studio.

**CO2.** Student will be able to create simple programs and implement OOPs concepts (Classes, objects, inheritance) in C#.

**CO3.** Students will be able to create programs on interfaces and create event handlers using delegates in C#.

**CO4.** Student will be able to create programs on string manipulations, creating and handling threads. Students will also be able to implement exception handling in different programs.

**CO5.** Student will be able to create window application and establish connection to database using ADO.NET, perform data retrieval and manipulations. Students will also be able to display different reports.

**Title: Cryptography and Network Security**

**Course Code: MC-541**

**COURSE OUTCOMES:-**

**CO1.** The students will get an insight about the various security principles and issues in the computer networks. The students will get the knowledge about various types of attacks that are possible in the world of Internet.

**CO2.** The students will learn various encryption and decryption techniques for ensuring the data security.

**CO3.** The students will learn about various Asymmetric key cryptographic techniques, knapsack algorithms and various strategies to manage the public and private keys.

**CO4.** The students will get familiar with basic concepts about incorporating Internet Security via various mechanisms and protocols like SSL, TLS, etc. The students will learn how to ensure email security by PGP and various other similar protocols.

**CO5.** Student will be able to understand various user authentication mechanisms (biometric, certificate-based, etc) and will be able to learn about various other Network security mechanisms.



**Title: Artificial Intelligence**

**Course Code: MC-542**

**COURSE OUTCOMES:-**

**CO1.** Understand basic concepts of Artificial intelligence, early developments in this field, basic knowledge representation, problem solving, and learning methods of Artificial Intelligence.

**CO2.** Understand the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular problems, game playing as problem solving.

**CO3.** Write Programs in LISP.

**CO4.** Implement a search problem as a state space, and how different types of search algorithms work like state space search, heuristic search, Greedy Best First Search, A\* Search, IDA\* Search.

**CO5.** Understanding the concepts of Machine Learning and Neural Networks, Applications of Machine Learning.

**CO6.** Understanding the concept of Biological Neural Network, Neuron Model and Architecture, and Applications of Artificial Neural Networks.

**Title: Web Technologies**

**Course Code: MC-543**

**COURSE OUTCOMES:-**

**CO1.** Student will be able to understand the concept of DNS Server and HTTP Request and Response Header formats. Students will be able to configure IIS and deploying a web application.

**CO2.** Student will be able to understand the basic principles of web designing and design web pages using HTML and Cascading Style sheets.

**CO3.** Students will be able to understand ASP.NET architecture. For a given domain students will be able to create interactive web applications and implement validation and authentication using ASP.Net controls.

**CO4.** Student will be able to understand the concept of Request and Response objects in ASP.NET. Student will be able to work with different databases, retrieve and manipulate data using ADO.Net.

**CO5.** Student will be able to build small AJAX applications and implement state management in web applications.

**Title: Lab 3: Web Technology**

**Course Code: MC-571**

**COURSE OUTCOMES:-**

**CO1.** Student will be able to configure IIS and deploying a web application.

**CO2.** Student will be able design web pages using HTML and Cascading Style sheets.

**CO3.** Students will be able to create interactive web applications and implement validation and authentication using ASP.Net controls.

**CO4.** Student will be able to work with Request and Response objects in ASP.NET. Student will be able to work with different databases, retrieve and manipulate data using ADO.Net.

**CO5.** Student will be able to build small AJAX applications and implement state management in web applications.

**Title: Linux & Shell Programming**

**Course Code: MC-572**

**COURSE OUTCOMES:-**

**CO1.** Student will be able to install various flavors of Linux.

**CO2.** Student will be introduced to Linux file subsystem commands.

**CO3.** Student will be able to work on various editors in Linux

**CO4.** Student will be able to perform System administration commands.

**CO5.** Student will be able to do shell scripting.

**Title: Data Warehousing and Data Mining**

**Course Code: MC-544**

**COURSE OUTCOMES:-**

**CO1.** Students will be able to understand the concepts of Data Warehousing and its various models.

**CO2.** Students will be able to understand the concepts of Data Mining basics such as Data Mining Processes, Techniques, Tasks, Applications and Issues.

**CO3.** Students will be able to understand and use the various Data Mining Algorithms related to Association Rule Mining and Clustering such as Apriori, Decision Tree and Sampling and Classifications.

**CO4.** Students will be able to understand and work with Clustering Techniques such as Partitioning, Hierarchical, Density Based and Grid Based.

**CO5.** Students will be aware about the concepts of Soft Computing and various techniques such as Neural Network, Fuzzy Sets, Rough Sets and Genetic Algorithm.

**Title: Parallel and Distributed Computing**

**Course Code: MC-545**

**COURSE OUTCOMES:-**

**CO1.** Student will be able know about the basics of Parallel Computers.

**CO2.** Student will be able to know about parallel solutions like Problems in Parallel, Temporal parallelism, Data Parallelism.

**CO3.** Student will be able to know about structure of parallel computers.

**CO4.** Student will be familiarize with Distributed computing goals like transparency, openness, scalability and Software concepts in Distributed computing.

**CO5.** Student will able to understand, communication in distributed computing like Remote procedure call and Message passing interface.

**Title: Web Mining**

**Course Code: MC-546**

**COURSE OUTCOMES:-**

**CO1.** Students will be introduced with the different kind of web mining.

**CO2.** Students will be able to understand the various techniques for web content mining.

**CO3.** Student will be able to understand various concepts related to NLP.

**CO4.** Student will be able to extraction of data from social networks.

**CO5.** Student will able to explain semantic web and web spam analysis.

**Title: Compiler Design**

**Course Code: MC-547**

**COURSE OUTCOMES:-**

**CO1.** Students will be aware about the introduction of Compiler Designing and syntax/semantics of Compiler of Programming Language.

**CO2.** Students will be able to understand the designing and working of Lexical Analyzer.

**CO3.** Students will be able to understand the Syntactic Specification of Programming Languages and basic parsing techniques.

**CO4.** Students will be able to implement Syntax Directed Translation and Intermediate Code Generation.

**CO5.** Students will be able to understand the process of Error detection and Recovery in Compiler and Code Semantic Optimization.

**Title: Systems Software**

**Course Code: MC-548**

**COURSE OUTCOMES:-**

- CO1.** Students will aware about the Machine (Computer Systems) Structures.
- CO2.** Students will be aware about Assemblers Designing and its various Functions.
- CO3.** Students will be able to understand the concepts and functions of Macros within systems.
- CO4.** Students might be able to understand the designing concepts and functions of Loader and Linker.
- CO5.** Students will be able to understand the designing concepts and functions of Compiler within Systems.

**Title: Pervasive Computing**

**Course Code: MC-549**

**COURSE OUTCOMES:-**

- CO1.** Students will be aware about the Architecture underlying pervasive computing.
- CO2.** Students will be aware about the various protocols with regard to pervasive computing.
- CO3.** Students will be able to understand the allied pervasive technologies.
- CO4.** Students might be able to understand the Architecture of programming paradigm and implement the same in developing pervasive applications using latest technologies .
- CO5.** Students will be able to understand and work on the real life easesing technologies.

**Title: Bioinformatics**

**Course Code: MC-550**

**COURSE OUTCOMES:-**

- CO1:** Gain the knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics
- CO2:** Understand and evaluate the existing software(s) tools to effectively extract information from large databases and to use this information in computer modeling
- CO3:** Understand and evaluate the Nucleic Acid sequence databases (GenBank, EMBL, DDBJ), bio-molecular sequences and the Proteomics tools.
- CO4:** Understand the Sequence Analysis of genes and the evaluation of Scoring Matrices
- CO5:** Understand the Sequence Alignment of genes and the Measurement of sequence similarity.

**Title: Cloud Computing**

**Course Code: MC-551**

**CO1.** Student will be able to know the Overview of Existing Hosting Platforms, Grid Computing, Utility Computing and Autonomic Computing.

**CO2.** Student will be introduced to Cloud Computing.

**CO3.** Student will be able to know the Classification of Cloud Implementations: IaaS, PaaS and SaaS.

**CO4.** Student will be familiarize with Cloud Environment like Windows Azure Platform

**CO5.** Student will be familiarize with Cloud Environment like Microsoft Office Live - SaaS, LiveMesh.com, Google Apps

**Title: Big Data Analytics**

**Course Code: MC-552**

**COURSE OUTCOMES:-**

**CO1.** Students will be introduced with the concept of Big Data, and Big data Analytics.

**CO2.** Students will be introduced with supervised and unsupervised learning and various machine learning algorithms.

**CO3.** Student will be able to understand Hadoop architecture and EcoSystem.

**CO4.** Student will be write Map-Reduce Programming and others programming related to Hadoop.

**CO5.** Student will able to understand privacy and security issues related to Big Data.

**Title: Major Project**

**Course Code: MC-641**

**COURSE OUTCOMES:-**

**CO1:** Students will have hands of experience of system development life cycle.

**CO2:** The students will learn to apply the technologies learnt during the course in real life projects.

**CO3:** Students will learn to work in real life project development environments involving deadlines and teamwork.

**CO4:** Students will learn to pick up and apply upcoming technologies in project development not covered during the course.

**Programme: M.Ed.**

**PROGRAMMES OBJECTIVES (PO) M.Ed.**

The M.Ed. programme has been designed keeping in view of the following objectives.

**PO1:** To produce dedicated teacher Educators who believe in lifelong learning.

**PO2:** Set high standards of professional competency of intellectual conviction and integrity.

**PO3:** Have a clear futuristic vision and aspiration for improving the teaching learning process as professionals.

**PO4:** Be inspiring and motivational leaders in the school, community, nation and the world.

**PO5:** To educate new a cadre of instructional leaders, teacher, educators, school entrepreneurship and administrators who will have the capacity, skills and knowledge to create and sustain environments in modern day education.

**PO6:** To equip the teachers with the knowledge and skills of new technologies focusing on understanding the principles of organizational management, leadership systemic change

**PROGRAMME SPECIFIC OUTCOMES (POS):**

**PSO1** – Demonstrate an understanding of the concepts, theories, nature, scopes, principles and procedure of the selected areas of study in Education.

**PSO2** - Prepare/ implement/ apply/select/analyze the educational problems and provide realistic and relevant solutions attained through the knowledge and skill of the program.

**PSO3** –Develop skills in analyzing different statistical measures, interpreting test results and interpretation of data through graph and statistic technique.

**PSO4-** Develop a positive self-concept, self-confidence and an optimistic attitude towards life.

**PSO5** – Demonstrate ability of making objective decision in educational management.

**PSO6** –Analyze the various problems faced by the mentally and physically challenged children and design an awareness program to encounter the problem of challenge children.

**PSO7** –Perform investigative research skills and develop skill of writing report by conducting project work in the field of education.

### **COURSE OUTCOMES (CO)**

**COURSE TITLE : PSYCHOLOGICAL PERSPECTIVES OF EDUCATION**

**COURSE CODE :M.ED 111**

**CO1:** To familiarize the students with the basic psychological principles connected with effective teaching learning process .

**CO2:** The course will enable the learners to understand how psychological knowledge and procedures given by various schools of psychology may be applied to the solution of educational problems.

**CO3:** It will further help them to understand some important learning theories and pursue their attempts to understand the intricacies of human personality and intelligence.

**CO4:** To analyse the implications of understanding human development and theories of learning for teachers.

**CO5:** To understand the concept of personality and intelligence

**COURSE TITLE : DEVELOPMENT OF EDUCATION SYSTEM IN INDIA**

**COURSE CODE :M.ED 112**

**CO1:** To enable the students to know about educational system, the various committees and commissions constituted for the progress of education during the pre-independent India.

**CO2:** To enable the students to know about educational system, the various committees and commissions constituted for the progress of education during the post-independent India.

**CO3:** It will also help them to know and explain the various issues and trends of education in India.

**CO4:** To enable the learners to understand the philosophy of open and distance learning system in India.

**CO5:** The course will enable the student teachers to develop understanding of the education as a subsystem of society.

**COURSE TITLE : METHODOLOGY OF EDUCATIONAL RESEARCH**

**COURSE CODE :M.ED 113**

**CO1:** To enable the students and researchers to develop the most appropriate methodology for their research studies and make them familiar with the art of using different research methods and techniques.

- **CO2:** The course will develop a research orientation among students and to acquaint them with fundamentals of research methodology and basic framework of research process.
- **CO3:** The course will further help the students to develop an understanding of various research designs and techniques.
- **CO4:** Further it will develop an understanding of various methods used in educational research

**COURSE TITLE: SELF DEVELOPMENT (COMMUNICATION & EXPOSITORY WRITING)**

**COURSE CODE : M.ED 150**

- **CO1:** To enhance the ability of students to listen, converse, speak, present, explain and exposit ideas in groups and before an audience through group discussions, seminars and workshops.
- **CO2:** The course will expose the learners towards writing of news paper articles, book reviews and research papers.

- CO3: It will further enable them to write expository writing in the form of poster and power point presentations.
- CO4: It will further enable to write the References and Bibliography.
- CO5: It will enable them to face the different Interviews, Vivo-voce etc.

### **COURSE TITLE:COMPUTER FUNDAMENTALS AND ITS APPLICATIONS**

#### **COURSE CODE :M.ED-151**

- CO1: The objective of the course is to acquaint students with the hardware and software approaches of micro-computer and train them to use computers for day-to- day working.
- CO2: It will enable them to access the internet and use various search engines for searching the knowledge available on different websites.
- CO3: It will also help the learners in calculating various numerical calculations by using MS Excel.
- CO4: To provide a rich learning experience for student teachers through various ICT tools to enable them to engage diverse classroom contexts.
- CO5: To help the student teachers to critically assess the quality and efficacy of resources and tools available

### **COURSE TITLE: SOCIOLOGICAL PERSPECTIVES OF EDUCATION**

#### **COURSE CODE: M.ED 210**

- CO1: To enable the students to understand the intimate relationship between education and sociology.
  - CO2: It will acquaint them with the sociological perspectives of education with its contribution to educational development.
- CO3: It will also orient the learners to understand various educational problems and issues related to the socially and economically disadvantaged sections of the society.
- CO4: The course will further enable the students to understand the social system, its characteristics and components
- CO5: The course will enable student-teachers to engage with studies on Indian society and education

### **COURSE TITLE:TEACHER EDUCATION**

#### **COURSE CODE :M.ED 211**

- CO1: To enable the students to understand the meaning, need and importance of teacher education.
- CO2: It will also help them to understand the aims, objectives and scope of teacher education; appreciate the historical development with special emphasis on different documents.
- CO3: The paper will enable the learners to understand the structure, administrative agencies, curriculum methodology and evaluation of teacher education programmes in the country.
- CO4: It will further help them to understand the evaluation procedure of pre-service and in-service teacher education programmes in India.



CO5: To understand the school functioning mechanisms

**COURSE TITLE: STATISTICS IN EDUCATION AND PSYCHOLOGY**

**COURSE CODE :M.ED 212**

CO1: To will enable the students to understand the concept of central tendency and variability.

CO2: It will help them to make various numerical calculations by using different statistical techniques like mean, median, mode, standard deviation and quartile deviation.

CO3: It will also help the learners to analyze and interpret quantitative data by using various advanced statistical methods.

CO4: It will help the students to understand the concept of different types of scales.

CO5: It will help them to make various numerical calculations by using different statistical analysis like: Descriptive, Differential, Correlation and Regression

**COURSE TITLE:COMPARATIVE EDUCATION &CURRICULUM DEVELOPMENT**

**COURSE CODE :M.ED 213**

CO1: To acquaint the students with the educational system of various countries and to develop in them the ability to assess their efficacy.

CO2: Once equipped with this ability the students will be able to solve the problems inherent in Indian education system.

- CO3: The course has also been designed to acquaint the students about curriculum designing and the development of curriculum with special reference to various models.
- CO4: It will also orient the students in curriculum analysis and evaluation.

**COURSE TITLE:DISSERTATION WORK-I**

**COURSE CODE :M.ED 214**

- CO1: The Dissertation for the students of M.Ed course is compulsory and it is to be completed as a partial, fulfillment of the course.
- CO2: To bridge the gaps in the preparation of a good researcher and practitioner in the Educational Institutions, CO3: In this backdrop, the first component of the dissertation work component shall enable the students to learn how to prepare the synopsis for any research study.
- CO4: It will also enable them to scan the related literature in their research area.
- CO5: It will also enable the students need to be fully groomed in the research pursuits.

**COURSE TITLE:HIGHER EDUCATION**

**COURSE CODE :EDU. 210**

- CO1: To acquaint the students with the basic concepts of Indian Higher Education System.
- CO2: It will enable the students to develop an understanding about the integration of higher education with the national development.
- CO3: It will also lead the students to develop the critical perspective of the issues prevailing in the Higher education System in India particularly relating to Quality, Autonomy, Governance, Privatization and Internationalization.

- CO4: It acquainted them with various regulatory bodies that govern the higher education system in the country.
- CO5: It familiarizes the students regarding various issues that emerge as a result of migration of students, teachers and technician abroad.

**COURSE TITLE:INSTRUCTIONAL TECHNOLOGY**

**COURSE CODE :EDU. 215**

- CO1: To develop and enhance Teaching skills and competencies among the learners in order to make teaching learning process more effective.
- CO2: It will make them familiar with the various innovative techniques used in educational technology.
- CO3: The course will help the learners to gain mastery in Teaching devices, digital tools and computer techniques used in teaching learning process.
- CO4: It will also enable the students to understand about the important structures, steps and techniques of teacher preparation.
- CO5: It will make the students aware with the various methods, strategies and techniques used in educational technology.

**COURSE TITLE:EDUCATIONAL TECHNOLOGY**

**COURSE CODE :M.ED 310**

- CO1: to enable the learners to become the effective users of educational technology in terms of it's both the hardware and software components.
- CO2: It will help them to understand the role of educational technology in the present system of education.
- CO3: The course will familiarize the learners with the origin and development of programmed learning.
- CO4: It will also orient them with the new trends and techniques in education including e-learning, virtual learning, ICTs etc.
- CO5: To develop and enhance Teaching skills and competencies among the learners.

**COURSE TITLE:EDUCATIONAL MEASUREMENT AND EVALUATION**

**COURSE CODE :M.ED 311**

- CO1: To familiarize the students with the basic concepts of measurement and evaluation.
- CO2: It will help them to understand the utility of measurement and evaluation in education.
- CO3: It will also orient the learners with the basic tools of measurement and evaluation; general principles and steps of test construction.
- CO4: The course will further help the students to understand the new trends of examination reforms and reports of various committees and commissions for improving the system of examination in the country.
- CO5: It will also enable them to understand various statistical techniques like correlation, Normal Probability Curve F-test, t-test and Z-test.

**COURSE TITLE:GUIDANCE AND COUNSELLING**

**COURSE CODE :M.ED 312**

- CO1: To enable the students to understand the meaning, nature and scope of guidance and counseling.
- CO2: It will acquaint them to recognize the role of guidance in attaining the goals of education.
- CO3: The course will further orient the students to analyze the relationship between guidance and counseling.
- CO4: It will also help them to understand various theories of guidance and counseling advocated by different psychologists
- CO5: It will also prepare the students for interviews and other face to face interactions.

**COURSE TITLE:DISSERTATION WORK-II****COURSE CODE :M.ED 313**

- CO1: To enable the students to prepare or develop the standardized tools necessary for the collection of data.
- CO2: It will also enable them to procure the standardized tools related to the research problem from various organizations/sources.
- CO3: The course will further expose the students how to collect the data from the sample subjects.
- CO4: It will also familiarize them with the ethical issues while collecting the data from the sample units.

**COURSE TITLE:SECONDARY EDUCATION****COURSE CODE :M.ED 314**

- CO1: To understand the nature and scope of secondary education.
- CO2: It will help them to examine the present status of secondary education in India.
- CO3: It will also help them to understand the Vocationalization of education at secondary level.
- CO4: The course will orient the students with the various programmes and policies for expansion of secondary education in India.
- CO5: It will further enable them to critically examine the role and contribution of various bodies for improving the quality of secondary education in India.

**COURSE TITLE:ENVIRONMENTAL EDUCATION****COURSE CODE :M.ED 315**

- CO1: To acquaint the students with the concept and scope of environmental education.
- CO2: It will help them to understand the recommendations of various committees and commission for environmental education.
- CO3: It will also enable the learners to acquire awareness and sensitivity to the total environment and its allied problems.
- CO4: The course will acquaint the students with the various environmental hazards like environmental pollution, green house effect and ozone layer depletion.

- CO5: It will further help them to understand the role of various national and international agencies for promoting the environmental awareness across the globe.

**COURSE TITLE:HIGHER EDUCATION**

**COURSE CODE :EDU. 316**

- CO1: To acquaint the students with the basic concepts of Indian Higher Education System.
- CO2: It will enable them to develop an understanding about the integration of higher education with the national development.
- CO3: The course will also help the students to understand the impact of globalization on higher education with special reference to WTO and GATs agreement.
- CO4: It will help them to develop an understanding about the critical perspective of the issues prevailing in the higher education system related to the Quality, Autonomy, Governance, Privatization and Internationalization
- CO5: It will also help them to understand the Vocationalization of education at higher level.

**COURSE TITLE:GENDER STUDIES**

**COURSE CODE :M.ED 317**

- CO1: To familiarize the students with the meaning and scope of gender studies and develop a critical perspective on the gendered structure of the society.
- CO2: It will also help them to analyze the status of education of girls in schools with special reference to access, enrolment and achievement.
- CO3: The course will help the learners to understand the policy perspectives related to education of girls in India. CO4: It will orient them with the schemes and programmes meant for education of girls in the country.
- CO5: The course will develop an understanding among the learners about the concept and importance of gender justice and equality.

**COURSE TITLE:FIELD ATTACHMENT/INTERNSHIP**

**COURSE CODE :M.ED 350**

- CO1: To acquaint the students with the real experience of the institutional setup.
- CO2: It will orient the students with the day today activities of the high/higher secondary institutions.
- CO3: The course will also enable the learners about the activities being carried out in different teacher training institutions and DIETs.
- CO4: The course will also orient the learners with various techno-pedagogical and motivational skills used in the class-room environment.

**COURSE TITLE:EDUCATIONAL ADMINISTRATION AND MANAGEMENT**

**COURSE CODE :M.ED 410**

- CO1: To acquaint the students with the concept and applications of administration and management in the field of education.
- CO2: It will orient them with the concept of educational supervision and inspection.
- CO3: The course will help the learners to understand the concept, types, principles and importance of communication in management and administration.

- CO4: It will also enable them to understand the importance of educational and institutional planning.
- CO5: The course will further enable the students to understand the role of central and state organizations in educational administration and management,

**COURSE TITLE:INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTS)**  
**COURSE CODE :M.ED 411**

- CO1: To enable the students to understand the key concepts and benefits of using ICTs in education.
- CO2: It will orient them to understand the integration of ICT into teaching-learning process.
- CO3: The course will enable the learners to participate in the activities of teachers' networks and in the evaluation and selection of ICT resources.
- CO4: The course will also help them to use ICT for making classroom processes more inclusive in order to address the multiple learning abilities.
- CO5: The course will familiarize the learners with the origin and development of programmed learning through ICT resources.

**COURSE TITLE:INCLUSIVE EDUCATION**  
**COURSE CODE :M.ED 412**

- CO1: To enable the students to understand the concept of inclusive education, special education and integrated education.
- CO2: It will help them to develop a critical understanding about the recommendations of various commissions.
- CO3: The course will also help the students to understand the needs and problems of children with diverse needs.
- CO4: It will further enable them to identify the concept and needs for curriculum adaptations of children with special needs.
- CO5: It will help them to develop a critical understanding about committees for promotion of inclusive education in the country.

**COURSE TITLE:DISSERTATION**  
**COURSE CODE :M.ED 413**

- CO1: To enable the students to summarize their research findings and as such familiarize them with the preparation of research report.
- CO2: It will also enable them to analyze and interpret the data in the light of proposed objectives and hypotheses.
- CO3: The course will further help the students to present the research findings before the audience/experts.
- CO4: It will also help the students how to select the sample and also about the sample procedure.
- CO5: The course will further expose the students how to collect the data from the sample subjects.

**COURSE TITLE:PEACE EDUCATION**

**COURSE CODE :EDU 414**

- CO1: To familiarize the students with the meaning, nature and classification of peace.
- CO2: It will also enable them to know the historical perspective, objectives, scope, methods and challenges of peace education.
- CO3: The course will further help the students to know the role of community, school, family and different organizations in peace education.
- CO4: Besides, it will familiarize the learners with the concept, significance and types of human rights.
- CO5: It will also enable them to understand the pedagogy for human rights education and human rights in Indian constitution

**COURSE TITLE:EARLY CHILDHOOD CARE AND EDUCATION (ECCE)****COURSE CODE :M.ED 415**

- CO1: To enable the students to develop an understanding about early childhood care and education (ECCE) in terms of its concept, importance and the methods.
- CO2: It will acquaint them with the different aspects of early childhood growth and development along with their educational implications.
- CO3: The students may also get familiar with the works and contributions of important educational thinkers and psychologists in ECCE.
- CO4: The course will enable the learners to achieve a comprehensive coverage and understanding of recommendations and programmes of various agencies working in the field of early childhood care and education.
- CO5: It will further help them to compare various ECCE programmes being run in India, Australia, U.K. & China

**COURSE TITLE:HISTORY AND PROBLEMS OF EDUCATION IN J&K****COURSE CODE :M.ED416**

- CO1: To enable the learners to understand the growth and development of education in the state of Jammu and Kashmir.
- CO2: It will help them to understand the recommendations of various commissions for the development of education in J&K.
- CO3: The course will familiarize the learners with the various issues and problems of education in the State.
- CO4: It will also orient them with different educational Acts related to the system of education in J&K.
- CO5: It will help them to understand the recommendations of various committees for the development of education in J&K.

**COURSE TITLE:MENTAL HEALTH AND EDUCATION****COURSE CODE :EDU 417**

- CO1: To enable the students to understand the fundamentals of mental health and hygiene.
- CO2: It will help them to understand the principles and conditions conducive to good mental health.

- CO3: It will also help the learners to develop a thorough understanding about the measures for fostering good mental health.
- CO4: The course will further help the students to develop an understanding about the role of home, school and society in developing good mental health among the children.
- CO5: To enable the students to understand the fundamentals of balanced diet and hygiene

## **Programme: MA (Islamic Studies)**

### **Programme Outcomes (PO)**

Islamic Studies is a subject which attempts to study the whole range of Islamic Civilization and culture. Its main interests include, besides the religion of Islam, such topics as the socio-economic, structure, development of various sciences and thought, cultural life, cosmology, mysticism, literature and fine arts, and many other aspects of Islamic civilization.

- Muslim contribution to various disciplines in sciences, technology, fine arts, as well as religious sciences.
- Simultaneously, for honors students a paper covering the origin and development of Muslim sects, and their contribution to the development of various religious sciences from the early phase of Islam up to the modern period is also included. At the post-graduate level the department of Islamic Studies offers courses in history, culture, and civilization, from pre-Islamic Arab culture to Islam in the modern age, and papers on Islamic religious sciences, origin and development of Muslim sects, Kalam, and philosophy. Besides compulsory papers on Arabic language for the students having no knowledge of Arabic, papers on non-Muslims contribution to Islamic Studies and Muslims contribution to science, technology and fine arts during the Medieval period are offered for students having proficiency in Arabic. In view of the recent developments in the Islamic world, the department of Islamic studies has broadened its area of studies, and in addition to courses on West Asia and North Africa, courses on central Asia and North East, Asia have also been introduced under the title of Islam and Modern Age, and Muslim Reform Movements; and most significantly, a paper entitled major World Religions is also taught at the post graduate level.

### **PSO**

The program of Masters in Islamic Studies consists of 5 major areas of thrust namely a) Islamic Religious Sciences (including study of Quran, Hadith and fiqh), b) the History of Islamic Civilization from beginning to the present age, c) Allied Islamic Sciences like Ilm al Kalam, Muslim Philosophy and Tasawwuf/ Mysticism d) Islam in modern world that includes development of Thinkers, movements and trends and e) Subjects of contemporary relevance /importance like Islam and Science, Gender Studies, Islamic Economics and Professional Ethics.

- The student after completing MA Islamic Studies will have a clear concept of Islamic Teachings contained in Holy Texts and the right approaches to their interpretation.
- Islam from its advent in early to present age has over the centuries faced many challenges and process of interactions has brought out major changes in outlook which the students will be able to appreciate after the completion of the course.



- The monotheistic ideology of Islam faced challenge from Human thought and critical inquiry of philosophy and science which was effectively responded through process of Kalam and scholastic theology and now scientific theology as the time demanded. The knowledge of this whole process encourages and prepares the students to face and respond to the new questions with more ease and confidence.
- Islam after 1800 CE faced new challenges in the form of Industrial growth, science and technology and the modern sociopolitical values like Democracy, secularism, human rights etc that forced Muslim scholars to introspect and come forth with appropriate responses not only to existing but even prospective issues. The Students in this program are equipped with this necessary background knowledge and correct methodology of response.
- Islam has always been open to genuine demands of time in all ages and the subject of contemporary relevance like economics, human rights, ethics and gender studies have not only been adopted but enriched/augmented with Islamic inputs, to update the outlook of the students to broader world view.

## **Introduction to Islamic Studies**

**MIS-101**

### **CO 1**

To introduce the students to the writing of the Orientalists and the Muslim Response towards those writings.

### **CO 2**

To trace the origin and development of Islamic Studies as an academic subject on a global level

### **CO 3**

To foster a harmonious relationship with the people of other faiths, while working for the cause of global peace.

### **CO 4**

To train the students to write academically and impartially on Islam and other religions

### **CO 5**

To unveil the contribution of Muslims in multiple fields of human knowledge.

## **History of Islamic Civilization: Origin and Developments upto Khulafa –e-Rashidun MIS 102**

### **CO 1**

To acquaint the students with the background scenario in which Islam originated and developed as an influential religion of the world.

### **CO 2**

To make students familiarize with the polity of Islam developed on Divine guidelines

### **CO 3**

The nurture the thoughts of students to revisit the early phase of Islam in order to analyze the later developments of Islamic history.

CO 4

To carry on the spirit of just governance as exemplified by Prophet and his immediate followers

CO 5

To revive the spirit of God consciousness for a healthy moral life among the students

CO 6

To link the students to the original and primary sources of the subject

### **A STUDY OF QURAN**

**MIS-103**

CO 1

A correct and deeper understanding of Quran which is essential for knowledge of all aspect of Islam, may it be legal, scientific, social or political developments.

CO 2

They will be introduced to the basic terminology used in the Qur'an, the history of its collection and compilation.

CO 3

They will get acquainted with the correct methodology of interpretation of this Sacred Book and notable Tafsir works in different languages.

CO 4

The course includes the Quranic guidelines on basic, social, political, ethical and economic teachings of human life.

CO 5

This will help students to have a first-hand practical knowledge of the divine message removing myths and misconceptions about Islam.

### **A Study of Hadith**

**MIS-104**

CO 1

That the Qur'an is the embodiment of Divine message to humanity, Hadith or Sunnah is the practical demonstration of the teachings contained in the Divine Will.

CO 2

That None can afford to circumvent Hadith while trying to understand the contents of Qur'an.

CO 3

The students will be made to understand the types of Hadith, the correct methodology of Hadith analysis and the main corpus of Hadith literature.

CO 4

They will be better equipped to draw the correct and authentic guidance from the primary texts.

### **Proficiency in Arabic**

**MIS-105**

CO 1

The Students are expected to learn the basic grammatical points.

CO 2

Be able to translate and explain passages and portion from the prescribed texts from Arabic into English.

CO 3

Be able to translate and explain passages and portion from the prescribed texts from English into Arabic.

CO 4

They will also be able to use words into sentences, fill in the blanks and answer questions given in the prescribed books.

CO 5

They will also be able to initiate day to day conversation in Arabic.

### **History of Islamic Civilization-Umayyads and Abbasids**

**MIS-201**

CO 1

To involve the students to engage in this period of Islamic history for a deeper understanding of evolution in different fields of knowledge like religious, political, socio-economic, physical, and biological sciences.

CO 2

To make the students to acquire the comprehension of such aspects of knowledge in that particular period of Islamic civilization.

CO 3

To assess the achievements of Umayyads and Abbasids in the field of science, art, and literature.

CO 4

To estimate the original contribution of the two great dynasties in the field of polity and governance.

CO 5

To allow students to cherish the legacy left by the Muslims

CO 6

To re-engage the students in gauging the causes of fall of empires

### **Islamic Religious Sciences-iii (Fiqh)**

**MIS-202**

CO 1

The fact that the Qur'an and Hadith provide the broader guidelines for personal and socio-political life of Muslims and the Islamic Law or Fiqh emanates from these primary sources.

CO 2

An understanding of the Islamic Legal terminology and principles of Islamic Jurisprudence (*Usul al Fiqh*).

CO 3

Introduction to appreciation of different interpretations and development of different schools of thought/ sects in Islam.

CO 4

Thus the course on Fiqh is expected to equip the students with requisite knowledge of the basic principles of Islamic Law and their application with changing circumstances.

### **Ilm al kalam and Muslim Philosophy**

**MIS-203**

CO 1

To acquaint students with the writings of Muslim philosophers who not only imbibed the philosophy of Greeks, but equally enriched it with fresh insights.

CO 2

To know about the intellectual awakening of Europe and the West for it owes much to the former.

CO 3

To generate the spirit of Islamic philosophy among the students.

CO 4

To accustom the students with the cosmopolitan outlook of Islam that was displayed in the 11<sup>th</sup> century period of Islamic History.

CO 5

To make the students to be familiarized with the approach and methodology of Muslim philosophers

### **Proficiency in Arabic II**

**MIS-204**

CO 1

The Students are expected to learn the basic grammatical points.

CO 2

Be able to translate and explain passages and portion from the prescribed texts from Arabic into English.

CO 3

Be able to translate and explain passages and portion from the prescribed texts from English into Arabic.

CO 4

They will also be able to use words into sentences, fill in the blanks and answer questions given in the prescribed books.

CO 5

They will also be able to initiate day to day conversation in Arabic.

### **Introduction to Islamic Religious Sciences**

**MIS-205**

CO 1

That is expected to acquaint them with a clearer and deeper knowledge of Islam.

CO 2

They will be introduced to the Qur'an and the Hadith forming the primary texts of Islam that contain broader guidelines for mankind.

CO 3

They will get acquainted to different approaches and methodologies of interpretation of primary texts.

CO 4

The principles of Islamic Jurisprudence as essential for students and scholars form a part of this course.

**History of Islamic Civilization: West Asia and Africa**

**MIS- 301**

**CO 1**

Introducing students of Islamic Studies to the historical background of the developments like advancement in sciences and technology that took place during this phase of Muslim history (13<sup>th</sup> to the 20<sup>th</sup> centuries)

CO 2

Changes in the outlook of Islamic civilization during the second millennium of history

CO 3

The role of some mighty empires of West Asia and Africa as Ottoman and Fatimid empires respectively in the creation and preservation of knowledge.

CO 4

Study of the challenges faced by the Muslim empires with the dawn of the 19<sup>th</sup> century

CO 5

Constitutional developments and beginning of democratization of the polity

**Islam in Modern World-West Asia & Africa**

**MIS-302**

CO 1

To acquaint the students with the concept of Ijtihad in Islam

CO 2

Introducing the students with the terms like Islah, Tajdid, etc that are embodied in the primary texts of Islam i.e. Qur'an and Hadith

CO 3

Methods and methodologies of revival and reform in Islam

CO 4

Different movements, ideologies, and ideologues that originated in West Asia like *Wahabi*, *Sannusi*, *Jadidi*, that had a remarkable impact on the later legacy of Islamic movements.

**Tasawwuf**

**MIS-303**

CO 1

Islamic spirituality/Tasawwuf draws its building blocks from the Islamic primary texts in the form of terms like Tadabbur, Taffakur, Tazkiyyah, etc.

CO 2

They will be introduced to the development of different Sufi Orders and schools.

CO 3

Acquaintance will be provided to students as to how *Tasawwuf* has contributed to world peace and harmony among different faiths.

CO 4

The students through the aid of this paper will thus be acquainted with the basic concept of *Tasawwuf*, its development over the centuries and its contemporary relevance.

### **Proficiency in Arabic-iii**

**MIS-304**

CO 1

Learn the basic grammatical points

CO 2

Be able to translate and explain passages and portion from the prescribed texts from Arabic into English

CO 3

Be able to translate and explain passages and portion from the prescribed texts from English into Arabic.

CO 4

They will also be able to use words into sentences, fill in the blanks and answer questions given in the prescribed books.

CO 5

They will also be able to initiate day to day conversation in Arabic.

### **Islamic Daw'ah/ Elective I**

**MIS-305**

CO 1

To familiarize the students with ideals of Dawah as practiced by the Prophet and his companions

CO 2

To awaken and sustaining the spirit of cooperating with the good and opposing the evil

CO 3

To reintroduce the Islamic values in modern world not only as a social necessity but an obligation after the finality of Prophethood.

CO 4

To infuse the spirit among the students through which they rise to voice against evil and work for the causes of peace, justice, equality, and freedom

### **Islamic Economics and Finance/Elective III**

**MIS-306**

CO 1

To aware the students about preserving and using the natural and human resources judiciously

CO 2

To introduce the students the basic terminology used in Islamic economics as Ba'`iah, Tijarah, Iktisab, infaq, etc.

CO 3

To explicate to the students the demerits of Riba i.e. interest based banking

CO 4

To introduce to them the Islamic ideals of investment and share as Musharak, Mudarabah, etc

CO 5

To acquaint them some of the banks working with Islamic ideals as Islamic Development Bank Saudi Arabia, Al Ameen Finance and Investment Corporation India, Islamic Investment Bank Pakistan, Amanah Mutual Funds Trust U.S.A, Grameen Bank Bangladesh, etc

### **Islam and Science/ Elective III**

**MIS-307**

CO 1

To aware the students about the Qur'an account of nature and natural phenomenon

CO 2

Nature (Afaq) as the symbol of God's existence and design

CO 3

Contribution of Muslim scientists in different fields of scientific knowledge

CO 4

Inspiring students to carry on the legacy of such Muslim scientists and intellectuals to carve out their place in the modern world

CO 5

To encourage the students trace their missing links and re-engage themselves with their own lost property with more conviction and vigor.

CO 6

To ascertain the role of Muslim scientists towards the welfare of humanity as a whole

### **Islam and Gender Studies/ Elective IV**

**MIS-308**

CO 1

To elucidate the students, the concept of gender as enshrined in Qur'an and Sunnah

CO 2

The status of women in early Islamic period and the the later developments with the passage of time

CO 3

To critically evaluate the claims that allege Islam as the suppressor of women

CO 4

To bring in the actual Islamic teachings contained in the Islamic primary texts regarding women

CO 5

The course has been introduced for students to have a deeper insight into the Islamic teachings to be brought forth and tested through the touchstone of truth

CO 6

The course is expected to develop analytical ability among the students, making them more confident rather than apologetic

### **Islamic Civilization in Indian Subcontinent**

**MIS-401**

CO 1

Helping students to get an insight into the chronology of Muslim rule in India in the development of Islamic art, architecture, and Muslim civilization.

CO 2

Contribution of Muslim to the Indian economy and political administration

CO 3

The contribution of Indian scholars to the development of Islamic sciences particularly Tasawwuf, and its contemporary relevance for a peaceful co-existence is brought to fore in this paper.

CO 4

Resistance against the occupation of British

### **Islam in Modern World- South Asia**

**MIS-402**

CO 1

Through this course the students will be acquainted with the different movements and ideologies emerging in the South Asia in response to the Western challenges of science and technology as well as the modern social values like freedom, democracy, equality and human rights which in fact are rooted in Islam itself.

CO 2

Analyzing the social and political conditions of India with the dawn of modernity

CO 3

The approaches adopted by South-Asian Muslim scholars to the challenges that posed threat to the Islamic identity

CO 4

Highlighting the contribution of prominent Muslim scholars to the revival of Islamic Ideals and values.

### **Human Rights in Islam**

**MIS-403**

CO 1

This paper has been included in the course in order to allow the students to explore the basis human rights in the Qur'an and as upheld by Prophet (SAAS) through his Sunnah.

CO 2

The paper also exposes students to the secular organizations advocating human rights.

CO 3

The students would be able to compare the human rights as prescribed by religion as Islam, and world secular organizations like IHRO, Amnesty International, etc

CO 4

To scrutinize the evils of authoritarianism (religious, political, economic, or any other), tribalism, racism, sexism, slavery or anything else that prohibits or inhibits human beings from actualizing the Qur'anic vision of human destiny

CO 5

To make the students to update with the campaign of advocacy of restoration of human rights in the contemporary world

Major World Religions

**MIS-404**

CO 1



Reading world Religions provides an excellent preparation simply for living life in a pluralistic society and global culture.

CO 2

To introduce students to the textual, historical, literary, social scientific, philosophical, and art-historical approaches in studying religions.

CO 3

To prepare the students to study religions other than their own, so that they may understand their fellow religionists.

CO 4

To promote communal harmony and brotherhood thereby defying the spirit of fanaticism and violence in the name of religion.

CO 5

To respond to the criticism against the religion as imposed by secular ideologies as humanism, etc

#### **Proficiency in Arabic –IV**

**MIS-405**

CO 1

The Students are expected to learn the basic grammatical points.

CO 2

Be able to translate and explain passages and portion from the prescribed texts from Arabic into English.

CO 3

Be able to translate and explain passages and portion from the prescribed texts from English into Arabic.

CO 4

They will also be able to use words into sentences, fill in the blanks and answer questions given in the prescribed books

CO 5

They will also be able to initiate day to day conversation in Arabic.

## **Programme: MA(Urdu)**

### **Programme Outcome**

Urdu being the official language of the state of Jammu and Kashmir, so it is imperative to delve deep into Urdu literature to understand the language and literature in the broader perspective. There is a vast treasure in the Urdu literature which enroots us to our glorious past and enlightens us about our culture and heritage. Additionally, the onslaught of science and technology and various other current trends make it essential to render the subject compatible with the modern challenges. A special paper about feminism is being taught in the program to make it more comprehensive and unique. Last but not the least; the program encompasses almost all the genres of Urdu literature to make the students and researchers well versed in the subject, taking full cognizance of the courses offered in other colleges and universities.

- The students may be able to preserve the age old cultural traditions that are preserved in the mass of Urdu literature
- They may avail the job opportunities in different fields as radio and TV broadcasting apart from journalism
- They can turn into good writers, script writers for TV serials and films.
- They may become the part of some cultural academy.
- They may join or envision a drama club
- They can act as good translators at embassies, etc.

### **Programme Specific Outcomes**

Masters in Urdu is a two year course wherein the main thrust remains on some vital areas of Urdu literature as Urdu Ghazal, Novel, Afsana, Drama, Tehqiq wa Tanqeed. The ultimate purpose is to acquaint and train the students in such fields for placing themselves as contributors in the social cause. After the completion of the course the students may get the following:

- Urdu Ghazal forms the core of Indian culture. It engages the maximum of the Indian population. The students may be able to keep such a spirit alive in the hearts of the millions of people who appreciate the aesthetics of Ghazal.
- Novel acts as an expression of our social issues that require attention at every period of time. It is the representative of our collective thinking. The students through this study may learn the art of highlighting the social and individual issues in an appealing way.
- Afsana has a special feature of deliberating on a specific theme with clear assessment. Through the course of Afsana as is taught in our department, the students may be able to write on some

vital issues of society with least ambiguity.

- Drama represents the reflection of our sufferings, joys, achievements. Through this course our students may be able to inspire and encourage the community for achieving higher objectives.
- The study of Tehqiq e Tanqid would pour the spirit of splitting right from wrong, truth from falsehood, and historical aberrations from factual points. After this course our students are expected to write and speak on any issue with impartiality and neutrality with no bias.

### **Course Outcomes (CO)**

#### **Classical Urdu Ghazal**

**MUR-101**

- To acquaint the students with the poetry and lyrics of ancient world.
- To make the students to experience the literary style of great classical lyricists like Mir Taqi Mir, Mirza Ghalib, etc
- To familiarize the students with the fact that Urdu lyrics being the widely read genre in India

#### **Urdu Masnavi**

**MUR-102**

- To aware the students about the fact that Masnavi is another sub-genre of poetry itself
- To generate the spirit of spirituality through the aid of Masnavi
- To widen the mental horizon of the students
- To awaken the students intellectually

#### **Urdu Qasida**

**MUR-103**

- It enables the students to acquire a deep understanding regarding Urdu Qasida“
- To enable the students to acquire the knowledge pertaining to cultural aspects of Rajas, maharajas etc under the impression of Qasida writers
- It enables the students to have a detailed account of five Qasida writers like Sodha, Zouq, Ghalib, Quali Qutab Shah and Mohsin Kakarvi as their contribution is more valuable and significant.
- The study of this paper helps the students to acquire knowledge about the life history, personality and knowledge of above writers of Qasida.

#### **Urdu Marsiya**

**MUR-104**

- To make the students apprehend the worth Marsiya have had through the ages
- To find out the element of religiosity in the Marsiyas.
- To introduce to the students the celebrated Marsiya points.
- To acquire the skill of appreciation of acknowledging great literary works.

#### **Jadeed Urdu Ghazal**

**MUR- 201**

- To acquaint the students with modern lyrics.
- To enable the students to have a better understanding of valuable contributions in modern oriental lyrics.
- To enable the students to have an idea about the verse style and artistic beauty used in the modern oriental lyrics.

- To enable the students to have an opportunity of usage of various literary devices/ literary elements, Diction etc.

### **Jadeed Urdu Nazam**

**MUR-202**

- It helps the students to achieve moral and spiritual values.
- It aims to introduce the poetry of poets as Mohd Hussain Azad, Hali, Khaki, Faiz Ahmad Faiz etc.
- To help the students to know the poets perspectives and its alignment with their own lives.
- To enable the students to broaden their imagination and visualize the things with references to modern Urdu poetry.

### **Urdu Novel**

**MUR-203**

- To help the students to understand the novel as it represents the social, political, economical, psychological, cultural aspects of life.
- To help the students to understand the novel in all its aspects
- To introduce the students to the novel writing of such great novelists as Prem Chand, Aziz Ahmad, Krishan Chander, etc
- To train the students for novel writing.

### **Urdu Afsana**

**MUR-204**

- It enables the students to understand sensational and emotional aspects of human beings.
- To help the students to understand the artistic and technical aspects of Urdu Afsana.
- To enable the students to study about the most prominent and famous novelists.
- To help the students to generate the taste for artistic activities.
- MUR-204 (Urdu Afsana)

### **Urdu Nasar Ki Tarikh**

**MUR-301**

- It aims to enable the students to understand the history of non-fiction prose in detail.
- To help the students to understand the background of historical and social development of Urdu prose
- To enable students to understand this aspect historically with reference to North and South Indian prose which includes the valuable books like Bagho Bahar, Etc.
- To help the students for a thorough understanding of the valuable old prose

### **Urdu Adab Ki Tarikh**

**MUR-302**

- It aims to make the students to understand the history of Urdu literature in detail
- It helps the students to know that the urdu literature is the language of composite culture.
- It aims to introduce the students about the two schools of urdu literature i.e. Delhi and Lucknow.
- This paper is also introduced as it enables to understand the history of urdu literature and generate the opportunities for the research I this field.

## **Urdu Drama**

**MUR-303**

- It enables the students to have a thorough understanding of dramatic art and its technical aspects.
- The student should be able to understand the most famous dramatists of Urdu literature as Imtiaz Ali Taj, Habib Tanvir, etc.
- It aims to acquaint the students the importance of these dramatists and their valuable contribution in Urdu literature.
- It aims to understand the students their role and responsibility in the social sphere of life.

## **Urdu mein Adabi Tehreeqat wa Rujhnat**

**MUR-304**

- It helps the students to study about various literary movements and trends in Urdu literature.
- It aims to have a clear idea about the various literary movements like Aligarh Muslim movement, Progressive movement, Post Modern Movements, Romantic Movements.
- It aims to acquaint the students with the trends in Urdu literature for better awareness.
- It aims to provide the students to opportunities of employment.

## **Speacial Study of Mir Taqi Mir**

**MUR-305**

- To enable the students to acquire knowledge about the poet and his life history. Enabling them to understand the poetry of Mir Taqi Mir and use that knowledge as a source of creativity.
- It aims to acquaint the students with poetic dictions and expressions in order to embed in them the literary taste.
- It aims to study the critics of Mir Taqi Mir such as Shams ul Rehman Farooqi, Gopi Chand Narang, Hamid Kashmiri etc.
- It also intends to introduce the students to the biography of the poet to seek inspiration.
- To present Mir Taqi Mir not only as a poet but also as a good prose writer.
- 

## **Special study of Iqbal**

**MUR-306**

- It aims to explore and analyze all the poetical aspects of Urdu language.
- It helps the students to understand about Iqbal's life and contribution with special reference to his Poetry.
- It aims as introducing the students to the text and its comprehension in order to increase their knowledge and development of skills regarding poetry.
- It helps the students to identify the various literary devices like metaphors, similes, imagery etc. used in the poetry for creativity.

## **Special Study of Munshi Prem Chand**

**MUR- 307**

- It intends to introduce the students to the biography of the poet to seek inspiration
- It aims to aware the students about Urdu fiction, Afsana, Drama, Novel, etc.
- To acquaint students about the literary achievements of the writer vis-à-vis his novels.
- To import the implications of the writings of the writer on the contemporary society

### **Special Study of Sir Syed**

**MUR- 308**

- To acquaint the students with the biography and the educational movement of Sir Syed
- It aims to familiarize the students with the contribution of Sir Syed to the Indian Society on a whole
- It intends to inculcate among the students the dynamism and spirit as awakened by Sir Syed during his period
- To appreciate the contribution of Sir Syed as a prose writer

### **Ghair Afsanvi Nasr**

**MUR-401**

- It aims to acquaint the students with deep understanding of nonfiction prose in Urdu, so that the students may be able to acquire knowledge regarding Inshiaya Nigari, Khaka Nigari etc.
- It enables the students in acquiring proficiency over Inshiaya Nigari and enables them to identify other types of nonfiction prose in Urdu.
- It enables the students to recognize all types of nonfiction prose in Urdu, so that they may be able to develop the spirit of writing of nonfiction prose.
- It aims to develop in the students to use skills for creative writing in order to prove their professional excellence in nonfiction prose.

### **Urdu Mein Tahqeeq-o-Tanqeed**

**MUR-402**

- It aims to enable the students to acquire the concrete knowledge of Tahqeeq-o-Tanqeed in Urdu with reference to its principles, methods, history etc.
- It aims to acquaint the students about the types of Tahqeeq, Takhleeq and Tanqeed, so that the students may be benefitted for its judicious use for correct writing.
- It aims to acquaint the students to differentiate between two pieces of writing by using their skills and values by judging correct or incorrect, right or wrong ways.
- It will make the students to go for the research programs in the field of literary criticism.

### **Feminism in Urdu Literature**

**MUR-403**

- It enables the students to acquire the knowledge regarding Taneesi Adab in Urdu
- It may enable the students to study in detail about Taneesi Adab with special reference to its historical, political and social background in order to encourage the students especially girl students towards progress, and self-respect cum honor.
- To help the female students to develop a sense of achievement and empowerment so that they may be able to add the valuable contributions in Taneesi Adab
- It aims to develop an awareness among women about the most valuable contributions of women writers and poets like Qurat-ul-Ain Haider, Azmat Chughtai, Parveen Shakir and the likes

### **Zaraye Tarseel-o-Iblagh**

**MUR-404**

- To develop the professional skills among the students as the paper is directly connected/ aligned with the professional coaching/training with reference to Urdu language

- To provide the students the thorough knowledge about subjects as internet, websites, television, radio, journalism, motion pictures, etc.

To create a platform for the students to prove their mettle in the research program as M.Phil and Ph.D

## **Programme: MA (Arabic)**

### **Programme Outcome:**

Masters degree in Arabic offers a deep insight into the Arab world through its literatures. It is an advanced programme designed for students who know Arabic. The fundamental objective is to make Arabic culture and literature accessible to a wider body of postgraduate students and to provide them with training in the study of literature. Students develop an advanced understanding of Arabic literature and gain detailed knowledge of its past and present. Students have the opportunity to become familiar with, among other things, literary theory, translation techniques, the sociology of literature, the social and political dimensions of modern Arabic literature, and different genres and themes of classical, medieval and modern Arabic literature.

The two year course of Masters in Arabic covers the following features:

- PO 1:** This program offers an emphasis on the literature, culture and history of Arabic societies.
- PO 2:** Its main interests include such topics as the classical and modern Arabic prose and poetry, history of Arabic literature from pre-Islamic period to modern time, translation from Arabic to English & vice versa, Arabic linguistics and Rhetoric and research methodology. Besides, elective papers are offered that cover other important areas of Arabic language and literature, like Mahjar literature, Arabic literature in Spain.
- PO 3:** Benefits of studying Arabic language, its history and culture include a heightened ability to critically engage with text and ideas – a skill helpful in a variety of careers and social situations
- PO 4:** After completing two years course students may develop enhanced research skills and achieve proficiency in Modern Standardized Arabic, aiding in communication thereafter with Arabic-speaking peoples.
- PO 5:** The students may choose a career as an educator or researcher, teaching other students and publishing valuable studies.
- PO 6:** The subject of translation may offer exiting opportunities. By excelling this subject students can join media, embassies, multinational companies, and tourism and hospitality fields.
- PO 7:** Have the adequate knowledge about modern and classical literary genres



**PO 8:** Know the characteristics of the Arabic language and its various styles

**PO 9:** Know the influences and vulnerability of the Arabic language and its literature through the ages.

**PO 10:** The masterpieces of prose and poetry from classical to modern period have been incorporated with an aim to refine the test of students to appreciate the good writings and know the nuances of language.

**PO 11:** The pieces of prose and poetry along with their literary beauty they have good moral values to offer. They teach etiquettes and visions that make the life meaning full. They talk of truth, beauty, they make the learners sensitive to their surroundings whether human being or nature of environment. It rekindles in them the sense of appreciating and promoting the truth, beauty, equality, brotherhood, humanism, patience, empathy, compassion and bravery.

**PO 12:** Learning modern Arabic also opens the door to the vast literature of classical Arabic, including religious and secular texts.

### **Program Specific Outcome**

M. A. Arabic which is two years program offers a whole range of subjects including classical and modern prose and poetry, history of Arabic literature, translation and composition, applied Arabic grammar, rhetoric and linguistics. The main purpose of the program is to make student good in Arabic language and literature and proficient in expressing themselves in both written as well as spoken language, and upon completing the course students will:

**PSO 1:** Enhance the skills of artistic sense, scientific and critical thought and sound critical consciousness.

**PSO 2:** Critically analyse literature whether in poetry or prose and produce high quality researches and compose works in different genres.

**PSO 3:** Know the Arab society and culture through Arabic literature as well as develop a taste to appreciate good writings.

**PSO 4:** Prepare scientific research according to the research scientific methods

**PSO 5:** learn translation technique a very important skill from carrier point of view

**PSO 7:** Teach the language and literature at institutes and universities.

**PSO 8:** To qualify academic specialists who are able to pursue research and work at academia.

**Course Title: Classical Arabic Prose-I**

**Course Code: MAR-141**

**CO 1** Introducing the students to classical Arabic prose of the distinguished writers of Pre- Islamic, Islamic and Umayyad periods

**CO 2** To develop a taste for appreciating masterpieces of Arabic language

**CO 3** To enrich with vocabulary

**CO 4** To acquaint with different literary styles

**CO 5** To enhance writing and speaking skills

**Course Title: Classical Arabic Poetry-I**

**Course Code: MAR-142**

**CO 1** Introducing students to classical Arabic poets covering pre-Islamic, Islamic and Umayyad periods in order to acquaint them with one of the richest and most rewarding areas of Arabic literature

**CO 2** To make students familiarize with the polity of Islam developed on Divine guidelines

**CO 3** To sharpen students' awareness of the significance of poetry to the understanding of vital cultural, social and political processes in Arab societies

**CO 4** To develop their aesthetic sense and train them in functional and creative writing and methods of expression

**CO 5** To examine the influence of Islam on the poetry of this period

**CO 6** To examine intellectual, emotional, and political changes which resulted in developing and reviving the arts and purposes of poetry.

**Course Title: History of Arabic Literature-I**

**Course Code: MAR-143**

**CO 1** To introduce students to the developments in Arabic literature in their chronological order from Pre Islamic period to Abbasid period

**CO 2** To make aware of major historical developments during abovementioned different periods in which distinguished poets & writers lived and enriched Arabic language & literature

**CO 3** Student will be able to evaluate literary works in right perspective

**CO 4** Understand the major Arab authors and Arabic texts and their significance in the development of Arabic literature.

**CO 5** To Identify and characterize Arabic literary genres and locate their aesthetics, ethics and politics in the context of their cultural context and historical development

**Course Title: Applied Arabic Grammar and Morphology**

**Course Code: MAR-144**

**CO 1** Definition of syntax and morphology, their relationship to other sciences of language.

**CO 2** Students will be equipped with morphology and syntax, and art of basic sentence construction

**CO 3** Will be able to gain an elementary understanding of Arabic sentence construction so that they may apply this in spoken and written formulation of simple, everyday language

**CO 4** Develop a reasonable standard of pronunciation

**CO 5** Recognise and use Arabic script in context and be able to compose dialogues and notes

**Course Title: Classical Arabic Prose-II**

**Course Code: MAR-241**

**CO 1** Introducing the students to classical Arabic prose of the distinguished writers of Umayyad , Abbasid and later periods.

**CO 2** To develop a taste for appreciating good writings of Arabic language

**CO 3** To enrich vocabulary stock of the students

- CO 4 To acquaint them with different literary styles
- CO 5 To improve further their writing and speaking skills

**Course Title: Classical Arabic Poetry-II**

**Course Code: MAR-242**

- CO 1 Introducing students to classical Arabic poets from Abbasid and Andalusian periods in order to acquaint them with one of the richest and most rewarding areas of Arabic literature.
- CO 2 To sharpen students' awareness of the significance of poetry to the understanding of vital cultural, social and political processes in Arab societies.
- CO 3 To develop their aesthetic sense and train them in functional and creative writing and methods of expression
- CO 4 To examine the Ajami influence on the poetry of this period
- CO 5 To examine intellectual, emotional, and political changes which resulted in developing and reviving the arts and purposes of poetry

**Course Title: History of Arabic Literature-II**

**Course Code: MAR-243**

- CO 1 To introduce students to the developments in Arabic literature in modern period
- CO 2 To make them aware of major socio-cultural developments in which distinguished poets & writers lived and enriched Arabic language & literature
- CO 3 To enable the student to evaluate literary works in right perspective
- CO 4 To understand the major Arab authors and Arabic texts and their significance in the development of Arabic literature.
- CO 5 To Identify and characterize Arabic literary genres and locate their aesthetics, ethics and politics in the context of their cultural context and historical development.

**Course Title: Fundamentals of Arabic Language (CBCS)**

**ARB-208**

- CO 1 Arabic Alphabets and then simple sentences
- CO 2 Equip them with basic morphology and syntax
- CO 3 Basic rules of Arabic syntax
- CO 4 Enable them to construct basic sentence in Arabic, and acquire some vocabulary which will help them to conduct basic conversations
- CO 5 Shall be able to understand simple textbooks

**Course Title: Modern Arabic Prose-I**

**Course Code: MAR-341**

- CO 1 Students will get acquainted with Arabic prose of the distinguished writers of modern period.
- CO 2 Develop a taste for appreciating good writings of Arabic language.
- CO 3 Will come across different literary trends
- CO 4 To enrich their vocabulary
- CO 5 Acquaint them with different literary styles and improve further their writing and speaking skills

**Course Title: Modern Arabic Poetry-I**

**Course Code: MAR-342**

- CO 1 Introduce students to the master pieces of modern Arabic poetry to acquaint them with the continuing poetic literary heritage.
- CO 2 Sharpen their awareness of the significance of poetry to the understanding of vital cultural, social and political processes in Arab societies.
- CO 3 Develop their aesthetic sense and train them in functional and creative writing and methods of expression.
- CO 4 Examine the influence of western literary trends on the poetry of this period.
- CO 5 Bring into their notice the new ways of poetic expressions in accordance with socio-political and cultural changes

**Course Title: Translation and Composition-I**

**Course Code: MAR-343**

- CO 1 Enriching the vocabularies of students
- CO 2 Assisting them in mastering both Arabic and English languages
- CO 3 Enabling them to translate different kind of passages
- CO 4 Teaching them how to compose articles
- CO 5 Teaching them how to draft different kind of letters and applications

**Course Title: Fundamentals of Rhetoric**

**Course Code: MAR-344**

- CO 1 Developing the critical thinking of the students through rhetoric
- CO 2 Enabling them to comprehend the beauty of the language in both prose & poetry
- CO 3 Making them able to distinguish between standard and sub-standard expressions

**Course Title: Fundamentals of Literary Criticism**

**Course Code: MAR-345**

- CO 1 Sharpening the aesthetic sense of the students.
- CO 2 Improving their critical judgment and artistic taste
- CO 3 Make them able to articulate the broader ways in which literary theory applies to their own culture, global culture, and their own lives.
- CO 4 Exposing them to the expression of the human person's creative nature and to develop a respect for it
- CO 5 Get acquainted with the towering figures in the field of Arabic literary Criticism

**Course Title: Arabic Literature in India**

**Course Code: MAR-346**

- CO 1 to give students basic information regarding Indo-Arab relations
- CO 2 To introduce them to Indian Arabic Literature; prose and poetry
- CO 3 To make them understand the major Indian authors and Arabic texts and their significance in the development of Arabic literature
- CO 4 To present an outline of major educational institutions that played significant role in promoting Arabic language in India
- CO 5 To enable the student to evaluate literary works in right perspective

**Course Title: Mahjar Literature**

**Course Code: MAR-347**

- CO 1 Introducing students to one of the most important part of Arabic literature i.e. Diaspora literature
- CO 2 Acquaint them with the western literary influences
- CO 3 Introduce them to the major Arabic literary movements north and south America
- CO 4 The influence of Mahjar literature on Arabic literature in Arab world
- CO 5 Making the them aware of the contribution of Arabic Journalism to the development of Arabic literature

**Course Title: History of Arabic Literature in Spai**

**Course Code: MAR-348**

- CO 1 About one of the most precious Arabic literary heritage developed in Spain
- CO 2 The emergence Islamic State in Spain
- CO 3 Will be aware of the difference between Arabic Literature in Arab world and Spain
- CO 4 Know new poetic forms that developed in Spain
- CO 5 Have a glimpse of the giants of literature in the field of oratory, poetry and other fields of literature

**Course Title: Arabic Prose and Poetry in Spain**

**Course Code: MAR-349**

- CO 1 Introducing the students to classical Arabic prose and poetry of Andalusian period
- CO 2 To develop a taste for appreciating masterpieces of Arabic language
- CO 3 To enrich their vocabulary
- CO 4 To acquaint them with different literary styles
- CO 5 To improve their writing and speaking skills.

**Course Title: Modern Trends in Arabic Literature**

**Course Code: MAR-350**

CO 1 The students may get acquainted with the latest development in the field of Arabic literature  
CO 2 They will be introduced to western influences on Arabic literature  
CO 3 Introducing them to Neo-Classism, Romanticism, Realism, Symbolism, Modernism and Post Modernism  
CO 4 Acquainting them with new developments in the form and theme of Arabic literature  
CO 5 Introducing them to forms of free verse and blank verse in modern Arabic poetry  
**Course Title: Modern Arabic Prose-II** **Course Code: MAR-441**

CO 1 Introducing the students to Arabic prose of the distinguished writers of modern period.  
CO 2 Developing a taste for appreciating good writings of Arabic language  
CO 3 To acquaint them with modern literary trends  
CO 4 To improve their writing and speaking skills  
CO5 To enrich their vocabulary  
**Course Title: Modern Arabic Poetry-II** **Course Code: MAR-442**

CO 1 Introducing students to the master pieces of modern Arabic poetry to acquaint them with the continuing poetic literary heritage.  
CO 2 To sharpen their awareness of the significance of poetry to the understanding of vital cultural, social and political processes in Arab societies.  
CO 3 To develop their aesthetic sense and train them in functional and creative writing and methods of expression.  
CO 4 To examine the influence of western literary trends on the poetry of this period.  
CO5 To bring into their notice the new ways of poetic expressions in accordance with socio-political and cultural changes.  
**Course Title: Translation and Composition - II** **Course Code: MAR-443**

CO 1 Enriching the vocabularies of students  
CO 2 Assisting them in mastering both Arabic and English languages  
CO 3 Enabling them to translate different kind of passages  
CO 4 Teaching them how to compose articles  
CO 5 Teaching them how to draft different kind of letters and applications  
**Course Title: Arabic Linguistics** **Course Code: MAR-444**

CO 1 Have the knowledge basics of linguistics and Arabic linguistics  
CO 2 Making the students recognize important historical trends in the evolution of the Arabic language and its classification within the Semitic language family  
CO 3 Acquainting them with the importance of Arabic phonetics  
**Course Title: Research Methodology** **Course Code: MAR-445**

CO 1 Introducing the students to the meaning and significance of research.  
CO 2 Making them aware of basic methods and tools of research.  
CO 3 Acquainting them how to prepare synopsis.  
**Course Title: Project-Viva Voce** **Course Code: MAR-445**

**Objective:**

In this paper the student will require to prepare a project on any literary topic assigned by the Department. After the submission of the Project a Viva Voce examination will be held and the student will be asked questions from the project as well as his overall knowledge which he gained through the four semesters will be assessed.

## **Programme: BA (Hons.) Arabic**

### **Program Outcomes**

B.A. Arabic is a 3-year undergraduate course involving an advanced study of the history, usage, and culture of the Arabic language. This program will enable the students to achieve near-native proficiency in modern Arabic while studying the language within its cultural and historical context.

Although the focus will be on Arabic, they will also know other languages and sciences. This program offers a variety of subjects ranging from Arabic to Islamic studies and Urdu. They include Arabic text; prose and poetry, Arabic Grammar, history of Arabic literature, translation from English to Arabic and vice versa, oral expression in Arabic, an introduction to the Urdu language and literature, Islamic studies and its different aspects and communicative English.

- PO 1:** Students will start as an absolute beginner in reading, writing, speaking and listening comprehension of Arabic and develop to an advanced level by the end of the four-year course.
- PO 2:** The course is carefully structured so students can measure their progress step by step
- PO 3:** Know the basics of the Arabic language skills: reading writing listening and speaking.
- PO 4:** Know the Arabic syntax and morphology
- PO 5:** Know the cultural and knowledge-based of the genesis of the Arabic language and the history of its development.
- PO 6:** Know the rules of verb forms
- PO 7:** Know the poetry rhyme
- PO 8:** Speak standard Arabic language
- PO 8:** Express correct text according to their rules
- PO 9:** Express their written language by taking into consideration the grammar, spelling and morphological ( form and content )
- PO 10:** They will also look more widely at Arab culture and literature, and be introduced to social and cultural trends in the Arab Middle East and beyond.
- PO 11:** You will also have access to the award-winning University Careers Service
- PO 12:** Studying Arabic will lead to many openings for the graduates of the Arabic language in fields such as journalism, business and industry, education, finance and banking, translation and interpretation, consulting, foreign service and intelligence, as well as many others.

## Program Specific Outcome (PSO)

The program of BA (Hons) in Arabic consists of one main subject i.e. Arabic and four subsidiary subjects; (a) Urdu, (b) Islamic Studies, (c) General English and (d) Environmental science. While the purpose of the program is to prepare the students for post graduation and research in Arabic, they cannot master the target language without having a good knowledge of other sciences and languages. Hence Urdu, English, Islamic Studies and Environmental science shall make their comprehension of the language they are learning finer and their overall intellectual development more robust and rich.

**PSO1:** The students after completing BA (Hons) Arabic will have a clear concept of the richness and usefulness of Arabic language.

**PSO2:** They will be able to use Arabic for their benefit in their day to day life

**PSO3:** Their reading of grammar and texts will enable them in understanding simple Arabic prose and poetry, help them in composing simple sentences, and improve their communication skill.

**PSO4:** They will have basic and necessary information about the origin and development of Urdu Language, in addition to their study of fine pieces of Urdu prose and poetry

**PSO5:** Likewise after completing this course students would be able to communicate into English.

**PSO6:** Besides this also will make them more sensitive towards their environment and surroundings.

### Arabic Text-I

**BAR-111**

CO 1 Introducing the students to the basics of Arabic Language

CO 2 Helping them build their vocabulary

CO 3 Helping them practice to pronounce Arabic correctly

CO 4 Students will be able to understand the structure of sentences grammatically

CO 5 It will develop their writing and speaking skills

### Arabic Grammar (Syntax & Morphology) I

**BAR-112**

CO 1 Introducing the students to the basics of Arabic Language

CO 2 Helping them build their vocabulary

CO 3 Helping them practice to pronounce Arabic correctly

CO 4 Students will be able to understand the structure of sentences grammatically

CO 5 It will develop their writing and speaking skills

### Arabic Grammar (Syntax & Morphology) I

**BAR-112**

CO 1 Students will get introduced to the alphabets of Arabic language

**CO 2** They will know the basics of Arabic syntax and morphology

**CO 3** Make them read, write and speak the language correctly

**CO 4** They gain an elementary understanding of Arabic sentence construction

**CO 5** Develop a reasonable standard of pronunciation

**Urdu-I Ghazal and Nazm**

**BAR-113**

**CO 1** Introducing the students to the origin and development of Urdu poetry

**CO 2** Acquainting them with the great figures of Urdu poetic tradition

**CO 3** Introducing them with the masterpieces of Urdu Ghazal

**CO 4** Acquainting them with the good pieces of Nazm literature in Urdu

**CO 5** Ultimately to develop their taste for appreciating the best of Urdu poetry

**Islamic Studies-I (Islam: Early Phase)**

**BAR-114**

**CO 1** Familiarize the students with the Prophethood of Mohammad (PBUH) and the basis of Islamic brotherhood on the principles of Tauhid

**CO 2** To acquaint them to the vision and mission of Prophethood of Mohammad (PBUH) through his social reformation-ideals

**CO 3** Will be able to gain an elementary understanding of Arabic sentence construction so that they may apply this in spoken and written formulation of simple, everyday language

**CO 4** To know and involve the qualities of justice and brotherhood as accomplished by the followers of Prophethood of Mohammad (PBUH)

**CO 5** To get acquainted with the achievements of pious caliphs specially in the formation of good governance and welfare.

**General English-I**

**BAR-115**

**CO 1** To acquaint the students with the different literary genres like poetry, prose and short stories

**CO 2** To broaden their horizons and inculcate reading habits through introducing them to celebrated poets.

**CO 3** To make them proficient in English grammar

**CO 4** To inculcate democratic values in the students

**CO 5** To improve reading, writing and speaking skills

**Arabic Text-II**

**BAR-211**

**CO 1** Introducing the students to the basics of Arabic Language



- CO 2 Helping them build their vocabulary
- CO 3 Helping them practice to pronounce Arabic correctly
- CO 4 Understand the structure of sentences grammatically
- CO 5 Developing their writing and speaking skills

**Arabic Grammar (Syntax & Morphology) II**

**BAR-212**

- CO 1 Introducing the students to the alphabets of Arabic language
- CO 2 Introducing students to the basics of Arabic syntax and morphology
- CO 3 Making them read, write and speak the language correctly
- CO 4 Making them able to gain an elementary understanding of Arabic sentence construction
- CO 5 Developing a reasonable standard of pronunciation

**Urdu –II (Qasida, Marsiah, Masnawi and Rubayee)**

**BAR-213**

- CO 1 Introducing the students to the origin and development of Urdu Ode and its basic components
- CO 2 Introducing them to the masterpieces of Urdu ode
- CO 3 Introducing them to the Urdu Elegy
- CO 4 Introducing them to the masterpieces of Urdu elegy
- CO 5 Introducing them to the best Pieces of Urdu Mathnawi

**Islamic Studies-II (Islam: A way of Life)**

**BAR-214**

- CO 1 Introducing the students to the basic principles of Islam
- CO 2 Acquainting them with beliefs or Imaniyat of Islam
- CO 3 Introducing them to the Ibadat or Prayer in Islam
- CO 4 Acquainting them with the rights of Allah in Islam
- CO 5 Acquainting them with social and moral systems of Islam

**General English-II**

**BAR-215**

- CO 1 To acquaint the students with the different literary genres like poetry, prose and short stories
- CO 2 To broaden their horizons and inculcate reading habits through introducing them to celebrated poets.
- CO 3 To make them proficient in English grammar
- CO 4 To inculcate democratic values in the students

**CO 5** To improve reading, writing and speaking skills

**Arabic Text-III**

**BAR-311**

**CO 1** Introducing the students to the basics of Arabic Language

**CO 2** Helping them build their vocabulary

**CO 3** Helping them practice to pronounce Arabic correctly

**CO 4** Understand the structure of sentences grammatically

**CO 5** Developing their writing and speaking skills

**Arabic Grammar -III (Syntax & Morphology)**

**BAR-312**

**CO 1** Introducing the students to the alphabets of Arabic language

**CO 2** Introducing students to the basics of Arabic syntax and morphology

**CO 3** Making them read, write and speak the language correctly

**CO 4** Making them able to gain an elementary understanding of Arabic sentence construction

**CO 5** Developing a reasonable standard of pronunciation

**Urdu –III (Mazmoon Nigari & Khaka)**

**BAR-313**

**CO 1** Introducing the students to the origin and development of Urdu prose

**CO 2** Acquainting them with the contribution of scholars like Sir Sayyed, Shibli and Hali to the development of Urdu prose

**CO 3** Introducing them to Urdu Khaka Nigari

**CO 4** Acquainting them with the major writers of Khaka nigari

**CO 5** Acquainting them with the masterpieces of Khaka nigari

**Islamic Studies-III (Islamic Civilization under Abbasid and Muslim Spain)**

**BAR-314**

**CO 1** To acquaint students with the later developments of Islamic history since the culmination of Khilafat by Khulafa e Rahedun

**CO 2** To familiarize them with the cultural synthesis of different communities during Umayyed and Abbasid regimes in the early medieval period

**CO 3** To introduce them with the cultural, religious diversity under Muslim rule

**CO 4** To aware them about the intellectual and scientific contribution of Muslims during Umayyed, Abbasid and Spanish period of Muslim rule.

**CO 5** To enable the student to evaluate literary works in right perspective

**General English-III****BAR-315**

CO 1 Assisting the students to improve their writing and speaking skills

CO 2 To inculcate social values among students

CO 3 To introduce them to classical English prose

CO 4 To introduce them to beautiful English poetry

CO 5 To make them proficient in English communication

**Environmental Science****BAR-316**

CO 1 Making the students aware of the importance of their surroundings

CO 2 familiarizing students with their immediate environment

CO 3 making them aware of consequences of human onslaught on the environment

CO 4 educating them about the measures to be taken for mitigating the impending

CO 5 Making the students aware of the importance of their surroundings

**Arabic Text-IV****BAR- 411**

CO 1 Introducing the students to the Arabic prose

CO 2 Enable them to analyze the lessons grammatically

CO 3 to improve their reading and writing skill

CO 4 making them proficient in spoken Arabic

CO 5 inculcate good values through moral stories

**Arabic Grammar IV (Syntax & Morphology)****BAR- 412**

CO 1 Introducing the students to the alphabets of Arabic language

CO 2 Introducing students to the basics of Arabic syntax and morphology

CO 3 Making them read, write and speak the language correctly

CO 4 Making them able to gain an elementary understanding of Arabic sentence construction

CO 5 Developing a reasonable standard of pronunciation

**Urdu- IV (Novel & Afsana)****BAR- 413**

CO 1 introducing the students to the origin and development of Urdu novel and short story

CO 2 Acquainting them with the components of novel and short story

CO 3 Acquainting them with the difference between novel and novella

CO 4 Introducing them to the masterpieces of Urdu novel and short story

CO5 Introducing them to the great figures of Urdu novel and short story

**Islamic Studies-IV (Islamic Sciences)**

**BAR- 414**

CO 1 Introducing the students to the origin and development of Islamic Sciences; Tafseer, Hadith and Fiqh

CO 2 Acquainting them with great scholars of the abovementioned sciences

CO 3 Acquainting them with the milestones in the field of Quran , Hadith and Fiqh

CO 4 Introducing them to the origin and development of Islamic Mysticism

CO5 Acquainting them with great personalities in the field of Tasawwuf

**General English-IV**

**BAR- 415**

CO 1 Assisting the students to improve their writing and speaking skills

CO 2 To inculcate social values among students

CO 3 To introduce them to classical English prose

CO 4 To introduce them to beautiful English poetry

CO 5 To make them proficient in English communication

**Arabic Prose**

**BAR- 511**

CO 1 Introducing the students to the masterpieces of Arabic prose

CO 2 Enable them to analyze the lessons grammatically

CO 3 to improve their reading and writing skill

CO 4 making them proficient in spoken Arabic

CO 5 inculcate good values through moral stories

**Translation (Arabic-English & Vice Versa)**

**BAR- 512**

CO 1 Enriching the vocabularies of students

CO 2 Assisting them in mastering both Arabic and English languages

CO 3 Enabling them to translate different kind of passages

CO 4 Teaching them how to compose articles

**Introduction to the Arab World**

**BAR- 513**

**CO 1** Introducing students to the social, political and cultural history of the contemporary Arab world

**CO 2** Making them aware of the developments in different spheres of life there before and after oil exploration in Arab world

**CO 3** Helping them in understanding Arabic language and literature in a better way

**Urdu-V (Drama & Tanzo Mazah)**

**BAR-514**

**CO 1** Introducing the students to the origin and development of Urdu drama

**CO 2** Acquaint them with the basic components of drama

**CO 3** Intruding them major figures as well as masterpieces of urdu drama

**CO 4** Introducing them to literature of satire in urdu

**CO 5** Acquainting them to the best writers and their writings in satire in Urdu literature

**Islamic Studies-V (Islam in the modern world)**

**BAR- 515**

**CO 1** Introducing students to the concept of revival and reform in Islam

**CO 2** Acquainting them with the reform movements of early nineteenth century and their causes

**CO 3** Introducing them to the impact of modernization on Muslim governments in the places like turkey and Iran

**CO 4** To make them avail the ideals of reform by the great intellectuals and thinkers of Islam

**General English-V**

**BAR- 516**

**CO 1** Assisting the students to improve their writing and speaking skills

**CO 2** To inculcate social values among students

**CO 3** To introduce them to classical English prose

**CO 4** To introduce them to beautiful English poetry

**CO 5** To make them proficient in English communication

**Arabic Prose and Poetry**

**BAR-611**

**CO 1** Introducing the students to classical Arabic prose and poetry

**CO 2** Making them appreciate the literary beauty of Arabic language

**CO 3** Enable them to analyze the lessons grammatically

CO 4 to improve their reading and writing skill

CO 5 making them proficient in spoken Arabic

**Oral Expression in Arabic**

**BAR-612**

CO 1 Acquainting the students with the importance of communication into Arabic

CO 2 Introducing them to the basic grammar and simple sentences of Arabic

CO 3 Improving their vocabulary stock

CO 4 Enabling them to communicate and express themselves fluently in Arabic

CO 5 Preparing them for jobs abroad specially in Arab countries

**History of Arabic Literature**

**BAR-613**

CO 1 Introducing students to the developments in Arabic literature in their chronological order

CO 2 Acquainting them with major historical developments of different periods

CO 3 Introducing them to poets & writers who enriched Arabic language and literature

**Urdu- IV (Adabi Tanqeed)**

**BAR-614**

CO 1 Introducing the students to the basic concept of literary criticism

CO 2 Acquainting them with different schools of criticism

CO 3 Acquainting them with the influences of western criticism on Urdu criticism

CO 4 Acquainting them with major types of criticism

CO5 introducing them to the great writers who contributed significantly in developing the Urdu criticism as well as the literary trends

**Islamic Studies- VI (Islamic Tenets and Institution)**

**BAR-615**

CO 1 To acquaint the students with the basic Islamic tenets like Tauheed that forms the basis of Islamic world view

CO 2 To familiarise them with the essence of Sirah of the Prophet (PBUH) for better understanding of the Quranic principles

CO 3 To make them to comprehend the importance of marriage and family institutions for building up a healthy society

CO 4 To cultivate in them the spirit of learning the educational principles as laid down by Islam

CO5 To introduce them to economic and political teachings of Quran and Sunnah and place the contribution of such teachings in contemporary

**General English-VI**

**BAR-616**

**CO 1** Introducing the students to the best pieces of English prose

**CO 2** Introducing them to beautiful English poetry

**CO 3** Improving their knowledge of grammar

**CO 4** Cultivating their taste for appreciating the beauty of literature

**CO 5** Making them proficient in English language

## **Programme: M. Sc. MATHEMATICS**

### **PROGRAMME OUTCOMES**

There are two levels of Programmes that we run in the Department of Mathematical Sciences:

#### **1. Post Graduate Programmes and 2. Research Programmes.**

After a student completes a Post Graduate Program successfully from our department, we expect he/ or she

**PO1:** has understood the basic principles of learning of Mathematics.

**PO2:** has acquired sufficient knowledge of Mathematics, based on which he or she can learn further independently.

**PO3:** understands the role of Mathematics in various branches of Science and Humanity subjects.

**PO4:** has all the basics covered that are required to handle National and State Level Eligibility tests(NET/ SET).

**PO5:** has developed good communication skills.

**PO6:** has acquired some computer related skills and has a sound knowledge of MATLAB, LATEX and SPSS.

**PO8:** has learned fundamental techniques involved in core courses of Mathematics, based on which he or she can contribute towards the creation of new knowledge, of international standards, in a specific areas of his/ her interest.

**PO9:** can contribute in transferring of knowledge to the younger generation.



After a student completes a Research Program successfully from our department, we expect, in addition to the above mentioned points, he/ or she

**PO10:** has understood the basic ethics of doing quality research.

**PO11:** has a fair understanding of current potential research areas. has a fair knowledge of Plagiarism so that he or she may not get involved in any kind of embarrassing situation.

**PO12:** has understood the importance of interdisciplinary research.

**PO13:** has understood his/ her role for the development of the society.

### **PROGRAMME SPECIFIC OUTCOMES (PSO)**

#### **M. Sc. MATHEMATICS(Regular and Evening)**

After completing this program successfully, we expect a student

**PSO1.** to have sufficient understanding of some core areas of Mathematics such as Real and Complex Analysis, Topology, Functional Analysis and Operator theory, Abstract and Linear Algebra, Galois theory, ODE, Numerical Analysis etc.

**PSO2.** to have sufficient knowledge of applications of above mentioned mathematical areas in various other fields of Mathematics and real world.

**PSO3.** to have deep understanding of that part of Mathematics which he or she encounters in National and State Level Eligibility tests(NET/ SET).

**PSO4.** to have a training of surfing internet for research purposes and to do team work through projects undertaken by the students in final semester.

**PSO5.** is prepared with such a strong background of the subject that he/she can do quality research of international repute in core areas of Mathematics.

**PSO6.** is prepared with such a strong background of the subject that he / she can acquire advanced knowledge of the subject independently.

**PSO7.** is enabled with good communication skills in both verbal and written forms.

**PSO8.** gets enough confidence to speak before gatherings by making him to go through a series of presentations in the class room during his / her course of the study.

**PSO9.** have sufficient computer skills which he / she requires in his / her further studies in the subject.

**PSO10.** have sufficient introduction to Mathematical software MATLAB, LATEX and SPSS.

**Course Outcomes:**

On successful completion of this course, we expect that a student

1. Should be able to explain the concepts of Euclidean, Metric & Topological spaces with standard examples.
2. Should be able to explain the concepts and properties of interior & accumulation points, open, closed, connected & compact sets in Euclidean, Metric & Topological spaces.
3. Should be able to explain the concepts of closure & interior of a set in a topological space and their various properties.
4. Should know the fundamental theorems such as Bolzano- Weirstrasstheorem(BWT), Cantor's intersection theorem(CIT), Lindelof covering theorem(LCT), Heine - Borel theorem(HBT) in  $\mathbb{R}^n$  and also should be able to explain the validity of these theorems (as usually been stated in  $\mathbb{R}^n$ ) in general metric spaces.
5. Should be able to explain the connection between metric spaces and error correcting codes and DNA sequences.
6. Should be able to explain the connection between topological spaces and modeling of digital image displays and applications to geo information system.
7. Should be able to explain the concept of convergence of a sequence and Cauchy sequence and their various properties in Topological spaces.
8. Should be able to explain the concept of Continuity with its various versions in Topological spaces and its connections with connected and compact sets.

**Course Title: Techniques in Differentia Equations**

**Course Code: MS -102**

**Course Outcomes:**

After studying this course we expect a student have understood

1. The concept of homogeneous and non-homogeneous linear differential equations and the method of finding its general solution.
2. How to find the power series solution of homogeneous differential equations at singular points and ordinary points.
3. How to find the solution of linear system by operator method.

4. The basic theory of linear system of differential equations in normal form & matrix method for solving homogeneous linear system with constant coefficients.
5. The concept of Laplace transform & its basic properties.
6. How to find the solution of linear differential equation by using Laplace transform.
7. The concept of Sturm-Liouville problem, orthogonality of characteristic functions & expansion of functions in a series of orthogonal functions.
8. The concept of trigonometric Fourier series and its convergence.

**Course Title: Real Analysis**

**Course Code: MS -103**

**Course Outcomes:**

After going through this course a student must be able to

1. Explain upper & lower sums, Upper & lower integral & hence Riemann integral.
2. Develop the basic criterion for the existence of Riemann integral and connection between the existence of Riemann integral with monotonicity & continuity.
3. Differentiate between point wise & uniform convergence of sequences & series of functions.
4. Elaborate Cauchy criterion for uniform convergence of sequences & series of functions & hence connection of uniform convergence with differentiation integration & continuity.
5. explain the convergence and absolute convergence of improper integral of both type –I & II
6. explain the concepts of measurable sets, measurable functions with their basic properties.
7. Describe the integral of a measurable function with their properties.
8. Explain the fundamental theorems such as Fatou's lemma, monotone convergence theorem, Vitali's theorem, Lebesgue convergence theorem etc.

**Course Title: Applied Numerical Analysis**

**Course Code: MS -104**

**Course Outcomes:**

After studying this course a student should be able to

1. Solve algebraic transcendental equation using an appropriate numerical method.
2. Approximate a function using an appropriate numerical method.
3. explain how to fit experimental data into different curves.
4. explain the concept of Spline, Bernstein's Polynomials and Bezier curve.
5. Perform an error analysis for a given numerical method.

6. explain central differentiation formulas, Richardson's extrapolation, differentiation of Lagrange's and Newton's polynomials.
7. Explain Newton's cotangent formulae such as, Trapezoidal, Simpson's rules, Boole's rules, Romberg integration and their error analysis.

**Course Title: Computer Fundamentals and C-Programming Course Code: MS -105**

**Course outcomes:** After completing this course a student

1. should be able to explain the concepts of input and output devices of computer and their working.
2. should know the uses of different types of worksheets like WordPad, MS- office and excel sheet.
3. should be able to design programs connecting decision structures, loops and functions.
4. should be able to explain the difference between call by value and call by address.
5. should be able to explain the dynamic behavior of memory by the use of pointers.

**Course Title: Lab course on MS-104 & MS-105**

**Course Code: MS -106**

**Course outcomes:**

After completing this course a student

1. Should be able to appreciate the use of computers in engineering industry.
2. Should have developed in him / her the basic understanding of computers, the concept of algorithms and algorithmic thinking.
3. Should have developed in him / her the ability to analyze a problem and develop an algorithm to solve it.
4. Should know the use of the C - programming language to implement various algorithms.

**Course Title: Numerical Linear Algebra Course Code: MS-201**

**Course outcomes**

On successful completion of this course we expect a student will be able to

1. explain vector space, linear dependence / independence, basis and dimension, linear transformation, change of basis matrix, permutation and its signature.
2. explain the concept of characteristic polynomial to compute the eigen values and eigen vectors of a square matrix and Cayley-Hamilton theorem.
3. explain the concept of minimum polynomial of a matrix and its properties, primary decomposition theorem and diagonalization.
4. explain the concept of Nilpotent linear transformations, Jordan decomposition theorem, Jordan

Block Matrix, Jordan form, Jordan basis.

5. explain the concept of bilinear forms, symmetric and skew symmetric bilinear forms, quadratic form and its properties.
6. explain the numerical methods such as Gauss- Jordan elimination method, LU factorization method, Doolittle method, Crout's method, Cholsky's method, Gauss-Seided iteration method for solving the system of linear equations.
7. explain the numerical methods such as power method, Jocabi's method, Household's method, QR method and theorems such as Gerschgorian's theorem, person's theorem.

**Course Title: Functional Analysis with Applications**

**Course Code: MS -202**

**Course Outcomes:**

On successful completion of this course, we expect a student

1. should be able to explain the concept of inner product and norm on a vector space.
2. should be able to explain the concept of normed, Banach & Hilbert spaces with standard examples and relation between them.
3. should be able to explain the concepts of bounded linear operator & bounded linear functional with standard examples.
4. should be able to explain the properties of linear operators on finite and infinite dimensional normed spaces.
5. should be able to explain the dual spaces of  $\mathbb{R}^n$  and  $l^p$  spaces and completeness of the normed space of operators.
6. should know the Banach contraction principle with applications to differential & integral equations.
7. should know the fundamental theorems such as Riez Lemma, Hahn Banach extension theorem, closed graph theorem, open mapping theorem, Principle of uniform boundedness, Bessel's

inequality, projection theorem, Parseval's relation, Baire Category theorem and Riesz theorem with applications.

8. should be able to explain the concept of separable and reflexive normed spaces.

**Course Title: Abstract Algebra with Applications**

**Course Code: MS -203**

### **Course Outcomes**

After completing this course, we expect a student have understood

1. Class equation with applications, Cauchy theorem, Sylow's theorems with applications to find simplicity of a group.
2. The concept of ring with standard examples, different classes of rings such as Integral domain, field, ideal and quotient ring.
3. The concept of ideal with standard examples, maximal and prime ideals and quotient field of an Integral domain.
4. The concept of Unique factorization domain, Euclidean ring and Principal Integral domain and relation between them.
5. The concept of Ring of Gaussian integers and polynomials with properties.
6. Gauss lemma and Eisenstein's criteria.
7. the characterization of subfields of a finite field.
8. The concept of linear code, Hamming distance, coding, decoding, and syndrome.

**Course Title: Complex Analysis with Applications**

**Course Code: MS -204**

### **Course Outcomes**

After the completion of this course a student must be able to

1. Explain the concept of extended complex plane, derivative of a complex function with its basic properties, analytic function, Cauchy Riemann equations.
2. Explain in detail the elementary complex functions such as exponential, trigonometric, hyperbolic, logarithmic, etc.
3. Describe contour integral, convex hull, open convex sets, simple connected domains & winding number etc.
4. Provide the proof of theorems like Cauchy-Goursat theorem, Cauchy integral formula, Cauchy inequality, Morera's theorem, Liouville's theorem, fundamental theorem of Algebra, maximum, minimum modulus theorem, Schwarz lemma Borel-Carathéodory theorem, reflection principle etc.

5. Differentiate between isolated and non- isolated regularities, zeroes and poles and should be able to find residues.
6. Explain the theorems like Riemann theorem, Residue theorem, Casorati-Weierstrass theorem, argument principle, Hurwitz theorem, Jordan's lemma, Poisson integral formula, Riemann mapping theorem etc.
7. find real integrals by using complex analysis techniques and construction of harmonic functions.
8. Describe Bi-linear transformation with its basic properties and the concept of cross ratios.

**Course Title: MatLab**

**Course Code: MS -205**

**Course Outcomes**

After studying this course, we expect a student have understood

1. the applicability of MATLAB in Mathematics in particular and engineering applications in general.
2. the commands of MATLAB which one uses to solve elementary problems of numerical Analysis.
3. the concept of M-file and Script file along with control flow programming.
4. the plotting of graphs of functions by using syntax and semantics.

**Course Title: Advanced Topics in Topology**

**Course Code: MS-301**

**Course Outcomes:**

After completing this course a student should be able to

1. explain the concepts of Compactness, Limit point compactness, local compactness, sequential compactness and relations between them.
2. explain the concepts of first and 2<sup>nd</sup> countable spaces, Lindeloff spaces regular spaces, normal spaces, metrizable spaces, compact Hausdorff spaces, Para-compact spaces normed spaces and relations between them.
3. explain the fundamental theorems such as Urysohn's Lemma, Urysohn's metrization theorem, imbedding theorem, Tietz extension theorem, Tychonoff theorem, Nagata- Smirnov metrization theorem, Lemma of E. Michael, Smirnov metrization theorem, Ascoli's theorem.
4. explain the concepts and examples of Nets, subnets, filters, subfilters and connection between them.
5. explain the concepts of convergence of a net and filter and their relationship with continuity.
6. explain the concepts of manifolds and embedding of a compact manifold in  $\mathbb{R}^n$ .
7. explain the concept of Compactification of a space and its relation with continuous maps.
8. Explain the concepts of totally boundedness and completeness in metric spaces and their relationship with compactness.

**Course Outcomes:**

*On successful completion of this course, we expect a student*

1. *should be able to explain the concept of spectrum of a bounded linear operator(BLO) with examples and properties such as compactness and spectral radius.*
2. *should be able to explain the spectral mapping theorem for polynomials, concept of compact linear operator(CLO), its basic properties and its connection with BLOs and weak convergence.*
3. *should be able to explain the compactness of adjoint of CLO and compactness of product of two CLOs.*
4. *should be able to explain the cardinality of spectrum and relation between spectral values and eigen values of a CLO.*
5. *should be able to explain the basic spectral properties of a self adjoint BLOs such as realness of the spectrum, spectrum bounds and their relationship with norm of the operator and emptiness of residual spectrum.*
6. *Should be able to explain the concept and properties of positive operator, square root of a positive operator, projection operators and their properties such as sum, difference and product.*
7. *should be able to explain the concept and properties of spectral family of a self adjoint BLOs with properties.*
8. *should be able to explain the concepts of +ve and -ve parts of an operator and their basic properties.*

***Course outcomes***

After studying this course we expect student should be able to explain

1. the concept of continuity, directional, partial and total derivatives and their relationships with each other.
2. the fundamental theorems such as Chain rule, mean value theorem, Taylor's theorem, Inverse and Implicit function theorems and their applications.
3. The concept of the Jacobian matrix, the condition of equality of mixed partial derivatives, the concept of Extreme-Values of multi-variable functions and Lagrange's multipliers.
4. The concept and properties of multiple integrals, iterated integrals and relationship between them.
5. The concept of improper integrals and various convergence tests such as the comparison test.
6. The concept and examples of test functions, distributions such as regular, Dirac delta, Heaviside.
7. The concepts of derivative of a distribution and convergence of distributions.
8. The product of a  $C^\infty(\mathbb{R}^n)$  function and a distribution and convolution of a test function with a distribution.



**Course Title: Set Theory**

**Course Code: MS-304**

### **Course Outcomes**

After Studying this course a student is expected to

1. explain the basic difference between finite, infinite, countable, uncountable sets and their various properties.
2. explain the arithmetic of cardinal and ordinal numbers.
3. explain the concept and examples of well ordered sets.
4. explain axiom of replacement and transfinite induction and recursion.  
explain the axiom of choice and its various equivalent forms.

**Course Title: Lab course on LATEX**

**Course Code: MAM-305**

### **Course Outcomes**

After studying this course, we expect a student have understood

1. Typeset mathematical formulae using latex.
2. Use the preamble of Latex file to define document class and layout options.
3. Use nested list and enumerate environment within a document.
4. Use tabular and array environment within latex document.
5. Use various methods to either create or import graphics into a Latex document.

**Course Title: Differential Geometry**

**Course Code: MS-306**

### **Course Outcomes:**

After completing this course a student should be able to

1. explain the concepts of diffeomorphism, tangent space and vector fields on  $\mathbb{R}^n$ , natural frame field, gradient vector field, and curves of class  $C^k$ .
2. explain the concepts of integral curve, local flow, derivative map, cotangent space and differential forms on  $R^n$ , Lie bracket, charts atlases.
3. explain the concepts of differential manifolds, induced topology on manifolds and para-compact manifolds.
4. explain the concepts of pullback functions, tangent vectors and tangent space, tangent bundle and pullback vector fields.
5. explain the concept of tensor, tensor product, tensor field, torsion tensor; curvature tensor and tensors of type  $(p, q)$ .

6. explain the properties of tensors on finite dimensional vector spaces.
7. explain the concept of symmetric and alternating tensors and their basic properties
8. explain the Bianchi and Ricci identities and the concept of geodesics and Riemannian manifold.

**Course Title: Number Theory**

**Course Code: MS-307**

**Course Outcomes**

After studying this course, we expect a student should be able to

1. explain Euclidean algorithm, Euler's Phi function and some fundamental theorems such as Fermat's theorem, Euler's theorem, Wilson's theorem Chinese remainder theorem, Gauss lemma, quadratic reciprocity law.
2. explain the concepts of power residues, Primitive roots, Legendre's symbols and Jacobi symbols.
3. explain the concept and properties of arithmetic functions and Fibonacci numbers.
4. explain Mobius inversion formulae, Diophantine equations, Pythagorean triplets and Fermat's last theorem.
5. explain the simple continued fractions, finite and infinite continued fractions, rational and irrational numbers as simple continued fractions.
6. Explain the Hurwitz theorem, periodic continued fractions and Pell's equation.

**Course Title: Module Theory**

**Course Code: MS-308**

**Course Outcomes**

After studying this course we expect a student should be able to

1. explain the concept, examples and basic properties of modules, submodules, quotient modules, simple and semi - simple modules.
2. explain the fundamental theorems on homomorphism between modules.
3. explain the concept of free modules (its various characterizations) and rank of finitely generated free modules.
4. explain the concepts of Finitely generated free module over PID, torsion module and torsion free module and the invariant factor decomposition.
5. explain some fundamental results such as structure theorem for finitely generated modulus over a PID, condition for a finitely generated module over a PID to be free module, the primary decomposition theorem and Chinese remainder theorem.
6. explain the concepts, examples and properties of projective and injective modules.
7. Explain the concept, examples and properties of Simple ring, Noetherian rings and semi-simple modules.

8. Explain some fundamental results such as condition for a ring to be semi-simple ring, necessary and sufficient condition for a ring to be Noetherian ring, Baer's criterion, Schin's lemma, Artin-Wedder Burn theorem, Hopkins Levitzki theorem.

**Course Title: Commutative Algebra**

**Course Code: MM-309**

### **Course Outcomes**

After studying this course we expect a student should be able to

1. explain the concept, examples and fundamental properties of Ring, ring homomorphism, ideals, quotient rings, zero-divisors, nilpotents and units, prime and maximal ideals, local rings, Nilradical and Jacobson radicals.
2. explain the concept, examples and properties of module, Module homomorphism, Sub - modules, Quotient modules, direct sum and product of modules, Finitely generated modules and Tensor product of modules.
3. explain the fundamental theorems such as Nakayama lemma.
4. explain the concept and properties of Localization and primary decomposition.
5. explain the concept and properties of Integral dependence, transitivity of integral dependence.
6. explain the some fundamental theorems such as going-Up and going down theorems, Hilbert basis theorem.
7. explain the concept of Noetherian and Artinian modules, Noetherian rings, irreducible ideals and primary decomposition in Noetherian rings.

**Course Title: Advanced Complex Analysis**

**Course Code: MM-310**

### **Course Outcomes**

After studying this course we expect a student should be able to

1. explain the concept of Direct analytic continuation and double periodic entire functions.
2. explain Monodromy theorem, Poisson integral formulae, open mapping and Herwitz theorem, Hadamard's three circle theorem, Schwarz lemma and its various consequences.
3. Explain the concept of infinite sum of meromorphic functions and infinite product of analytic functions.
4. explain factorization of entire functions, the gamma functions, zeta functions, order and the genus of entire functions.

5. Explain the concept and basic properties of univalent functions and normal families.
6. Explain some fundamental theorems such as the Riemann mapping theorem, Bieberbach conjecture, the Bloch-Landau theorem, Picard's theorem.
7. Explain the basics of Nevanlinna's theory with special emphasis on Nevanlinna's first and second fundamental theorem.
8. Explain the concept of order of a meromorphic function.

**Course Title: Abstract Measure Theory and Integration**

**Course Code: MS-311**

**Course Outcomes**

After studying this course we expect a student should be able to

1. explain the concept, examples and properties of Measureable space, measurable sets, measurable functions, measures and Borel sets.
2. explain the concept, examples and properties of integral of measurable function.
3. explain some fundamental theorems such as Lebesgue monotone convergence theorem, Fatou's lemma, Lebesgue dominated convergence theorem, Riesz representation theorem, Lusin's and Vitali-Caratheodory theorems, Jensen's inequality
4. explain the concepts of  $L^p$  -space and its various features such as completeness and Bounded linear functionals on it.
5. explain the concepts of complex measure, total variation, positive and negative variations, absolute continuity and some fundamental results such as Lebesgue-Radon-Nikodym(with consequences) and Hahn decomposition theorem.
6. explain the concepts of derivatives of a measure, Lebesgue points, nicely shrinking sets.
7. explain the concepts of product measures, completion of product measure, convolutions and distributions functions.

Explain some fundamental theorems such as fundamental theorem of calculus, Fubini's theorem with applications

**Course Title: Dissertation/Major Project**

**Course Code: MS-401**

**Course Outcomes:**

After a student completes the Major project, we expect a student have understood

1. the method of searching literature, on a particular topic, from the internet.
2. the various potential areas of research, in a particular field, that can lead to a research degree(M. Phil/ Ph. D).

3. various ethics of good research.
4. how to read a research paper and present it in his / her own words.
5. the use of various concepts from different courses for studying a research paper.
6. how to employ the skills learned through different courses to simplify complicated situations.
7. the value of teamwork.

**Course Title: Technical Communication**

**Course Code: MS-402**

**Course Outcomes:**

After completing this course we expect a student should

1. be able to explain the importance of good communication skills in verbal, non-verbal, oral and written communication.
2. be able to explain the techniques to improve communication and presentation skills.
3. be able to write reports etc in a precise and correct way.
4. be able to explain the basic principles of good writing.
5. be able to explain the method of presenting one's curriculum vitae.
6. be able to write various official and unofficial letters, notices, agendas, minutes of meetings etc.
7. know how to behave in a group discussion with better expressions.
8. know how to behave in an interview with better expressions.

**Course Title: Complex Dynamics**

**Course Code: MS-404**

**Course Outcomes:**

After completing this course we expect a student should be able to

1. explain the concepts of repelling points, attracting points and indifferent fixed points.
2. explain the concept of extended complex plane, chordal metric, spherical metric and relationship between chordal and spherical metrics.
3. explain the concepts of conjugacy class of a rational map, valency of a function, completely invariant sets, normal families and equicontinuous family of functions.
4. explain the minimal property of Julia sets and Julia sets of commuting rational functions.
5. explain the concepts of Fatou sets, Julia sets and relationship between them.
6. explain the topology of the sphere, the Euler characteristic and Riemann Hurwitz formula for covering maps.
7. explain the maps between components of Fatou and Julia sets.

**Course Title: Banach Algebras**

**Course Code: MS-405**

**Course Outcomes:**

After completing this course we expect a student should be able to

1. explain the concept, examples and properties of Banach Algebra, quotient space of a Banach algebra and the set of invertible elements of a Banach algebra.
2. explain the concept of ideals and maximal ideals of a Banach algebra.
3. explain the concept of spectrum of an element of a Banach algebra and formula for calculating spectral radius.
4. explain Riesz functional calculus and its uniqueness, spectral mapping theorem and dependence of the spectral on the algebra.
5. explain Gelfand - Mazur theorem, Gelfand transforms and its properties, radical of a Banach algebra and maximal ideal space of a Banach algebra with its properties.
6. explain the concept and elementary properties of  $C^*$  algebra, Abelian  $C^*$  - algebra, functional calculus in  $C^*$  - algebra, positive elements in  $C^*$  - algebra and their space with properties.
7. explain the concept of representation of a  $c^*$  - algebra, state of a  $c^*$ -algebra, Gelfand – Naimark – Segal construction and Abelian Van Neumann algebra.
8. explain some fundamental theorems such as double commutant theorem and Fuglede – Putnam theorem.

**Course Title: Advanced Functional Analysis**

**Course Code: MS-406**

**Course Outcomes:**

After completing this course we expect a student should be able to

1. explain the concept and examples of topological vector spaces(TVS), convex and absorbing sets, local base in a TVS and Locally convex TVS with its relation with dimension of the space.
2. explain the separation properties in a TVS and the concept of closure and interior in a TVS.
3. explain the concept and properties of continuity of linear mappings and relationship between F-space and closed subspace of a TVS.
4. explain the concept of semi norm, its various properties and MinKowski's functional.
5. explain some Fundamental theorems such as Banach – Steinhaus theorem, open mapping theorem (with consequences), Closed graph theorem, Hahn-Banach separation theorem (with corollaries), Banach- Alaogule theorem (with applications), the Krein- Milman's theorem, Milman's theorem and bipolar theorem.
6. explain the necessary and sufficient condition for a TVS to be normable and quotient spaces of a TVS.
7. explain the spaces  $C(\Omega)$  ,  $H(\Omega)$ ;  $C^\infty(\Omega)$  and  $Q_k$  ,  $L^p(0 < p < 1)$  and the continuity of limit of sequence of continuous linear mappings.

explain the concept of bilinear mappings, the weak and weak\* topology, Convex Hull (with properties), extreme points, Barelled and Bornological spaces, semi reflexive and reflexive topological vector spaces

**Course Title: Tensor Analysis and Riemanian Geometry**

**Course Code: MS-407**

**Course Outcomes:**

After completing this course we expect a student should be able to

1. explain the concept of a tensor (with various operations such as addition, multiplication, composition) contravariant and covariant tensors, symmetric and skew-symmetric tensors, Levi-Civita tensors, Christoffell symbols,
2. explain the idea of differentiable manifolds and contravariant (tangent) and covariant(cotangent) vectors.
3. explain the Riemannian space, coordinate hypersurfaces and field of normals to a hypersurface.
4. explain the principle directions for a symmetric covariant tensor of the second order
5. explain the covariant derivative of a contravariant and covariant vector and curl of a vector with its derivative.
6. explain the covariant differentiation of a tensor and divergence of a vector.
7. explain Gaussian curvature, Riemann curvature tensor, geodesics and its differential equations and coordinates.
8. explain the Ricci tensor, space-time symmetries (homogeneity and isotropy), space time of constant curvature and conformal transformations.

**Course Title: Algebraic Topology Course Code: MM-408**

**Course Outcomes:**

After completing this course we expect a student should be able to

1. explain the concept of Homotopy of paths, their equivalence, product and various basic properties.
2. explain the concept of fundamental group of a topological space and homomorphism induced by a continues path.
3. explain the concept of a covering space, covering map examples, local homomorphism and the fundamental group of circle.
4. explain some fundamental theorem such as non-retraction theorem and Brouwer fixed point theorem for the disc.
5. explain the concept of Deformation retracts and homotopy type and the fundamental group of  $S^n$  with its basic properties such as non commutatively of fundamental group of figure eight and double tores.

6. explain some fundamental theorems such as the general lifting lemma, the fundamental theorem of algebra, Borsule-Ulam theorem for  $S^2$  and the bisection theorem.
7. explain equivalence of covering spaces, relation between equivalent covering maps and conjugations of sub group, existence of covering spaces and semi locally simply connected space.
8. explain the covering transformation, group of covering transformations and regular covering map

**Course Title: Theory of Fields**

**Course Code: MS-409**

**Course Outcomes**

After studying this course we expect a student should be able to

1. explain the concept of finite extensions, algebraic elements, algebraic numbers and transcendence of e.
2. explain the concept of roots of polynomial over field, remainder theorem, irreducible polynomials, splitting field, constructible real numbers and their properties.
3. explain the relation between simple extension and characteristic of a field.
4. explain the concept of automorphism of a fields, fixed field of a group and normal extension.
5. explain the concept of fundamental theorem of Galois theory, Galois group of a polynomial.
6. explain the concept of solvable group, commutator sub group, relation between solvability and commutator subgroup.
7. explain the concept of radicals, radicals of a polynomial and solvability of polynomial of degree  $\geq 5$ .
8. explain the concept of finite field, existence of a finite field and roots of irreducible polynomials over finite fields

**Course Title: Spaces of Analytic Functions Course Code: MS-410**

**Course Outcomes**

After studying this course we expect a student should be able to

1. explain the concept of Fourier series, Fourier transform(with properties) and some basic theorems such as convolution theorem, the inversion theorem, uniqueness theorem, Plancherel's theorem and Parseval's formula.
2. explain Translation invariant subspaces of  $L^2$ , the Banach algebra  $L^1$ , Poisson kernel and the poisson integral of a  $L^1$  function, the Laplacian and some basic theorems such as Cauchy-Riemann equation, Harnack's theorem.



3. Explain the concept of Mean value property, maximal functions, non-tangential limits, boundary behavior of Poisson integrals and Poisson integrals of measures.
4. explain some fundamental results such as the Schwarz reflection principle, representation theorems, Arzela–Ascoli theorem.
5. explain the concept of sub-harmonic functions, Hardy space  $H^p(U)$  and its various features such as its Banachness.
6. explain Blaschke product (with properties), Navanlinna space  $N$ , the theorem of F and M Riesz and inner and outer functions factorization.
7. explain Sub-harmonic functions in the upper-half-plane, Hardy space  $H^p(\mathbb{H}^+)$  over the upper half plane and its features.
8. explain Poisson integral formula, Cauchy integral formula, boundary behavior of functions in  $H^p(\mathbb{H}^+)$ , canonical factorization  $H^p(\mathbb{H}^+)$  as a Banach space and Paley – Wiener theorem.

**Course Title: Algebraic Geometry**

**Course Code: MS-411**

### **Course Outcomes**

After studying this course we expect a student should be able to

1. explain rational functions and maps, affine varieties and their properties.
2. explain Projective space and projective varieties and algebraic characterizations of the dimension of a variety.
3. explain the Plane cubic curves and intersection, multiplicity, classification of smooth cubics.
4. explain the group structure of an elliptic curve.
5. explain Cubic surfaces and the existence of lines on a cubic.
6. explain configuration of the 27 lines and the rationality of cubics.
7. explain divisors on curves and the degree of a principal divisor
8. explain the Bezout's theorem and projective embeddings of curves.

**Course Title: Theory of Relativity**

**Course Code: MS-412**

### **Course Outcomes**

After studying this course we expect a student should be able to

1. explain postulates of the special theory of relativity
2. explain the concept of inertial frames of reference, Lorentz transformations, length contraction, time dilation, variation of mass, composition of velocities,
3. explain Minkowski space-time concept and equivalence of mass and energy, the idea of action principle and energy-momentum tensors (general and special cases).
4. explain the conservation laws and general theory of relativity.
5. explain various principles such as principle of covariance and principle of equivalence.

6. explain the Einstein's equation and Newtonian approximation of Einstein's equations.
7. explain the concepts of Schwarz's child solution, particle and photon orbits in Schwarzschild space-time.
8. explain Scalar tensor theory, higher derivative gravity and Kaluza-Klein theory.

### **M.Phil (MATHEMATICS AND APPLIED MATHEMATICS)**

After completing this program successfully, we expect a student

- PSO1.** has advanced understanding, in all respects, of a specific area of Mathematics / Applied Mathematics.
- PSO2.** has a deep understanding of doing the comparative study.
- PSO3.** has understood the fundamental ethics of research.
- PSO4.** has understood how to surf internet for collecting research material.
- PSO5.** has a fair understanding of active areas of research which rests on the foundation that he or she developed during his or her Post graduate program.
- PSO6.** has a fair knowledge of Plagiarism so that he or she may not get involved in any kind of embarrassing situation.
- PSO7.** gets a training of doing team work.
- PSO8.** has got a deep understanding of putting down his / her findings in the form of a dissertation.
- PSO9.** has understood the measures of quality of a Journals.
- PSO10.** has a good knowledge of preparing talks for various conferences related to his/ her area.
- PSO11.** has acquired a fair amount of confidence to face the audience through presentations made by him/her in conferences / seminars/ workshops.
- PSO12.** is able to apply some part of his knowledge for the betterment of the society.
- PSO13.** is able to understand the importance of interdisciplinary research and has the ability to do it up to some extent.

**Course Title: Research Methodology**

**Course Code: MPMS-121**

**Course outcomes**

After completing this course a student is expected to

1. Understand the meaning and objectives of research, review of literature, principles, nature, resources, functions and method of conducting review of literature.
2. Develop reflective and scientific thinking for Research Planning and Sampling, Questionnaire, schedule, rating scales, tests etc.
3. Explain types of research methods, purpose and uses of survey method.
4. Carry case studies using genetic data and thus analyse and interpret genetic data.
5. Identify criteria for good case study, sources of case data.
6. Understand sources and criteria for selection of the problem, Need and meaning of data collection, difference between facts and data.
7. Provide research proposal and criteria for evaluating problem, statistical analysis of data, descriptive data analysis, inference data analysis etc.
8. Perform Analysis of data and understand the need of research and general format of research report, mechanics of writing report and research paper.

**Course Title: Sequence Spaces and Measures of non Compactness  
MPMS-122**

**Course Code:**

**Course Outcomes**

After going through this course a student is expected to

1. explain the some space such as FK spaces, classical sequence spaces, linear metric spaces, paranormed spaces, FK and BK spaces, sequence spaces of matrix domains.
2. explain the concept of Continuous and Kothe - Toeplitz duals.
3. explain the concept of conservative, regular, Schur matrices and matrix transformations for matrix domains.
4. explain the Axiomatic approach to the Concept of a Measure of Non-compactness.
5. explain the concept of measures of non-compactness, Kuratowski measure, Hausdorff Measures, inner Hausdorff measure of non-compactness, Istratescu Measure etc.
6. explain the action of Compact matrix operators on some classical sequence and BK spaces and compact operators between the spaces related to  $lp$  spaces.
7. explain the concept of ODE in Banach Spaces and infinite systems of ODE in  $c_0$  and  $c$ .
8. explain the existence and attractivity of solutions of a Quadratic Volterra Integral Equation.

**Course Title: Advanced Topics in Wavelets**

**Course Code: MPMS-123**

**Course Outcomes**

After going through this course a student is expected to

1. Explain several windowed Fourier transforms and wavelet transform with their properties.
2. Explain the concept of Multiresolution spaces - orthogonal, biorthogonal and semiorthogonal decomposition.
3. Explain the concept of spline function with their properties.

4. Explain the construction of semiorthogonal spline wavelets, orthonormal wavelets and biorthogonal wavelets.
5. Explain graphical display of wavelets and signal representation in the approximation subspaces
6. Explain wavelet decomposition and reconstruction algorithm and FIWT algorithm.
7. Explain the two-channel perfect reconstruction filter bank, polyphase representation for filter banks and difference between DWT and PR filter banks.
8. Explain wavelet packets and wavelet packet algorithms.

**Course Title: Data Mining**

**Course Code: MPMS-124**

**Course Outcomes**

After completing this course successfully, a student is expected to

1. the concept of Data mining and various Data Mining tasks
2. explain the issues, Metrics and Social Implications of Data mining.
3. explain various techniques and technologies involved in Data Mining.
4. explain the concept of Data cleaning, Integration, Reduction and Data Transformation, Data Discretization by Cluster, Decision tree and Correlation Analysis.
5. explain the concept of Classification, Regression, Bayesian classification, K-Nearest Neighbors and ID3 Algorithms.
6. explain the concept of Clustering, Divisive Clustering, K-Means clustering and Nearest Neighbor Algorithm.
7. explain the concept of Association Rules, Apriori Algorithm, Sampling Algorithm, Data Parallelism and Task Parallelism.
8. explain the methods of Mining Complex Data Types and data Mining Applications and Trends.

**Programme: M.A (English)**

**PROGRAMME OUTCOMES (PO)**

The post graduate programme in English offers a wide range of possibilities to explore ones skills and have an all round development. The programme brings students closer to the realities of life.

The M.A English programme has been designed keeping in view the following objectives.

- PO1:** To enhance the communication skills of the students.
- PO2:** To understand present and past societies closely.
- PO3:** Literature serves the didactic purpose, thus provides vast opportunity to grow morally and ethically.
- PO5:** To help students to understand and critically evaluate the modern economic, political and social trends.
- PO5:** To help students to understand the menace of war through war literature.
- PO6:** To make students best human resource for future, considering economic, political and social aspects of life.

**PROGRAMME SPECIFIC OUTCOMES (PSO): PG ENGLISH**

- PSO1:** This programme is flexible and caters to professional and intellectual goals.
- PSO2:** The Literature component offers a comprehensive view of the world traditions with in a global critical perspective.
- PSO3:** The students get acquainted to national and international literature.
- PSO4:** The language component provides grounding in the fields of rhetoric, composition and pedagogy.
- PSO5:** The programme emphasizes on the importance of reading with sensitivity and understanding of writing clearly and concisely.
- PSO6:** The different genres of literature enrich students with experiences of life.
- PSO7:** Drama allows students to communicate with each other and understand others in new ways. It is an important tool to make students more team oriented rather than self centered. It also develops tolerance and empathy.
- PSO8:** Novels and stories allow the students to gain access to deep imagined lives than their own.
- PSO9:** Experiencing complex moral situations enriches the students with pool of experiences.
- PSO10:** Poetry helps to understand how language and symbol system works.
- PSO11:** It expresses emotions, feelings and aesthetics.

## **COURSE OUTCOMES (CO)**

**COURSE TITLE: British Non-Fictional Prose**

**COURSE CODE: Eng-101**

**CO1:** The students will be familiar with the eighteenth century British society.

**CO2:** Contribution of the periodical essays.

**CO3:** The literary trends adopted by the prose writers of the eighteenth century.

**CO4:** The importance of satire in rectifying the follies of society.

**COURSE TITLE: British Drama-I**

**COURSE CODE: Eng- 102**

**CO1:** Read with comprehension and learn to critically analyze works in dramatic literature.

**CO2:** Learn to comprehend and analyze historical movements in dramatic literature.

**CO3:** Learn the importance of cooperation through collaboration.

**CO4:** Get acquainted with major dramatists of the different ages and their works.

**CO5:** Learn to interpret knowledge of the human condition, as reflected in British Drama in its diverse generic manifestations and from various theoretical perspectives.

**COURSE TITLE: British Poetry-I**

**COURSE TITLE: Eng- 103**

**CO1:** The earlier poets of English Language and various types of poetry.

**CO2:** The shift that poetry had during renaissance after Chaucer's era in the form of sonnets.

**CO3:** The contribution of poetry in the Renaissance Age.

**CO4:** The status of poetry in the age dominated by drama about the significant schools of poetry.

**CO5:** The significant schools of poetry during the Elizabethan Age.

**COURSE TITLE: British Novel –I**

**COURSE code: Eng- 104**

**CO1:** The beginning of novel

**CO2:** The rise and growth of novel

**CO3:** Major novelists of the age

**CO4:** Death of drama and the dominance of novel

**CO5:** Difference in plots of novel and drama

**COURSE TITLE: Literary Theory and Criticism-I**

**COURSE TITLE: Eng-201**

**CO1:** The growth of Criticism in Literature

**CO2:** The contribution of Criticism in Literature

**CO3:** The contribution of Criticism in Renaissance and subsequent ages.

**CO4:** The shift in the Criticism in nineteenth century.

**CO5:** The analysis of poems through practical criticism

**COURSE TITLE: British Drama-II**

**COURSE TITLE: Eng-202**

**CO1:** Be able to develop an ability to analyze and assess social, moral, ethical and aesthetic values.

**CO2:** Be able to process, understand, express and communicate past experiences.

**CO3:** Examine diverse plays from different periods and will consider the thematic dramaturgical handling and of the different cultures from which the drama emanated.

**CO4:** Analyze theoretical and critical arguments about drama and theatre.

**CO5:** Identify current and historical developments in studies of British drama.

**COURSE TITLE: British Poetry- II**

**COURSE TITLE: Eng-203**

**CO1:** The poets of Romantic Age

**CO2:** The features and trends of Romantic Poetry

**CO3:** The Victorian Poets and Poetry

**CO4:** The contribution of Victorian Poetry towards Victorian society

**CO5:** The Modern Poetry and the shift in poetry from Romantics to Victorian to Modern

**COURSE TITLE: Applied English**

**COURSE TITLE: Eng-209**

**CO1:** Intelligible Communication

**CO2:** Pronunciation

**CO3:** Drafting skills

**CO4:** Formal Academic Skills in Written Format

**CO5:** Rectification of Grammatical Errors

**CO6:** Students will take interest in debating and discussion to solve the different problems

**CO7:** Students can enjoy Listening and Speaking Skills

**COURSE TITLE: Literary Theory and Criticism-II**

**COURSE TITLE: Eng- 301**

**CO1:** The Marxist theories and its application in literature.

**CO2:** The feminism and various facets of feminism, its contribution towards development of society.

**CO3:** The significance of psychoanalytic theories.

**CO4:** The New Criticism and its influence on the reading of texts

**CO5:** Application of various theories on the text.

**COURSE TITLE: Indian English Literature**

**COURSE TITLE: Eng- 302**

**CO1:** Learn about the pre-independence and post-independence writers.

**CO2:** Learn about the Indian nationalist movement and its influence on the writings of Indian English writers.

**CO3:** Know about the genesis of various genres of Indian English literature.

**CO4:** Learn how Indian English Literature is giving a platform to the writers to express themselves in the era of globalization

**COURSE TITLE: Modern Poetry**

**COURSE TITLE: Eng- 303**

**CO1:** The major Irish Poets and Irish Movements

**CO2:** The Movement Poets and their works

**CO3:** The American Poets and Poetry

**CO4:** The War Poets and the representation of War in Poetry

**CO5:** The various trends, features of American and various schools of British poetry

**COURSE TITLE: British Novel –II**

**COURSE TITLE: Eng- 304**

**CO1:** The students will come to know about the eighteenth century British society.

**CO2:** The students will become familiar with the literary trends of the eighteenth century British novel.

**CO3:** The cultural, historical and political aspects of the eighteenth century British society will be known to the students through the novels prescribed

**COURSE TITLE: Literary Theory and Criticism-III**

**COURSE TITLE: Eng- 401**

**CO1:** Development of Literary Comprehension

**CO2:** Practical utility of critical theories in write-ups

**CO3:** Expansion of Philosophical perspectives



**CO4:** Different modes of interpretation of a literary text

**COURSE TITLE: American Literature-I**

**COURSE TITLE: Eng- 402**

**CO1:** The American Literature.

**CO2:** The American Dream and American Hero.

**CO3:** The representation of American Dream in literature.

**CO4:** The influence of capitalism on American Society.

**CO5:** The detective short stories.

**COURSE TITLE: World Literature**

**COURSE TITLE: Eng- 403**

**CO1:**The world literature

**CO2:** The famous works from across the world

**CO3:** New trends in literature across the world

**CO4:** How to carry out different works across the world.

**CO5:** The significant trends in poetry in different parts of the world.

**COURSE TITLE: Introduction to Sufism**

**COURSE TITLE: Eng- 450**

**CO1:** The mysticism and the great poets of mystic art.

**CO2:** The mysticism of different religions.

**CO3:** The purification of soul

**CO4:** The significance of moral values

**CO5:** The essence of Creator

**COURSE TITLE: Literature in Translation**

**COURSE TITLE: Eng- 451**

**CO1:** The translation theories.

**CO2:** The significant translators

**CO3:** The significant translated works

**CO4:** The difference between original and translated work.

**CO5:** The scope and growth of translation studies

**COURSE TITLE: Literature and Gender**

**COURSE CODE: Eng- 452**

**CO1:** The gender studies

**CO2:** Famous critics of gender studies

**CO3:** Famous works by female authors

**CO4:** Role of gender studies in shaping the postmodern society.

**CO5:** Scope of gender studies in literature

### **M. PHIL (ENGLISH)**

M. Phil programme in English help Scholars to enhance their skills at critical evaluation of subjects and work on the works of art through various approaches.

The course is designed to meet following objectives.

**PO1:** To help students, kin understanding the Literary Theories.

**PO2:** To help Scholars in application of various theories on the works of art and Literature.

**PO3:** Literature from across the world helps Scholars to understand the cultures of various parts of the world.

**PO4:** To help students in comparing works of various languages, by working on comparative literature.

**PO5:** To find social, political and economic relevance of works of arts, by analyzing the theories through various approaches Marxism, Sociological or Psychoanalytic approach.

### **PROGRAMME SPECIFIC OUTCOMES (PSO): M. Phil English**

**PSO1:** To learn the research writing skills & techniques.

**PSO2:** To develop understanding of existing theories.

**PSO3:** To learn how to apply a theory on a text.

**PSO4:** To inculcate the research ethics in young scholars.

**PSO5:** To practice original research by avoiding plagiarism.

**PSO6:** To extend the horizons of critical and evaluative thinking.

**PSO7:** To encourage inclusive researchers to think critically & innovatively to understand the contemporary society.

**COURSE OUTCOMES (CO)**

**COURSE TITLE: Research Methodology**

**COURSE CODE: M. Phil/Eng/01**

**CO1:** To develop and expand writing skills.

**CO2:** To identify, select, process and analyze information regarding the topic.

**CO3:** To critically evaluate a study's overall validity and reliability.

**COURSE TITLE: Literary Theory & Criticism**

**COURSE CODE: M. Phil/Eng/02**

**CO1:** To study literary theory as an intellectual & critical activity.

**CO2:** To provide a conceptual context for an understanding of the function & practice of literary criticism.

**CO3:** To maintain the high standards of literature for greater understanding of the world.

**COURSE TITLE: Literature-I**

**COURSE CODE: M. Phil/Eng/03**

**CO1:** To develop sufficient confidence & ability to express a particular view point.

**CO2:** To identify good work in text through detailed and critical observation of characters created issues involved and process employed

**COURSE TITLE: Literature-II**

**COURSE CODE: M. Phil/Eng/04**

**CO1:** To introduce students to major movements and figures of Indian Literature in English through the study of selected texts.

**CO2:** To expose students to the artistic and innovative use of language employed by the writers.

**CO3:** To enhance literary & linguistic competence of students.

## **PROGRAMME OUTCOMES (PO): Ph. D ENGLISH**

Ph. D programme in English help Scholars to enhance their skills at critical evaluation of subjects and work on the works of art through various approaches.

The course is designed to meet following objectives.

- PO1:** To help students, kin understanding the Literary Theories.
- PO2:** To help Scholars in application of various theories on the works of art and Literature.
- PO3:** Literature from across the world helps Scholars to understand the cultures of various parts of the world.
- PO4:** To help students in comparing works of various languages, by working on comparative literature.
- PO5:** To find social, political and economic relevance of works of arts, by analyzing the theories through various approaches Marxism, Sociological or Psychoanalytic approach.

## **PROGRAMME SPECIFIC OUTCOMES (PSO): Ph. D English**

Curriculum designed for Pre-Ph. D Course work by the Dept. of English is divided into two papers

1. Research Methodology
2. Literary Theory & Criticism

The Curriculum focuses following points:

- PSO1:** Research Methodology is a significant component of Research; this paper introduces Scholars to various Research Methodologies.
- PSO2:** Plagiarism is the most significant aspect of Research. Research Methodology paper stresses on imparting ethics of writing to the students.
- PSO3:** Many Scholars aware about the importance of citation of works and the correct method of citing books, as prescribed by the relevant authorities.
- PSO4:** General information regarding Research activities.
- PSO5:** Second paper of curriculum introduces Scholars to Literary Theory.
- PSO6:** Literary Theory in recent past has been a significant aspect of Research activity in English Literature; Scholars are made aware about theory.
- PSO7:** Scholars become skillful in application theory on the works of Literature.
- PSO8:** This paper preparing students to carry their Research work smoothly.

## **Programme: B.Sc (Nursing)**

### **Programme Outcomes:**

**On the completion of the four year B.Sc. Nursing program the nursing graduate will be able to:**

- PO1.** Integrate comprehension of nursing standards of excellence within the context of nursing skills and practice.
- PO2.** Recognize the need for the advancement of professional practice through contributions to education, administration, health care policy, and knowledge development.
- PO3.** Demonstrate caring, culturally responsive leadership communication
- PO4.** Effectively lead interdisciplinary healthcare teams by applying knowledge of professional nursing leadership roles in the healthcare system.
- PO5.** Demonstrate effective communication using principles of disciplined writing.
- PO6.** Demonstrate cognizant knowledge of inter-professional healthcare leadership roles for quality healthcare outcomes.
- PO7.** Demonstrate nursing leadership to facilitate interpersonal collaborations, conflict resolution, and team-building in health care systems
- PO8.** Advocate policy decisions to improve healthcare that is effective, timely, efficient, and equitable for all members of society.
- PO9.** Demonstrate an understanding of competent ethical principles and values of nursing practice.
- PO10.** Work with dedication towards advancing a culture of professional excellence and achievement through lifelong learning.

### **Programme Specific Outcomes:**

- PSO1.** Apply knowledge from physical, biological, and behavioural sciences, medicine including alternative systems, and nursing in providing nursing care to individuals, families and communities.
- PSO2.** Demonstrate understanding of life-style and other factors, which affect health of individuals and groups.
- PSO3.** Provide nursing care based on steps of nursing process in collaboration with the individuals and groups.
- PSO4.** Demonstrate critical thinking skill in making decisions in all situations in order to provide quality care.

- PSO5.** Utilize the latest trends and technology in providing health care.
- PSO6.** Provide promotive, preventive and restorative health services in line with the national health policies and programmes.
- PSO7.** Practice within the framework of code of ethics and professional conduct, and acceptable standards of practice within the legal boundaries.
- PSO8.** Communicate effectively with individuals and groups, and members of the health team in order to promote effective interpersonal relationships and teamwork.
- PSO9.** Demonstrate skills in teaching to individuals and groups in clinical/community health settings.
- PSO10.** Participate effectively as members of the health team in health care delivery system.
- PSO11.** Demonstrate leadership and managerial skills in clinical/ community health settings.
- PSO12.** Conduct need based research studies in various settings and utilize the research findings to improve the quality of care.
- PSO13.** Demonstrate awareness, interest, and contribute towards advancement of self and of the profession.

## **Course Outcomes**

### **1. COs of the Course “Anatomy and Physiology”**

Through this course the students will be able to:

- CO1. Define anatomy and physiology and relate them to each other.
- CO2. Discuss clinical significance of anatomical variations among humans.
- CO3. Identify the major levels of organization in living beings.
- CO4. Illustrate correct directional terms and relationships among body parts.
- CO5. Explain the locations and interactions of the muscles which facilitate bodily movements.
- CO6. Identify major events in skeletal muscle contraction.
- CO7. Describe the circulation and conduction of heart.
- CO8. Describe structure of alimentary tract and organs of digestive tract.

### **2. COs of the course “Nutrition and Biochemistry”**

- CO1. Identify the common nutritional problems and rectify them.
- CO2. Develop and expand cooking skills through controlled and guided activities.
- CO3. Provide an advanced understanding of the core principles and topics of biochemistry.
- CO4. Learn about the normal biochemical reactions in human body.
- CO5. Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease process.
- CO6. Provide nutrition counseling and education to individuals, groups, and communities throughout the life span using a variety of communication strategies.
- CO7. Introduce the nutrition and factors affecting food and nutrition, socio-economic, cultural, traditional production system of distribution of style and food habits etc.
- CO8. Explain about carbohydrates, their classification and malnutrition deficiencies and over compensation related problems of CHO.

### **3. COs of the course “Nursing Foundations”**

- CO1. Identify theoretical principles and critical behaviors of fundamental nursing.
- CO2. Demonstrate professional standards of moral, ethical, and legal conduct.
- CO3. Utilize the nursing process in the care of all clients.
- CO4. Monitor client outcomes to evaluate the effectiveness of interventions
- CO5. Distinguish the concept of health and illness and their influencing factors, body defenses, health Care Services and Role of nurse in health care agencies.
- CO6. Understand definition, concepts, scope, categories of nursing practice and personnel and the Principles that guide nursing action.
  
- CO7. Explain guidelines for taking vital signs such as body temperature, Pulse, respiration, blood Pressure by following principles and techniques of monitoring and maintaining vital signs.
- CO8. Develops knowledge regarding health assessment by using various Methods such as Inspection, Palpation, Percussion, Auscultation, and Olfaction in performing health assessment of each body system

### **4. COs of the course “Psychology”**

- CO1. Develop a core knowledge regarding the fundamentals of psychology and its application in nursing
- CO2. Get an insight into self in order to assess the patient during health and illness
- CO3. Learn to manage the patients with individual differences while performing therapeutic measures
- CO4. Build up information regarding mental hygiene and mental health
- CO5. Portray motivation and emotional process among the individuals
- CO6. Describe psychology of people during different stages of life
- CO7. Explain the psychological assessment and role of nurse in assessment
- CO8. Explain the concept of personality and its influence on behavior

### **5. COs of the course “Microbiology”**

- CO1. To illustrate the characteristic features of microorganisms and the disease they cause.
- CO2. To explore mechanism by which microorganisms cause disease.
- CO3. To show how the human immune system counteracts infection by specific and non specific mechanisms.
- CO4. To explore the routes of transmission of infection in hospital, communities and populations and the methods used to control the spread of infection.
- CO5. To demonstrates the principles of vaccine preparation and the use of vaccine in immunization.
- CO6. To shows the methods for sterilization of equipments.
- CO7. To shows the antimicrobial activity of disinfectants.
- CO8. To demonstrates the contribution of the microbiologists and the microbiology laboratory to the diagnosis of infection including specimen collection and the role of nurse in carrying this out.

### **6. COs of the course “General English”**

Through this course the students will be able to:

- CO1. Speak and write grammatically correct English.

CO2. Develop an ability to read, understand, and express meaningfully.

CO3. Improve writing skills

CO4. Converse meaningfully, fluently, and confidently in their profession and everyday situations.

CO5. Develop skills in listening comprehension.

CO6. Participate effectively in critical conversations and demonstrate the ability to prepare and deliver their work to the public.

CO7. Understand the process of communication and its effect on giving and receiving information.

CO8. Communicate effectively in English in their nursing profession and everyday situations.

#### **7. COs of the course “Sociology”**

Through this course the students will be able to:

CO1. Apply key social theories to current social problems and issues.

CO2. Demonstrate and communicate knowledge of sociology in nursing.

CO3. Develop positive attitudes towards individual, family and community

CO4. Understand the usefulness of the main sociological theories.

CO5. Understand real social issues such as gender, social deviance, and health from the sociological perspective.

CO6. Explain how culture and social structure shape individual experiences and opportunities.

CO7. Effectively communicate sociological concepts and empirical findings.

CO8. Create new knowledge about social reality and become future leaders of communities and the nation that is agents of change.

#### **8. COs of the course “Medical Surgical Nursing I**

At the completion of the course, the successful student will be prepared to:

CO1. Examine nursing situations using standards of care, critical thinking, clinical reasoning, and evidence-based practice and aware regarding the etiology, patho- physiology, clinical manifestations, diagnostic measures and management of patients (adults including elderly) with disorders of various body systems

CO2. Apply a range of knowledge to promote health and well-being and prevent complications in adults experiencing illness and disease.

CO3. Appreciate and describe various concepts and trends in medical and surgical nursing and identifies the various role of a nurse in caring for adult patient in hospital and community and apply the nursing process to patient learning needs.

CO4. Demonstrate professional, empathetic and therapeutic communication skills in all learning situations.



CO5. Understand the common signs, symptoms, problems and their Specific nursing interventions related to adult patient in clinical and community settings and apply the nursing process as a basis for clinical decision-making.

CO6. Construct and implement safe, effective, patient-centered nursing care using nursing knowledge, information technologies and research evidence.

CO7. Explore principles of collaboration and advocacy to safely provide and manage patient care.

CO8. Examine ethical and legal principles and professional standards that are foundations to nursing practice and Emulate professional behavior in all learning situations.

## **9. COs of the course “Pharmacology, Pathology, and Genetics”**

**CO1.** Explain how the fundamental pharmacological properties of pharmacokinetics and pharmacodynamics influence routes of administration

**CO2.** Describe the process by which new drugs are discovered, developed, tested, and finally approved by the federal drug administration for use in the clinic.

**CO3.** Apply principles of normal anatomy and physiology of human body systems to the pathophysiological processes and common health problems

**CO4.** Explain how a patients’ family history or pedigree can help nurses identify a disease trend such as breast cancer and blood clotting disorders.

**CO5.** Describe four essential activities related to genetics and genomics related to health care.

**CO6.** Students would have studied the composition, action, dosage, indications, contraindications, side-effects, and route of drugs used in respiratory system, urinary system, gastrointestinal system, nervous system, skin, and mucus membrane.

**CO7.** Students would have studied conditions, affecting the mother, baby, and their genetic influence on development.

**CO8.** Describe four essential activities related to genetics and genomics related to health care.

## **10. COs of the course “Community Health Nursing-I”**

CO1. Understand the concepts of community health and community health nursing

CO2. Understand the various factors influencing health in the community

CO3. Understand the concept, scope, uses and methods of epidemiology

CO4. Understand the epidemiology and nursing management of common communicable diseases.

CO5. Understand the concept and scope of demography

CO6. Understand the impact of population explosion and population control

CO7. Differentiate between levels of prevention and uses and scope of epidemiology

CO8. Get to know about determinants of health and understand the different environmental factors affect the health of an individual

## **11. COs of the course “Communication and Educational Technology”**

CO1. Identify the common error and rectify them.

CO2. To develop standard and accreditation process in nursing education program.

CO3. To develop basic skills in guidance and counseling

CO4. To develop effective human relation in context to nursing

CO5. To develop teaching skills by using various teaching methods.

CO6. Establish the effective interpersonal relations with patients, families and co-workers.

CO7. Acquire knowledge and develop skills regarding teaching by using various teaching methods in clinical, classroom and community settings.

CO8. Explore the different types of questions for assessment of knowledge, skills and attitudes.

## **12. COs of the course “Medical Surgical Nursing-II”**

CO1. Practical application of knowledge and skills required for nursing care of adult patients with commonly occurring acute/critical medical-surgical problems is demonstrated in both Lab and clinical settings.

CO2. Provide standardized nursing care to a group of adult, acutely/critically ill patients in a structured setting.

CO3. Utilize the nursing process to administer care to the adult patient with commonly occurring health care needs and problems.

CO4. Provide appropriate health information to the patient and family using standardized teaching plans, therapeutic communication skills, guidance and support.

CO5. Assume responsibility for personal and professional growth in the medical-surgical setting and Practice within the nurse’s legal scope of practice, in accordance with policies and procedures of the practice setting.

CO6. Monitor the patient outcome to evaluate the effectiveness of intervention

CO7. Appreciate and describe the etiology, patho-physiology, clinical manifestation, diagnostic measures and management of patients with various body system disorders and Throat and demonstrate as well as practice respective nursing procedures

CO8. Explain the organization of emergency and disaster care service and the role of nurse in Emergencies and disaster management and demonstrate as well as practices respective nursing procedures. Establish, practice and disseminate various concepts of critical care units and the role of nurse in management of patients in critical care units and demonstrate as well as practice respective nursing procedures

## **13. COs of the course “Child Health Nursing”**

CO1. Acquire knowledge on the normal growth and development of children from birth throughout adolescence with emphasis on the methods of assessment.

CO2. Understand the concept of child health, trends in child care and health problems of children.

CO3. Practice skills in carrying out nursing intervention while caring for paediatric age group.

CO4. Learn about the various ethical and legal implications in paediatric nursing.

CO5. Monitor the client outcome to evaluate the effectiveness of intervention.

CO5. Gain knowledge regarding managing the child with behavioural and social problems and depict to identify the social and welfare services for challenged children.

CO6. Explores the nursing care in common childhood diseases and enables to identify measures to prevent common childhood diseases including immunization.

CO7. Enable the students to perform the neonatal resuscitation as well as providing care to normal and high risk neonates.

CO8. Explore knowledge regarding Integrated management of neonatal and childhood illness.

## **14. COs of the course “Mental Health Nursing”**

CO1. Acquire knowledge related to mental health disease process for optimum implementation of nursing process

CO2. Identify the functions of specified neuro-anatomy in relation to an individual ability to present adaptive physiological and psychological functioning

CO3. Practical application of knowledge and skills required for nursing care patients with mental health problems in individuals, family and community

CO4. Monitor the client outcomes to evaluate the effectiveness of the interventions.

CO6. Build information related to therapeutic communication and nurse patient relationship and its application in mental health assessment.

CO7. Describe the disease process and nursing management of patients with schizophrenia and other psychotic disorder

CO8. Attain understanding regarding psychopathology and different treatment modalities used for the patients with personality, sexual and eating disorders

#### **15. COs of the course “Midwifery and Obstetrical Nursing”**

CO1. Understand the concept and principles of midwifery and obstetrical nursing

CO2. Acquire knowledge and skills in the nursing care of normal and high risk pregnancies.

CO3. Learn about the nursing care during antenatal and postnatal periods in hospitals and community settings.

CO4. Help in develop skills in managing normal and high risk neonates.

CO5. Develop skills to manage and participate in family welfare programme.

CO6. Describe indication, dosage, action, side effects & nurse’s responsibilities in the administration of drugs used for mothers.

CO7. Appreciate the importance of family welfare and the methods of contraception & role of nurses in family welfare programme.

CO8. Portraits the physiology and stages of labour including the management of women during intra-natal period and Learn about the physiology of puerperium with the management of women during post-natal period.

#### **16. COs of the course “Community Health Nursing-II”**

CO1. Understand the concepts of community health nursing and its approaches.

CO2. Identify major health problems, national health problems and specialized community health services

CO3. Explain the concept of health team and describe nurses’ role at various levels of health care settings.

CO4. Demonstrate skills in rendering effective nursing care to the individual, family and groups in all community health settings.

CO5. Continue medical care and follow up in community for various diseases and disabilities

CO6. Distinguish the concept and dimensions of community health, and explore the development of community health nursing pre- independence and post- independence era

CO7. Appreciate and understand the activities of a community health nurse in assisting and maintaining the health of an individual, family and community.

CO8. Understand the roles and responsibilities of a community health nurse at various levels in community

#### **17. COs of the course “Nursing Research and Statistics”**

CO1. Develop and understand the basic concepts of research, research process and statistics

CO2. Conduct/participate in need based research studies in various settings.

CO3. Utilize the research findings to provide quality-nursing care.

CO4. Accelerate the professional and academic strength to conducting individual or group research project

CO5. Demonstrate and understand the central concepts of modern statistical theory and their probabilistic foundation.

CO6. Appraise current issues relevant to nursing research. CO7. Explore basic quantitative and qualitative research design.

CO8. Formulate Evidence Based Practice questions that relate to relevant clinical problems and demonstrate critical thinking.

**18. COs of the course “Management of Nursing Services and Education”**

CO1. Acquire knowledge related to the principles of administration and its implication in nursing administration.

CO2. Identify dynamics of organizational behavior styles and functions of effective leadership CO3. Demonstrate skills in planning, staffing organising, directing, and budgeting various activities in nursing service and nursing education departments.

CO4. Application of administrative practical skill in various settings in academic, clinical community and other setting.

CO5. Elaborate the management of nursing services including Planning, Human resource management, Budgeting, Material Management, Directing & Leading in the hospital and community.

CO6. Understand regarding establishment of nursing educational institutions by following the norms, guidelines and Co-ordination with various Regulatory bodies.

CO7. Develop awareness regarding Continuing education, Career Opportunities and various opportunities for professional advancement.

CO8. Follow philosophy of nursing practice, legal aspects in Nursing and legal responsibilities as professional nurse.

## **Programme :BBA**

### **First Semester**

**Course Title: Principles of Management**

**Course Code: BBA 111**

**Course objective:** This course familiarizes students with the conceptual framework of management and its principles.

#### **Course outcome**

1. Discuss and communicate the management evolution and how it will affect future managers.
2. Observe and evaluate the influence of historical forces on the current practice of management.
3. Identify and evaluate social responsibility and ethical issues involved in business situations and logically articulate own position on such issues.
4. Explain how organizations adapt to an uncertain environment and identify techniques managers use to influence and control the internal environment.
5. Practice the process of management's four functions: planning, organizing, leading, and controlling.

**Course Title: Business Economics**

**Course Code: BBA 112**

**Objective:** The objective of this course is to acquaint students with concepts and techniques used in Business Economic Theory and enable them to apply this knowledge to business decision making.

#### **Course outcomes:**

After completion of this course students will be able to

1. Understand concept of Business economics.
2. To gain concept of demand and cost analysis
3. To understand production functions analysis
4. Illustrate common pricing strategies in different market structure.
5. To understand different macroeconomic variables.

**Course Title: Financial Accounting**

**Course Code: BBA 113**

**Objective:** This course familiarizes student with the basics of Management Accounting and Analysis of Financial Statements.

#### **Course Outcomes**

**CO 1:** To know about the meaning, objectives, need, development and importance of accounting and GAAPs.

**CO 2:** To be familiar with the preparation of ledger, journal and financial statements. To know the

various concepts relating to the financial statements.

**CO 3:** To have an understanding about provisions and reserves and to be able to differentiate various provisions and reserves. To be able to calculate depreciation using various methods.

**CO 4:** To have an idea about the periodic and perpetual method of inventory valuation and the entry system.

**CO 5:** To know about the hire purchase and installment system and consignment and joint venture account.

**Course Title: Communication Skills**

**Course Code: BBA 114**

**Objective:** The objective of this course is to make the student familiar with day to day communication process for improving their skills and abilities.

**Course outcome**

1. To Understand the role of Communication skills in business and Economics
2. To understand the types and importance of various forms of communication.
3. To learn the process and importance of oral presentations and Group discussions.
4. To develop effective writing skills
5. To learn effective report writing.

**Second Semester Course**

**Title: Business Law Course Code: BBA 211**

**Objective:** To give exposure to students about important commercial laws, the knowledge of which is essential for understanding legal implications of general activities of modern business organizations.

**Course Outcomes**

**CO 1:** To know about companies, types of companies and all other legal implications of the activities related to registration, membership of the companies.

**CO 2:** To understand the basic concepts related to contracts and the legal framework governing the contracts and agreements in the business world.

**CO 3:** To have an insight about the Indian partnership act 1932, the concept of partnership, duties and rights of partners and position of minor in a partnership firm.

**CO 4:** To be able to differentiate the various types of contracts and agreements and to know the remedies for breach of contract.

**CO 5:** To bring about a clear understanding of the sale of goods act 1930 and to be able to make distinction between conditions and warranties and to know the rights of unpaid seller.

**Course Title: Fundamentals of Statistics**

**Course Code: BBA 212**

**Objective:** The objective of this paper is to familiarize students with the application of statistical tools and techniques in business organizations.

**Course Outcome:** After Completion of the course the student will be able:

**CO1:** To understand the concept of statistics, data, its method of data collection and various sampling techniques.

**CO2:** To find the central tendencies of various types of data sets.

**CO3:** To find the dispersion of various set of data through various measures of dispersion **CO4:**

To apply the concept of correlation & regression analysis for various problems **CO5:** To analyze the time series data through the method of graphical representation & moving average along with the development of index numbers through basic methods.

**Course Title: Environmental Science**

**Course Code: BBA 213**

**Objective:** The aim of the course is to make students abreast with the immediate concerns about the quality of environment.

**Course Outcome:** Teaching the syllabus, the student shall be able to understand the concepts:

- To bring awareness about the relationship between human beings and environment and the environmental problems/issues we are facing today because of our negative impact
- To provide children with knowledge, attitudes and skills so that they are equipped to contribute meaningfully towards the betterment of the environment and accomplish the goal of sustainable development.
- To enable the development of self-confidence, positive attitudes and personal commitment towards environmental protection and improvement of the environment.
- To make it student-centric programme which focuses on “experiential learning” rather than “teaching”.
- To develop in students a holistic or integrated perspective of our environment as a composite of natural and human-made surroundings with the intricate interactions and interdependence that exists.

**Course Title: Cost Accounting**

**Course Code: BBA 214**

**Objective:** This course familiarizes student with the basics of Cost Accounting and Costing techniques.

### **Course Outcomes**

**CO 1:** To have an understanding about the basics of cost accounting and elements of cost.

**CO 2:** To know about absorption costing and activity based costing.

**CO 3:** To have an insight of various methods of costing.

**CO 4:** To bring about an understanding of the reconciliation of cost with financial accounting. **CO 5:** To be able to distinguish absorption costing and marginal costing and to know the various concepts of break even analysis.

## **SEMESTER-III**

**Course Title: Organizational Behavior**

**Course Code: BBA 311**

**Objective:** The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behavior at the individual, group and organizational levels in the changing global scenario .

**Learning Outcomes:** On successful completion of the course, the student will be able to:

1. Explain the models, challenges and opportunities in the field of organization behavior.
2. Analyze the behavior of individuals in the workplace as influenced by personality, values,

- perceptions and learning.
- 3. Outline the elements of group behavior including group dynamics, communication, effectiveness and conflict.
- 4. Explain how organizational change and culture affect working relationship within organizations.

**Course Title: Human Resource Management      Course Code: BBA 312**

**Objective:** The main purpose of the course is to expose the students to the basics of human resource management to acquire and develop decision making and problem solving skills required in management.

**Course Outcome**

After teaching the syllabus, the students shall be able to understand and conceptualize

1. Importance of Human Resource management in organizations.
2. Methods of training and development undertaken by professionals
3. Different methods of appraisal
4. Basic laws of industries and grievance handling procedure
5. Human resource planning and its related concepts.

**Course Title: Marketing Management**

**Course Code: BBA 313 Course**

**Outcome:** Teaching the syllabus, the student shall be able to understand the concepts:

1. To offer the understanding on fundamental aspects, ideas, concepts and examples of how marketing is understood and practiced in real world.
2. To establish a strong understanding of the role played by the customer in today's market and also to know how a marketer could make business decisions by providing customer insights to the top management.
3. To discuss at length the philosophy behind marketing as a business orientation in comparison with other orientations such as production, product and sales.
4. To provide conceptual and practicing knowledge or product / brand development; pricing mechanisms and various pricing options available for markets; develop effective communication strategies and identify and evaluate distributing options for the designed customer value proposition.
5. To provide practical understanding of market segmentation, the pre-requisites to be considered while choosing a target market and positioning strategies to be concerned by a marketer.

**Course Title: Financial Management Course Code: BBA 314**

**Objective:** The objective of this course is to familiarize students with the concepts and techniques of Financial Management.

**Course Outcomes**

- CO 1:** To understand the basics of financial management, decisions in finance and time value of money.
- CO 2:** To explain the concept of working capital and its determinants. To know about the various techniques of inventory management
- CO 3:** To be able to differentiate short term and long term sources of finance.
- CO 4:** To have an idea of cost of capital and to be able to calculate costs of various debt and equity finance sources.



**CO 5:**To know about capital budgeting decisions and various methods of investment evaluation.

**Course Title: Business Ethics and Corporate Governance**

**Course code: BBA 411**

**Objective:** This course aims to provide knowledge about various concepts of business ethics and corporate governance and related issues in the present scenario.

**CO1:** Understand the importance of ethics for managers and for the organizations.**CO2:** Know how to use values in work place and formulations of values.

**CO3:** Promote value based governance in organization.

**CO4:** Explain relevance of corporate social responsibility towards different stakeholders.

**CO5:** Understand the necessity and importance of ethics in Information Technology

**Course Title: Security Market Operations**

**Course Code: BBA 412**

**Course objective:** The course aims at equipping students with the basic knowledge of Capital Markets.

**Course outcome**

1. Describe the general structure of Indian financial system and its components.
2. Value financial products such as common stocks (both undervalued and overvalued) and fixed-income securities.
3. The course helps students in understanding how to operate in Indian capital market for trading.
4. Students will come to know about role of regulatory body in Indian financial market..
5. Build a diversified portfolio and assess portfolio performance.

**Course Title: Sales Management**

**Course code: BBA 413**

**Objective:** This paper is designed to familiarize students with the basic concepts, tools and techniques used in sales management,

**Learning Outcomes:**

**CO1:** Understand the concept and importance of personal selling in a successful business.

**CO2:** Explain the role of sales budget and process of preparing sales budget.

**CO3:** Outline the factors which determine the structure of sales organization.**CO4:**

Sketch out essential qualities of an efficient sales managers.

**CO5:** Recognize the area of sales training and different tools used for successful sales training.

**Course Title: Management Accounting**

**Course Code: BBA414**

**Objective:** This course familiarizes student with the basics of Management Accounting and Analysis of Financial Statements.

**Course Outcomes**

**CO 1:** To understand the relationship between management, cost and financial accounting and role and importance of management accounting in decision making.

**CO 2:** To understand various ratios and their applications, characteristics and limitations and also to understand the analysis and interpretation of the financial statements.

**CO 3:** To provide an insight about the statement of changes in financial position and cashflow statements.

**CO 4:** To understand the process of budget, budgeting and budgetary control. To be able to differentiate budgeting and forecasting and to prepare various types of budgets.

**CO 5:** To bring about the thorough understanding of responsibility centres and its types, and to understand the concept of human resource accounting.

**Course Title: Management Information System**

**Course code: BBA 511**

**Objective:** The objective of this course is to develop a type of understanding among students regarding working of Information Technology, Information Systems and its utility in business environment.

**COURSE OUTCOMES:**

**CO1:** To get students familiar with concepts related to data and information used in Information Systems.

**CO2:** To make students get acquainted with concepts and components of Information Systems. **CO3:** To make students recognize functions performed by different types of Information systems.

**CO4:** To divulge students regarding processes of information systems related to management support and office management.

**CO5:** To make students get acknowledged with issues related to Information system development and analysis.

**Course Title: Customer Relationship Management Course Code: BBA 512**

**Objective:** The objective of this course is to enable students to understand the importance of satisfying the customer in today's competitive world.

**COURSE OUTCOMES:**

**CO1:** To get students familiar with concepts related to CRM, its growth and complementary layers. **CO2:** To make students get acquainted with development and implementation of CRM program. **CO3:** To make students recognize the overall CRM Process Framework.

**CO4:** To divulge students regarding Sales Force Automation and Privacy issues concerning CRM.

**CO5:** To make students get acknowledged with issues related to CRM links in E-business.

**Course Title: Corporate Finance**

**Course Code: BBA-513**

**objectives:** The objective of this paper is to familiarize students with preparation of Financial Statements of Joint Stock Companies and develop thorough understanding of the subject matter. After completion of this paper, students will be capable of taking up job as account assistant in the Accounting Department of any corporate body, Financial and non- financial institutions.

**Course outcomes**

**CO 1:** This unit aims to familiarise students about the accounting treatment of raising long term funds and capital.

**CO 2:** Second unit will make students aware about the accounting treatment on redemption of Preference Shares & BuyBack of equity shares .

**CO 3:** Third unit will develop complete understanding of Financial Statements of Joint Stock Companies.

**CO 4:** After completion of this unit, students will be able to understand various flows resulting from Operating , Investing and Financing activities.

**CO 5:** This unit will familiarise students about the accounting treatment on Mergers & Acquisition.

**Course Title: Indian Financial System****Course Code: BBA-514**

**Objective:** This course aims at providing students with understanding of the structure, organization and working of financial markets and institutions in India.

**Course outcomes:**

After completion of this course students will be able to:

1. Understand concept of Indian Financial System
2. To understand role of central banking in India.
3. To understand role of commercial banks in India
4. To understand role of Development banks in India
5. To understand role of cooperative banking in India.

**Course Title: Income Tax****Course Code: BBA-611**

**Learning objectives:** The basic objective of this paper is to familiarize students about the income tax rules, computation of taxable income, exemptions and deductions available to the individual assessee. The course is totally job oriented as students will be capable of understanding job in any organization or work as tax consultant.

**Course outcomes**

**CO 1:** First unit aims to familiarise with the various terms as defined under Income Tax Act 1961.

**CO 2:** After completion of this unit, the students will be able to determine residential status of assessee and incidence of tax.

**CO 3:** Third unit aims to develop complete understanding about the computation of Taxable Income from Salaries, Income from house property, and Business and Profession.

**CO 4:** After completion of this topic, students will be able to calculate income from Capital Gains and Income from Other Source along with the deductions u/s 80C.

**CO 5:** This unit will familiarise students about the Advance Tax Payment & Computation of Tax Liability.

**Course Title: International Business****Course code: BBA 612**

**Objective:** The Objective of the course is to make the students aware about the various concepts of international Business and to make them able to make decisions related to international trade

**Course Outcome:**

CO1: To understand the various theories of international trade.

CO2: To understand the various types of trade unions & tariff & non tariff barriers  
CO3: To give understanding of Balance of Payment & its importance

CO4: To make the students understand the concept of foreign exchange rate, purchasing power parity & types of exchange rate system.

CO5: To make them aware about the functions & objectives of WTO, IMF & World Bank

**Course Title: Entrepreneurship Development****Course code: BBA613**

**Objective:** to appraise students about the fundamental concept of entrepreneurship development and its implication in the present environment.

**Learning Outcome:** After the completion of the course, the students will be able to:

**CO1.** Have the ability to understand and imbibe entrepreneurial traits.

**CO2.** Know the parameters to assess opportunities and constraints for starting new business venture in rural area.

**CO3.** Understand systematic process to select viable business idea.

**CO4.** Able to design strategies for selection of an appropriate form of ownership structure.

**CO5.** Have the knowledge about different supporting agencies and type of support provided by them

**Course Title: Business Policy**

**Course Code: BBA 614**

**Objective:** The objective of this course is to acquaint students with the nature, scope and importance of strategic decision making in the existing business environment.

### **COURSE OUTCOMES**

**CO1:** To get students familiar with concepts related to Business policy and strategic management. **CO2:** To make students get acquainted with strategic decision making and different issues in strategic decision making.

**CO3:** To make students recognize the overall external and internal environmental sectors affecting strategy.

**CO4:** To divulge students regarding Organizational Capabilities.

**CO5:** To make students get acknowledged with types of Corporate Level Strategies.

## **Programme: MBA**

### **Programme Outcome:**

**PO1.** Help to develop managerial skills: Master of Business Administration forces students to get out of comfort zone, deal with the latest issues in international business, finance and marketing, apply the newest management techniques, and constantly challenge student.

**PO2.** Better career opportunity: There are several core areas covered within an MBA program, including Human Resource, Statistics, Technology and Information Systems, Economics, Financial management, and Marketing. All these areas qualify an MBA graduate to pursue a career in multiple sectors.

**PO3.** Be your own Boss: With an MBA degree program, you'll be taught business management, planning and even financial handling. These skills will put you in the perfect position to manage your own business effectively, while contributing to the economic development of your country.

**PO4.** High salary potential: MBA graduate is employed in private and public sector. If you do some research into salaries paid out to an individual with an MBA versus salaries of those with other degrees you will see that there is a significant difference.

**PO5.** Project Management and finance: Demonstrate knowledge and understanding of the management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO6.** Enhance communication skills: As part of an MBA program, enrollers are taught how to speak clearly and distinctively. How to develop effective and exceptional presentations, and overall, how to interact with others in and out of the classroom setting. These communication skills are invaluable in the business world.

**PO7.** Enhance Knowledge: program has thoroughly enlightened on certain aspects of life, especially concerning operations within the business world.

**PO8.** Environment and sustainability: Understand the impact of the professional Managerial solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO9.** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Business practices

**PO10.** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO11.** Life-long learning: it not only enhances social inclusion, active citizenship, and personal development, but also self-sustainability, as well as competitiveness and employability

### **Programme Specific Outcomes**

The students after completion of the MBA programme from the University will be able to:

**PSO1:** Start their careers as an entrepreneur

**PSO2:** Collaborate effectively as a business leader

**PSO3:** Identify the Business opportunities & challenges for business growth both domestic as well as at global level

**PSO4:** Do strategic analysis effectively

**PSO5:** Demonstrate business knowledge to solve the complex business problems using limited

resources

- PSO6:** Apply quantitative methods for solving business problems
- PSO7:** Work as a team leader and will be able to communicate effectively with all the members of the team.
- PSO8:** Possess the skills required to integrate concepts from various disciplines to develop & identify business strategies

### **Course Outcomes of MBA Programme**

#### **MBA First Semester**

**Course Title: Management process and Organizational Behavior**

**Course Code: MBA 111**

**Learning Outcomes:** On successful completion of the course, the student will be able to:

- CO1: Explain the management evolution and understand the process of management's four functions: Planning, Organizing, Staffing and Controlling.
- CO2: Analyze the behavior of individuals in the workplace as influenced by personality, values, perceptions, learning and motivations.
- CO3: Outline the elements of group behavior including group dynamics, communication, leadership, politics, conflict and negotiation.
- CO4: Explain how organizational change and culture affect working relationship within organizations.

**Course Title: Accounting for Managers**

**Course Code: MBA 112**

#### **Course outcomes**

- CO 1:** To understand the relationship between financial accounting, cost accounting, management accounting and its importance for managers in decision-making process and to comprehend the basic philosophy of various accounting principles involved in the processing and presentation of Accounting information.
- CO 2:** To bring about the thorough understanding of preparation of financial statements of business entities as per the best industry practices along with the main methods of charging depreciation on fixed & tangible assets.
- CO 3:** To demonstrate knowledge in making analysis of various quantitative variables of financial statements by establishing their relationships between them and to analyse financial data to support business decisions strategies, including valuation goodwill.
- CO 4:** To be able to make distinction between the various inflows and outflows of cash which will help them to make investment and financial decisions after making critical analysis of operation of business including valuation of shares of various companies
- CO 5:** To be able to demonstrate progressive learning in the elements of managerial decision-making through the ideas and practices of budgeting, marginal costing techniques, standard costing, and variance analysis to take various strategic decisions on pricing, capacity, product mix, make or buy or dropping a product etc.

**Course Title: Quantitative Techniques for Managerial Decisions**

**Course Code: MBA 113**

**Course Outcomes:** After completion of the Course the student will be able to:

- CO1: Find the measures of central tendency & Dispersion of any data.
- CO2: Calculate & interpret the correlation coefficient for qualitative as well as quantitative data and will be able to understand the casual relationship between the variable and will be able to find the Regression coefficients
- CO4: To find the significance of difference between the means of more than two samples through the technique of ANOVA will acquire knowledge about Non-Parametric tests Such as Chi Square and their relevance
- CO5: To decide about the use of various sampling techniques and will have knowledge about the Probability distributions, hypothesis & hypothesis testing. The student will also be able to solve the linear programming Problem graphically and will have the knowledge to find the optimal solution to transportation, Assignment & Simulation Problem

**Course Title: Managerial Economics**

**Course Code: MBA 114**

**Course outcomes:**

After completion of this course students will be able to

1. Understand concept of Managerial economics.
2. To gain concept of demand, supply and cost analysis
3. Contrast the decision-making process across industries characterized by pure competition, monopolies, and oligopolies.
4. Illustrate common pricing strategies in different market structure.
5. To understand different macroeconomic variables.

**Course Title: Marketing Management**

**Course Code: MBA 115**

**Course Outcome: After completing this course students will be able to:**

1. Analyze the nature of marketing, marketing challenges, tasks and several marketing strategies.
2. Get admittance about types of external and internal environment affecting marketing.
3. Predict how marketing research takes place in marketing management and maintaining customer value?
4. Become familiar with market segmentation, positioning and differentiation strategies.
5. Identify various diversified factors related to product and services mix.

**Course Title: Human Resource Management**

**Course Code: MBA 116**

**Course Outcomes**

- CO 1:** To understand the concept of human resource management, functions, scope, composition and role of HR manager in and organization.
- CO 2:** To bring about the thorough understanding of human resource planning, and training and development programme.
- CO 3:** To demonstrate knowledge in compensation management and performance appraisal.
- CO 4:** To be able to demonstrate progressive learning in the industrial relations and worker's participation in management.
- CO 5:** To bring about the thorough understanding of employee welfare services and quality of work life.

**Course Title: Business Communication & Soft Skills**

**Course Code: Mgt. 215**

**Learning Outcomes:** On successful completion of the course, the student will be able to:

COI: Explain the importance of communication for an individual and for the organization.

CO2: Analyze the functions of non verbal communication and appropriate use of non verbal communication

CO3: Outline the role of **presentation skills** and public speaking skills for proper functioning of business

CO4: Explain how to handle emotions of self and others for better performance

CO5: Understand the necessity and importance of working together as a team.

### **International Business**

**Course Code: MBA 221**

#### **Course outcome**

1. To understand Internationalization process and managerial implications.
2. To understand Framework for analyzing international business environment.
3. To understand the importance and Implications of BOP.
4. To understand Economic integration and Global trade Organizations.
5. To gain an insight into the contemporary issues in International Business.

### **Course Title: Financial Management**

**Course Code: MBA- 222**

#### **Course outcomes:**

After completion of this course students will able to:

1. Understand deep concept of finance and Management
2. To understand working capital Management.
3. They able to understand capital, concepts and types.
4. Full aware about capital budgeting techniques
5. They understand capital structure and dividend policy

### **Course Title: Corporate Law**

**Course Code: MBA 223**

#### **Course Outcome**

1. To demonstrate the relationship between law and economic activity by developing in the student an awareness of legal principles involved in economic Relationships and business transactions.
2. To develop in the student an understanding of the free enterprise system and the legal safeguards of the same.
3. To develop in the student an appreciation of the significant role played by the judiciary in the protection of individual liberty and private property.
5. To develop in the student habits of analytical thinking and logical reasoning as a technique for decision-making.
6. To develop in the student acceptable attitudes and viewpoints with respect to business ethics and social responsibility

### **Course Title: Operations Management**

**Course Code: MBA 224**



**Learning Outcomes:** On successful completion of the course, the student will be able to:

CO1: Understand the functions of operations management and its relationship with other functional areas.

CO 2: Explain the formulation and development of operations strategy for manufacturing and service sector with focus on competitive priorities.

CO3: Identify and evaluate the process, tools and methods of forecasting for better decision making.

CO4: Understand the importance of location, layout, capacity planning and quality maintenance for manufacturing sector to improve organizational performance.

**Course Title: Research Methodology and its Application**

**Course Code: MBA 225**

**Course Outcome:**

1. An overview of research methodology including basic concepts employed in quantitative and qualitative research methods.
2. To identify the overall process of designing a research study from its inception to its report.
3. To be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
4. To know why educational research is undertaken, and how it can contribute to the problems occurring in our society.
5. To develop a knowledge and understanding of research techniques relevant to the language teaching and learning context.

**Course Title: Strategic Management**

**Course Code: MBA 331**

**Course Outcome: *After completing this course students will be able to:***

1. Get familiar with nature, objectives and process of business policy and strategic management.
2. Know about elements of strategic intent, environmental and organizational appraisal.
3. Get admittance about several types of corporate and business strategies and strategic choice.
4. Become familiar with implementation progressions and recent developments of strategies.
5. Identify how strategic evaluation and control techniques are implemented?

**Course Title: Advertising and Sales Promotion**

**Course Code MBA M1**

**Course Outcome:**

**CO 1:** To understand the concept of advertising management and planning.

**CO 2:** To demonstrate knowledge in making advertising budgeting.

**CO 3:** To be able to progressive learning of creative strategy.

**CO 4:** To demonstrate knowledge in making media planning and strategy

**CO 5:** To understand the relationship between sales promotion and promotion effectiveness

**Course Title: Consumer Behavior and Marketing Strategy**

**Course Code MBA - M2**

**Course outcomes:**

Upon successful completion, students will have the knowledge and skills to:

**Co1:** Introduction to Consumer behavior includes approaches, uses, and framework of consumer Analysis.

**Co2:** Understand the affect and cognition portion of wheels of consumer analysis.

**Co3:** Explore Behavior part of Consumer behavior and marketing strategy.

**Co4:** Understanding the environmental aspect of consumer behavior and marketing strategy

**Co5:** Consumer Analysis and Marketing Strategy.

**Course Title: Service Marketing Management**

**Total Marks:100**

**Course Outcome:**

1. To foster understanding of service marketing concepts among students.
2. To make students understand various models of consumer behavior
3. To understand concepts of market segmentation and its types.
4. To understand pricing strategies with respect to demand
5. To understand the importance of customer feedback in service marketing

**Course Title: Rural Marketing**

**Course Code MBA M4**

**COURSE OUTCOMES**

1. To get students familiar with concepts related to Rural Marketing, classification, opportunities & challenges.
2. To make students get acquainted Rural Consumer Behaviour and Marketing mix for rural market.
3. To make students recognize Segmentation, Targeting & positioning for rural market.
4. To divulge students regarding Agriculture Marketing & its Economic importance, Agricultural Produces and their market etc.
5. To make students get acknowledged with Export potential for Agri-products.

**Course Title: Distribution Management**

**Course Code: MBA M5**

**Course Outcomes**

- CO 1: To understand the concept of sales management and its importance.
- CO 2: To bring about the thorough understanding of sales force management and ethical and legal issues in sales management.
- CO 3: To demonstrate knowledge in making distribution planning and control and channel conflict and management.
- CO 4: To understand the relationship between distribution and logistics for managers in decision making areas.
- CO 5: To be able to demonstrate progressive learning in functional areas of logistics, and integration of sales and distribution strategy.

**Strategic Human Resource Management**

**MBA-H1**

**Course outcome**

1. To understand HR investment considerations for investment in training and development.
2. To understand the Legal framework of HR Environment in Global perspective.
3. To get an insight of HR planning and the Strategic Impact of HRP in Human Resource Management.
4. To discuss strategically oriented performance measurement systems and their outcomes for enhance productivity.
5. To evaluate strategic contribution of HRM in traditional areas and in emerging areas.

**Course Title: Organizational Change and Development**

**Course Code MBA H2**

**Learning Outcomes:** On successful completion of the course, the student will be able to:

- CO1: Gain a general understanding of organization change and development concepts.
- CO2: Understand and analyze different approaches to managing organizational change.
- CO3: Critically evaluate, in an organizational development framework, the theoretical and Practical links between development models, interventions which can be used in Organizations in change and transition.

CO4: Discuss relevance of power and politics with organization development and future trends impacting upon organizational change initiatives

**Course Title: Industrial Relation and Labour Laws**

**Course Code MBA H3**

**Course Outcomes:**

On successful completion of course, students will be able to:

- CO1 Demonstrate descriptive knowledge of the field of industrial relations.
- CO2 Apply the essential concepts of industrial relations and their interrelationship at the personal, organizational and national levels.
- CO3 Explain the concept and provisions of formal institutions like trade union and its functions for solving various problems of employees.
- CO4 Understand the concept and importance of collective bargaining for negotiation purposes between aggrieved parties in industries.
- CO5 Acquire knowledge about various laws related with labour, welfare, health and safety and importance of different schemes of worker's participation for joint decision making in India and other advanced countries.

**Course Title: Human Resource Development**

**Course Code: MBA H4**

Course Outcome:

After teaching the syllabus, the students shall be able to understand and comprehend

1. The working of HRD Systems and their importance in organizations.
2. Theories of learning and their application in practical field.
3. HRD Mechanisms and related concepts.
4. Use of HRD principles and their implementation
5. HRD and its relevance to technology

**Course Title: Business Ethics and Environment**

**Course Code: MBA H5**

**Course Outcomes:**

- CO1. Recognize important ethical issues that arise in various business contexts and professional practice.
- CO2. Explain the concept of corporate governance and why governance is important for corporations as well as for society at large.
- CO3. Understand the concept, significance and changing dimensions of Business Environment and identify various types of Business Environment and tools for scanning the Environment.
- CO4. Understand the responsibilities of business toward different stakeholders while decisionmaking.
- CO5. Gain insights on laws, role of economic systems, government policies, public sector, economic reforms and its impact on business

**Course: Security Analysis**

**Course Code: MBA F1**

**Course Outcome**

1. Students will understand the characteristics of different financial assets such as money market instruments, bonds, and stocks, and how to buy and sell these assets in stock market.
2. Students will understand the characteristics of efficient market and gain knowledge of the various strategies followed by investment practitioners.
3. The course also provides in-depth knowledge to the students to study the behavior of various investors in capital market and trade accordingly during different market trends.
4. To stimulate the thought process among the students about various investment avenues and how to

select appropriate for investment purpose and hence encourage them to read any financial newspaper daily and present/seek views on the subject/article of their interest.

5. The course also ensures that students learn how to measure risk and return for various investment alternatives.

**Course Title: International Finance**

**Course Code: MBAF2**

**Course Outcome:** After Completion of the course the student will be able:

**CO1:** To understand the basic concept International Financial Markets & Exchange rates.

**CO2:** To understand & Utilize the Concept of purchasing power parity, Interest rate parity and foreign exchange forecasting

**CO3:** To understand the basic concepts and application derivative contracts in International Financial markets

**CO4:** To apply the various measures for management of transaction, translation & economic Exposure in case of international financial transactions

**CO5:** To explain the concept of optimal portfolio, International Project appraisals and international Working capital Management

**Course Title: Social Banking and Microfinance**

**Course Code: MBA-F3**

**Course Outcomes:**

CO1: To explain the concept of social banking & its related concepts

CO2: to explain the objectives, functions & role of commercial banks in promoting Microfinancing

CO3: to explain the concept of Microfinance, its objectives & related concepts

CO4: to understand the functions, organization & objectives of Micro financing institutions

CO5: To understand the objectives & functions of NABARD & RBI in promoting Micro financing in India

**Course Title: Indian Financial System**

**Course Code: MBA F4**

**Course outcomes:**

After completion of this course students will able to:

1. Understand concept of Indian Financial System
2. To understand role of central banking in India.
3. To understand role of commercial banks in India
4. To understand role of Development banks in India
5. To understand role of cooperative banking in India.

**Course Title: Project Management**

**Course Code: MBA-F5**

**Course outcomes:**

CO1: Manage the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders.

CO2: Align the project to the organization's strategic plans and business justification throughout its lifecycle.

CO3: Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.

CO 4 Implement project management knowledge, processes, lifecycle and the Embodied concepts, tools and techniques in order to achieve project success.

CO5: Adapt projects in response to issues that arise internally and externally.

**Course Title: Banking & Insurance Management**

**Course Code: MBA-F6**

**Course Outcomes:**

CO1: Identify the economic principles underlying the operation of commercial banks.

- CO2: Explain how central banks manage banking practices.  
CO3: Analyze the operations of a bank with the help of a case-study.  
CO4: Understand the mechanism of insurance.  
CO5: Evaluate various types of insurance

**Course Title: Entrepreneurship Development**

**Course Code: MBA 441**

**Course Outcomes**

- CO 1: To bring about the thorough understanding of entrepreneurship and constraints for the growth of entrepreneurial culture.  
CO 2: To demonstrate knowledge in entrepreneurship development.  
CO 3: To understand the concept of entrepreneurship training and various entrepreneurship training institutes in India.  
CO 4: To be able to demonstrate progressive learning in the project report and ownership structures.  
CO 5: To bring about the thorough understanding of source of finance to entrepreneurs.

**Course Title: Management Information System**

**Course Code: MBA 442**

**Course Outcome:**

1. Get familiar with nature, objectives, approaches, classification and process of Management Information System.
2. Know about elements of decision making in MIS, development of MIS and MIS tools.
3. Get admittance about several types of information system planning and implementation of MIS.
4. Become familiar with several types of information systems and issues related to security and control in MIS.
5. Know about MIS databases, SQL basic commands, DDL and DML procedures.

**Course Title: Portfolio Management**

**Course Code: MBA F7**

**Course Outcome**

1. The subject is aimed at providing insight to the various analytical techniques used in evaluation of the various investment opportunities and creation/construction of Portfolio.
2. The course also provides of application of various models in portfolio management and then comparing performance of managed Portfolio with market portfolio.
3. Students will understand the benefit of diversification of holding a portfolio of assets, and the importance played by the market portfolio.
4. Students will know how to apply different valuation models/strategies and derivative securities in order to hedge the unsystematic risk in the portfolio.
5. To evaluate fixed income and variable securities and how to create the best combination of both types of securities in order to derive efficient portfolio for risk adjusted returns.

**Course Title: Financial Derivatives**

**Course Code: MBA F8**

**Course Outcomes:** After completion of the course the student will be able to:

- CO1: have good understanding of basics of financial derivatives, their functions & Evolution.  
CO2: acquire knowledge about the fundamentals of forwards and futures, their trading

mechanisms and difference between the two.

**CO3:** Explain the basics of option contracts, their types, uses, evaluation and trading strategies

**CO4:** describe and explain the various financial swaps, conditions for their use and evaluation of profit & loss associated with each party to the contract

**Course Title: Behavioral Finance**

**Course Code: MBAF9**

**Course Outcome: After completion of the course the students will be able to:**

CO1: Understand and critically discuss the differences between a behavioural finance

perspective and a traditional finance perspective

CO2: Critically evaluate behavioural influences involving individual's investment decisions

CO3: Understand and critically discuss the cognitive biases and errors of judgment that affect financial decisions

CO4: Critically evaluate behavioural influences involving corporate (executive) financial Decisions

**Course Title: Mergers and Acquisitions**

**Course Code: MBA F10**

**COURSE OUTCOMES**

CO1: To get students familiar with concepts related to Corporate Restructuring, mergers and acquisitions.

CO2: To make students get acquainted with Merger Procedure and Estimation of merger gains. CO3: To make students recognize several methods for financing a Merger.

CO4: To divulge students regarding Divestiture Procedures and mechanism.

CO5: To make students get acknowledged with Accounting methods for Mergers & Acquisitions

**Course Title: Performance Management**

**Course Code MBA H6**

**Course Outcomes**

**CO 1:** To be able to understand the concept of performance management and dangers of poorly implemented performance management system.

**CO 2:** To understand the concept of performance appraisal system implementation.

**CO 3:** To bring about thorough understanding of performance management and employee development.

**CO 4:** To be able to understand the performance consulting and organizing performance improvement department.

**CO 5:** To be able to demonstrate progressive learning in the performance appraisal management system and challenges in performance management in Indian environment.

**Course Title: Interpersonal and Group Processes**

**Course Code MBA H7**

**Course Outcomes:** On successful completion of the course, the student will be able to:

1. Analyze the functions of managers, leadership styles, theories and perspectives of effective leadership.
2. Explain interpersonal awareness and impact of interpersonal behavior on organizational effectiveness.
3. Identify the factors that enhance group performance and increase group cohesiveness.

4. Understand the reasons and stages of group formation, team development and applications of interventions in respond to organizational changes.

**Course Title: Cross Cultural Management**

**Course Code: MBA H8**

- CO 1: Acquire knowledge about global human resource management.
- CO 2: Explain how cultural values and behavioural preferences when working in a team environment has impact on ability to function and manage effectively in a cross-cultural business environment.
- CO 3: Understands international ethics for taking international projects.
- CO4: Demonstrate the ability to take advantage of work force diversity
- CO5: Gain knowledge to maintain work life balance for better performance and ways to measure value of international assignments

**Course Title: Participative Management**

**Course Code: MBA H9**

**Learning Outcome: After the completion of the course, the students will be able to:**

- CO 1. Have the ability to understand the relevance of empowerment and bureaucracy in the current environment.
- CO2. Know the parameters for maintaining and enhancing quality of product for better performance.
- CO 3. Understand role of employees participation in business decision making.
- CO 4. Able to understand various leadership style for improving the effectiveness of team
- CO5. Recognize various participative schemes in different countries in order to acquire knowledge for project implementation at international level.

**Course Title: Strategic Brand Management**

**Course Code: MBA M6**

**Course outcomes:**

Upon successful completion of this course, students will have the knowledge and skills to:

- Co1:** Introduction to Brands and Brand Equity Analysis.
- Co2:** Brand Positioning and Values.
- Co3:** Marketing Programs for Brands and Marketing Communication for Brands.
- Co4:** Understanding the Brand Equity Measurement and Management System and marketing strategy.
- Co5:** Branding Strategy and Brand extensions.

**Course Title: Retail Marketing**

**Course Code MBA M7**

**Course outcomes:**

**After studying this course, students will be able to:**

- CO1: explain & understand the nature retailing & its related concepts
- CO2: understand the various types of Retail stores and features associated with them
- CO3: Understand the ways that retailers use marketing tools and techniques to interact with their customers in non store retailing
- CO4: Understand trends and decision in retailing

**Course Title: International Marketing**

**Course Code: MBA M8**

**Course Outcome: *After completing this course students will be able to:***

1. Get familiar with nature, objectives and process of international marketing.
2. Know about International Product Planning and Pricing decisions.
3. Get admittance about International Distribution Decisions and international logistics.
4. Become familiar with how to develop International Promotion Strategies and campaign?
5. Identify Emerging trends in International Marketing.

**Course Title: Digital Marketing**

**Course Code: MBA M9**

**Course outcomes:**

After completion of this course student will be able to learn

CO1: Marketing Environment

CO2: Behavior of Consumers in Digital Marketing

CO3: Product Attributes and Web Marketing Implications

CO4: Internet Enabled Retailing

CO5: Email Marketing - Viral Marketing - Affiliate Marketing



## **Programme: M.A (Economics)**

### **Programme Outcomes**

The programme enables the students:

**PO1:** To cater to the skilled manpower requirements in industrial and service sectors of the global economy.

**PO2:** To provide for a platform for generating evidenced-based policy recommendations for the regional and national economic policy-making.

**PO3:** To prepare the students for the rapidly changing job market.

**PO4:** To contribute to the fundamental and applied research on cutting-edge economic issues.

### **Programme Specific Outcomes M.A. Economics**

The department offers MA Economics programme since 2014. The basic objective of our Masters Programme is to train students so as to develop strong theoretical foundations, along with practical analytics. The knowledge imbibed would assist in honing professionals and experts to find solutions for world-economic issues. Besides, the students will get exposed to the global economic scenario, during this course. It aims to train students with decision making. Courses on data analysis aim to inculcate critical thinking and logical reasoning among the learners.

The programme aims to meet the growing demand of students, who want application of microeconomic and macroeconomic principles in real economic world. The students take compulsory courses in both Microeconomics and Macroeconomics; and for further advancing their analysis skills and techniques, they are taught Econometrics, Mathematical and Statistical Methods too. Besides, dissertation is also a part of M.A. Economics programme, which primarily focuses on pressing issues relevant to policy makers.

# Course Outcomes

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## Semester -I

**Course Title: Micro Economics –I**

**Course Code: MAE-111**

**Course Outcomes:**

On the successful completion of the course, students will be able to:

**CO1:** Explain the various types of markets and how competitive markets organize the allocation of scarce resources and the distribution of goods and services.

**CO2:** Relate the basic economic theory and principles to current microeconomic issues and evaluate related public policy

**CO3:** Use economic models to analyze a situation in terms of economics

**CO4:** Communicate their knowledge and understanding of economic issues using written, verbal and visual expression

**CO5:** Understand the broader social consequences of economic decisions making

**Course Title: Macro Economics-I**

**Course Code: MAE-112**

**Course Outcomes:**

On the successful completion of the course, students will be able to:

**CO 1 National Income and Social Accounting:** Application of Techniques for Data Collection data on factor incomes generated by economic sectors, Importance of Primary sector, Secondary sector and Tertiary sectors, Use of Methods for Calculation the National Income to measure their relative contributions to national income.

**CO 2 Classical Approach:** Reference to different group of economists, their personal opinion about Income and output determination. Role of saving and Investment for capital formation for production of Goods and services in the economy. How investment is made for establishment of further producing economic activity in classical view. To understand features of Classical model, supply determined nature of output.

**CO 3 Keynesian Approach:** Reference to different group of economists, their personal opinion about Income and output determination. Application of modern approach to Income generation. Pitfalls in conventional approaches to aggregate demand.

**CO 4 Neo Classical and Keynesian Synthesis:** Reference to different group of economists, their personal opinion about Income and output determination. : Reference to different group of economists, their personal opinion about Income and output determination.

**CO 5 Inflation and Unemployment:** How to overcome the obstacles like Inflation and decline in real value of money over time in order to raise the level of employment and income generation. In this section we study Classical and modern economists view of inflation, factors determining the Cost push and demand pull inflation]

**Course Title: Mathematical Economics**

**Course Code: MAE – 113**

**Course outcomes:**

**CO-1:** Brief revision of some basic mathematical concepts to be able to understand subsequent advanced mathematical tools.

**CO-2:** Understand the fundamental concepts of Optimization Techniques for constrained and unconstrained problems.

**CO-3:** Compute Differential Functions and their use in Economics.

**CO-4:** Understand basics of Integral Calculus with applications in economics.

**CO-5:** To be able to perform basic operations on matrices and their application in Economics.

**Course Title: Economics of Development**

**Course Code: MAE-114**

**Course Outcomes:**

On the successful completion of the course, students will be able to:

**CO1:** To acquaint them with the social and institutional aspects of development.

**CO2:** To familiarize them with major theories of economic development particularly focusing on underdeveloped economies.

**CO3:** Understanding of the role of Agriculture, Rural development and industries in Economic Development.

**CO4:** Analyse macroeconomics policies and planning in Economics development.

**CO5:** Understanding the development theories under the International perspective.

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**Semester – II**

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**Course Title: Microeconomics– II**

**Course Code: MAE-221**

**Course Outcomes**

On successful completion of this course students will be able to:

**CO1:** Explain consumers' and firms' behavior using mathematical tools

**CO2:** Develop communications skills through the presentation of your work, interactions during tutorial sessions, and appropriate use of the discussion board

**CO3:** Apply economic theory to diverse real-world situations

**CO4:** Analyze economic problems and prescribe solutions

**CO5:** Model economic situations in a logical, rigorous, and precise manner

**Course Title: Macro Economics- II**

**Course Code: MAE-222**

**Course Outcomes**

**CO 1 Supply of Money:** Addressing the subject matter of Money supply determination through bank deposit determination, It also portrays the role played by money supply in determination money supply. It signifies the role of RBI in money creation.

**CO 2 Demand for Money:** Introduces the students to Classical neo classical view about money. And different opinions about demand for money.

**CO 3 Inflation and Unemployment:** study Classical and modern economists view of inflation, factors determining the Cost push and demand pull inflation, Types of inflation, Structural theory of inflation and relevance of Phillips Curve in developed nations thereof. Relationship between Inflation and unemployment.

**CO 4 Macroeconomics in Open Economy:** Introduces students with IS and LM Model and simultaneous equilibrium between Both Goods and Money market. The role played by Investment and marginal efficiency of capital for determining the rate of interest and Income equilibrium.

**CO 5 Developments in Macroeconomic Theory:** Recent developments in the monetary economics. Theories of rational expectations and new Keynesians economics.

**Course Title: Statistical Methods**

**Course Code: MAE – 223**

**Course Outcomes:**

**CO-1:** Introducing the basic Statistical concepts and appreciate the importance and use of Descriptive statistics.

**CO-2:** To be able to understand and use correlation and regression analysis in data analysis and

interpretation.

**CO-3:** To understand data and Probability Distributions as fundamental tools for Inferential Statistics.

**CO-4:** To understand the basics of Sampling and data collection using sampling techniques.

**CO-5:** To be able to understand basics of hypothesis testing and some basic techniques and tests used in data analysis and research.

**Course Title: The Principles of Banking**

**Course Code: ECO-221**

**Course Outcomes:**

On successful completion of this course, students will be able to:

**CO1:** Identify the economic principles underlying the operation of financial intermediaries.

**CO2:** Explain how central banks conduct monetary policy.

**CO3:** Use models to analyze monetary and macroeconomic issues.

**CO4:** Conduct a theoretical analysis of real-world issues and phenomena.

**CO5:** Explain the importance and relevance of money in economic world.

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### Semester –III

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**Course Title: International Economics**

**Course Code: MAE-331**

**Course Outcomes:**

**CO1:** After going through this course, the students will be able to explain logically why international trade is beneficial for trading countries.

**CO2:** They will have understanding of the modern theoretical insights regarding different aspects of the international trade not covered by the traditional theories.

**CO3:** They will understand the gains from trade and the implications of various trade policies on the welfare of nations.

**CO4:** The students will be familiarized with various concepts regarding the Balance of Payments and available policy options to achieve equilibrium in both internal and external sectors of the country.

**CO5:** They will be acquainted with contemporary issues in international economics including various financial crisis across the world over past few decades.

**Course Title: Public Finance**

**Course Code: MAE-332**

**Course Outcomes:**

On completion of the course students would be able to:

**CO1:** Understand the sources of finance both public and private, demonstrate the role of government to correct market failures and possible advantage of public financing.

**CO2:** Attain the advantages and knowledge of public investments and other government expenditures.

**CO3:** Understand the causes of growing public expenditures for various programmes and policies within and outside the country.

**CO4:** Understand the possible burden, benefits and distribution of various types of taxes among various classes of people, know the general trend and impact on general welfare and arouse them to suggest good and bad tax system.

**CO5:** Understand the needs of public borrowing from all possible sources to meet necessary public investment/expenditures. Also be alerted to find sources for repayment.

**Course Title: Basic Econometrics**

**Course Code: MAE-333**

**Course Outcomes:**

**CO1:** The students will be familiarized with the basic concepts of econometrics including the procedure of hypothesis testing and various types of data.

**CO2:** They will be acquainted with various concepts regarding multiple regression analysis.

**CO3:** They will be able to identify various econometric issues in regression analysis and take appropriate remedial measures.

**CO4:** They will be able to make use of dummy variable and qualitative response variable regressions to analyze qualitative variables.

**CO5:** They will be able familiarized with dynamic models and their uses.

**Course Title: Environmental Economics**

**Course Code: MAE-336**

**Course Outcomes:**

**CO-1:** To understand the basic issues, concepts and Valuation methods used in the study of environmental economics.

**CO-2:** To be able to appreciate the various theoretical mechanisms for solution to environmental problems at local and as well as global level.

**CO-3:** To understand the issues in the management of different types of resources and implications for sustainability of development.

**CO-4:** To have a broader understating of Environmental issues and policy framework in India.

**CO-5:** To be able to understand the management and regulation of forest resources in India.

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## Semester – IV

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**Course Title: Theory of Economic Growth**

**Course Code: MAE-441**

**Course Outcomes:**

**CO1 Introduction to Economic Growth** Addressing the subject matter of developmental economics. Portrays the magnitude of development gap between developed and Underdeveloped Countries. Addressing the stylized facts of economic Growth with special reference to India.

**CO2 Early Growth Models** Introduction of various theories of economic growth. Classical (Adam Smith, Malthus, Ricardo, and Harrod Dommer and their application to developing countries like India.

**CO3 Neoclassical Models and Models of Cambridge School.** To Understand the applicability and relevance of 3<sup>rd</sup> generation (Neoclassical) Models Growth models in Indian economy.

**CO4 Two Sector model** To Analyze the difference in ideas of growth for formation and application of growth models in Indian economy, technical progress.

**CO5 Endogenous Growth models and Growth Accounting** To Understand methods and procedures connected to growth accounting,

**Course Title: International Political Economy** **Course Code: MAE- 442**

**Course Outcomes:**

**CO-1:** To understand the basic theoretical framework and various issues in the focus of International political economy.

**CO-2:** To understand the evolution of international trade system and appreciate the role of Multilateral institutions in Economic coordination among countries.

**CO-3:** To understand the basics concepts relating to regional trade cooperation and evaluate the progress of some prominent regional trading arrangements.

**CO-4:** To understand the evolution and functioning of international trade and financial institutions.

**CO-5:** To understand the dynamics between international institutions, MNCs and third-world countries with reference to India.

**Course Title: Indian Economy****Course Code: MAE-443****Course Outcomes:**

**CO1:** After going through this course, the students will be fully aware about the features of Indian economy including planning strategies and its achievements.

**CO2:** They will gain in-depth knowledge regarding the dynamics of India's agricultural sector and study various issues facing or linked to agricultural sector besides the policy reforms.

**CO3:** They will be familiar with the dynamics of industrial performance and will gain understanding of the issues facing industrial sector despite much of policy reforms.

**CO4:** They will be familiarized with key reforms across different sectors of the economy.

**CO5:** They will gain in-depth knowledge regarding India's trade with other countries and study various reforms and initiatives aimed to boost India's trading capacity.

**Course Title: Agriculture Economics****Course Title: MAE -445****Course Outcomes:**

**CO1:** Understand the nature and scope of agriculture and their role in economic development.

**CO2:** They will be familiar with the theoretical models underpinning the role of agricultural sector and its linkage with industry.

**CO3:** Understand the dynamics of agricultural production and productivity and its underlying factors.

**CO4:** Analyse the Market structure and agricultural prices in India and their role in agricultural development.

**CO5:** Understand the role of agricultural sector in economic development and identify various issues holding back agricultural sector in India's growth trajectory.

## **Programme: M.Sc. (Physics)**

### **Programme Outcomes**

#### **On completion of program, the physics post graduates will**

1. Students are expected to acquire a basic/fundamental knowledge in physics, including the core ideas of classical mechanics, Mathematical Physics, quantum mechanics, electromagnetic theory, electronics, Nuclear Physics, solid state physics, Numerical techniques and programming and nanotechnology.
2. Students are also expected to develop a written and oral communication skills in communicating physics related ideas.
3. Students learn how to design, conduct an experiments demonstrating interpreting and analyzing results scientifically.
4. Students will learn the applications of numerical techniques for modeling physical systems which have analytical and limitations.
5. Students will realize and develop an understanding of the impact of physics on day to day problems and situations.
6. Learn to reduce contributing variables and recognize the limitations of needed equipment.
7. Discover of physics concepts in other disciplines of basic and applied sciences.
8. Analyze physical problems and acquire more approximate solutions using natural laws.

### **Programme Specific Outcomes**

PSO1. Can understanding the basic concepts of physics particularly concepts in classical mechanics, quantum mechanics, statistical mechanics and electricity and magnetism to appreciate how diverse phenomena observed in nature follow from a small set of fundamental laws through logical and mathematical reasoning.

PSO2. Can understand the fundamental theory of nature, on scales at the levels of atom & subatomic particles.

PSO3. Can develop proficiency to analyze the complex physical problems and the use of mathematical or other appropriate techniques to solve them.

PSO4. Able to associate the learning from the software viz. MATLAB, Origin to understand and interpret the data related to the physical sciences.

PSO5. Can perform job in various fields' of science, engineering, education, and public service, etc. with precision, analytical mind, innovative thinking, clarity of thought and expression, systematic approach.

PSO6. Can use mathematical equations in physics to describe, interpret results and critically compare them with experiment and observation.

PSO7. Can construct and tackle problems of day to day life by correlating them with appropriate physical principles.

PSO8. Learn to carry out experiments in basic as well as certain advanced areas of physics such as nuclear physics, condensed matter physics, nanoscience, lasers and electronics.

PSO9. Able to develop written and oral communication skills for communicating physics related topics.

PSO10. Gain hands on experience to work in applied fields.

PSO11. To have deep understanding of that part of physics which he or she encounters in national & state level eligible test (NET/SET)

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## **Course Outcomes:**

**COURSE TITLE : Classical Mechanics and Relativity**

**COURSE CODE : MPH-111**

Course outcome:

At the end of the course, the students will be able to understand

- 1 The basic concepts on Classical Mechanics.
- 2 The need for introducing the **lagrangine mechanics**
- 3 The theorems relating to the nonlinear bodies.
- 4 The various aspects of dynamics and oscillations of bodies.
- 5 Relativity and four vectors .

**Course Title: MATHEMATICAL PHYSICS**

**Course Code: MPH-112**

Course outcome:

At the end of the course, the students will be able to understand

- 1 The basic concepts on Mathematical Sciences.
- 2 Idea of complex variable and Cauchy formula
- 3 Fourier series and their applications to electronics signals
- 4 Applications of group theory in physics .
- 5 Types of groups and their association

**Course Title: NUMERICAL METHODS AND PROGRAMMING**

Course Code: MPH-113

Course outcome:

At the end of the course, the students will be able to understand

1. The basic concepts of numerical methods and programming



2. Errors and their computations.
3. Interpolation Newton method of interpolation
4. C programming-program Control
5. standard input & output-structures

**Course Title: ELECTRONICS**

**Course Code: MPH-114**

Course outcome:

At the end of the course, the students will be able to understand the

1. Fundamentals of working of semiconductor and special devices
2. Practical application of diodes and their characteristics .
3. Applications of electronic devices.
4. IC chip and working
5. applications of CCDs.555 timer.

**Course Title: QUANTUM MECHANICS-I**

**Course Code: MPH-115**

Course outcome:

At the end of the course, the students will be able to understand the

1. Basics of quantum mechanics.
2. Transition from classical mechanic to quantum mechanics .
3. Application of schrodinger equation to varies physical problems
4. commutation relations of angular momentum.
5. Pauli;s spin matrices and their properties

**Course Title: physics lab -I**

**Course Code: MPH-116**

Course outcome:

1. To analysis the bandgap of semiconductor
2. To under the magnetro resistance and charge carrier type
3. To under the basic laws of photoelectric effect
- 4 To under the stress and strain of materials

**Course Title: ELECTRODYNAMICS**

**Course Code: MPH-211**

Course outcome:

At the end of the course, the students will be able to understand

1. Charge and its properties
2. Electrostatics and its applications.
3. Magnetostatic and application to varies field
4. Maxwells equations and tensors form
5. Relativistics Electrodynamics and four vectors .

**Course Title: Statistical Mechanics**

**Course Code: MPH-212**

Course outcome:

At the end of the course, the students will be able to understand the

1. Fundamentals of thermodynamic systems.
2. Various statistical laws governing the particles.
3. Concept of partition function and its application.
4. Quantum statistics and phase transition.
5. General remarks on Phase transition and Weiss molecular field approximation.

**Course Title: ATOMIC PHYSICS AND MOLECULAR SPECTROSCOPY**

Course Code: MPH-213

Course outcome:

At the end of the course, the students will be able to understand the

1. Basic ideas about the concepts of spectroscopy
2. Comparisons between different spectroscopic studies.
3. Raman Spectroscopy .
4. Resonance and basic principles
5. X ray spectroscopy and their applications

**Course Title: Quantum Mechanics-II**

Course Code: MPH-214

Course outcome:

At the end of the course, the students will be able to understand the

1. Basics of quantum mechanics.
2. Various physics concepts in the light of quantum mechanics.
3. Scattering theory and its application
4. Negative energy states and its existence .
- 5 Quantum field theory

**Course Title: PHYSICS LAB II**

Course Code: MPH -215

Course outcome:

1. To analyses different characteristics of solar cell
2. Paramagnetic properties of materials
3. Understand the features of transducer

4. Under the nature of laser diffraction

**Course Title: Condensed matter Physics General -I**  
**Course Code: MPH-311**

Course outcome:

At the end of the course, the students will be able to understand the

1. To understand basic of lattices existing in the crystals
2. Appreciate the need of band theory and figure out different type of band structure
3. Quantum theory of magnetism
4. Grasp the concept and basic idea of superconductivity
5. Aware the application of Mossbauer effect

**Course Title: Nuclear Physics -I**  
**Course Code: MPH-312**

Course outcome:

At the end of the course, the students will be able to understand

1. The basic properties of nuclear force
2. Deuteron, its ground state parity and angular momentum
3. Radioactivity and its decay mode
4. Shell model and calculation of magic numbers.
5. Nuclear reactions and energy calculations
- 6.

**Course Title: Advanced electronics & Applications**  
**Course Code: MPH-313**

Course outcome:

At the end of the course, the students will be able to understand

1. Design of various flip flop, encoder / decoder, multiplexer
2. Design different type of memories (ROM, RAM)
3. Understand the working of various A/D and D/A converter
4. Understand the machine learning and different coding
5. Basic knowledge of 8085 microprocessor

**Course Title: Condensed Matter Physics (Special)**  
**Course Code: MPH-314**

Course outcome:

1. to study the basic concepts of crystallographic
2. to understand and study different techniques of determination of crystal structure
3. To determine the crystal parameters and direction
4. To understand the types of defects, grains and boundaries
5. To understand temperature dependent properties of different materials

**Course Title: Nuclear Physics (Special)**

Course Code: MPH-315

Course outcome:

At the end of the course, the students will be able to understand

1. The significance of Lie algebra and solve problems on them
2. Special groups in quantum mechanics
3. Apply the concept of group to discrete and continuous physical problems
4. Apply matrices for determination of special unitary groups.
5. Understanding of physical representation of Gellman for quarks

**Course Title: Advanced electronics & Applications (Special )**

Course Code: MPH-316

Course outcome:

At the end of the course, the students will be able to understand

1. Describe the basics of optical fibres, its fabrication and source of attenuation, the required input and optical fiber communication
2. Elaborate the power launching coupling and working of photo detector
3. Explain the mechanism and use of optical fiber
4. Analyze the optical network and their performance
5. Calculate the attenuation and dispersion

**Course Title: MATERIALS SCIENCE AND CHARACTERIZATION**

Course Code: MPH-331

Course outcome:

At the end of the course, the students will be able to understand the

1. Various methods involved in material characterization
2. Quantitative metallographic techniques
3. Importance of use of different instruments for material study.
4. X-ray photoelectron spectrometry
5. Chemical and thermal analysis of material characterizations

**Course Title: Digital signal processing**

Course Code: MPH-332

Course outcome:

**Outcome**

At the end of the course, the students will be able to understand

1. The basic idea of elementary signal and different types of signal
2. Fourier transformation and different signals.
3. Properties of Fourier transformations, differentiation and integration
4. Sampling continuous time signal
5. Type of modulation and its spectral type

**Course Title: RADIATION PHYSICS**

Course Code: MPH-333

Course outcome:

At the end of course, students will be made to understand :

1. Concepts of electromagnetic radiation
2. Theory of artificial and natural radioactivity
3. Interaction of radiation with matter and concept of decimeter
4. Radiative collision and back scattering.
5. Radiation loss .

**Course Title: Physics lab - III**

**Course Code: MPH-316**

Course outcome:

1. To design different filters using active circuits
2. To design different oscillators using Op Am
3. To design different time related circuits
4. To design analog to digital converter

**Course Title: Condensed Matter Physics (General)**

**Course Code: MPH-411**

Course outcome:

- 1 . To understand the different technique of crystal growth
2. To understand the defects and different techniques
3. Diffusion under steady and non steady case
4. To understand the different dielectric and ferroelectrics techniques
5. General properties of materials

**Course Title: NUCLEAR PHYSICS-II**

**Course Code: MPH-412**

Course outcome:

At the end of the course, the students will be able to understand

1. The basic concepts nucleus and its properties
2. To gain the knowledge on elementary particles.
3. Quarks model and . Quark and Gell Mann Nishijima's formula.
4. Quark and Hadrons , classification of elementary particles
5. Standard models and Feynman diagrams .

**Course Title: Advanced electronics & Applications -II**

**Course Code: MPH-413**

Course outcome:

At the end of the course, the students will be able to understand

1. To analyze and fit the experimental data, different type of sampling errors and concepts
2. The theory principle and different methods of detectors sensors and transducer
3. The Explanation and importance of different type of ac and dc techniques
4. Concept of signal conditioning and analysis
5. Noise in circuit

**Course Title: condensed matter physics -II (Special )**

**Course Code: MPH-414**

Course outcome:

At the end of the course, the students will be able to understand

1. Elementary concept of crystallography
2. Overview of microscopy
3. Surface interface and thin film
4. Introduction of nanotechnology
5. Class seminar related with subject

**Course Title: Nuclear Physics (Special)**

Course Code: MPH-415

Course outcome:

At the end of the course, the students will be able to understand

1. Weak interaction in particle physics
2. Weak interaction in weak bosons
3. Quarks and their behavior
4. Quantum chromodynamics
5. Grand unification

**Course Title: Advanced electronics & Applications II (Special )**

**Course Code: MPH-416**

Course outcome:

At the end of the course, the students will be able to understand

1. Mode of microwave data interpretation
2. Microwave transmission mode and transmission line
3. Analyze microwave network and and measurement
4. Working of varies microwave devices
5. The modern day application of microwave

**Course Title: NANOSCIENCE AND TECHNOLOGY**

Course Code: MPH-441

Course outcome:

At the end of the course, the students will be able to understand

- The basic concepts about the Nano materials
- The importance of use of nano materials in design and synthesis of novel materials.
- Uses of nanoscience in different branches
- Nanoelectronics and integrated systems .
- **Biomedical application of nanoscience .**

**Course Title: SATELLITE COMMUNICATION AND REMOTE SENSING**

**Course Code: MPH-442**

Course outcome:

At the end of the course, the students will be able to understand

1. The working model satellite technology
2. Satellite communication of different country
3. The physics of remote sensing.
4. :Sensors characteristics- thermal sensors, principles
5. **Satellite application and history of our satellite communication system**

**Course Title: Astrophysics**

Course Code: MPH-446

**Course outcome:**

At the end of the course, the students will be able to understand

1. Origin of universe and its evolution .
2. Characteristics of the stars and galaxies
3. galaxies and hubble expansions
4. Various types of stellar dynamics .
5. Contributions of Indian physicists in astronomy .

**Course Title: project work**

Course Code: MPH -417

**Course outcome:**

At the end of the course, the students will be able to understand

1. Basic of project work .
2. Literature survey
3. Basics techniques of material fabrications

## **Programme: M.Sc. (Information Technology)**

### **Programme Outcome**

**PO1:** The Programme is aimed towards building prospective career in the field of Information Technology and is designed with the objective to provide knowledge and skills in the various aspects of Information Technology and core programming.

**PO2:** To prepare for advanced education in Information Technology and aim of the programme is to increase the number of skilled IT professionals and academicians.

**PO3:** : To provide enough skill and applied knowledge of Information technology and computing to produce effective designs and solutions for specific problems.

**PO3:** To prepare Post Graduates who will be successful in industry, government, academia, research, and entrepreneurial pursuit.

**PO4:** Student will develop software solutions to problems across a broad range of application domain.

**PO5:** Graduates will be able to communicate technical information effectively, both orally and in writing. Graduates will be able to work collaboratively as a member or leader in multidisciplinary teams.

**PO6:** Student get computing paradigm to use software development tools and modern computing platforms.

**PO7:** An understanding of professional and ethical responsibility and demonstrate a sense of societal and ethical responsibility in all professional endeavors.



## **Programme Specific Outcome**

### **M.Sc I.T**

**PSO1:** Students will be able to use the techniques, skills and modern hardware and software tools necessary for innovative software solutions. Student get ability to devise and conduct experiments, interpret data and provide well informed conclusions.

**PSO2:** Student will get skills to analyze a problem and identify and define the logical modeling of solution.

**PSO3:** Student will be able to select modern computing tool and techniques and use them with dexterity.

**PSO4:** Understand topics of wide relevance including Internet and Web technologies, Bio Informatics and Wireless and mobile Communication.

**PSO5:** Gain knowledge of Programming languages and other areas that influence the subject area.

**PSO6:** The course offers contemporary and cutting edge topics such as: Specialization in Web Mining, Cloud Computing and Information Security with an end result of providing talented hands in the related fields.

### **Ph.D.**

**PSO1:** Comprehensive Mastery of a body of knowledge: Demonstrate mastery of the body of knowledge and research methods of a defined scholarly field. Given the interdisciplinary nature of the PhD in Information Technology, comprehensive mastery includes both an assessment of the depth of knowledge in the focal area of one's dissertation along with an assessment of a broader range of overlapping intellectual spaces.

**PSO2:** Expertise with Research Design, Data Collection and Data Analysis methods: Demonstrate the ability to independently plan, design, execute, and report a scholarly research project.

**PSO3:** Prepared for Professional Practices: Demonstrate knowledge of the professional norms, practices, and ethical standards of a defined scholarly field.

**PSO4:** Pursue Academic Life: Demonstrate the ability to participate as an active contributor in the academic life as a faculty member or researcher.

Course Title: Data Structure Using C

Course Code: MIT-141

Courseoutcome:

1. CO1. Students will be familiarized with the basic 'C' language syntax and will be able to use the basic constructs (Control statements, Loops) in programming. Will also be able to develop the logic by writing various C programs
2. CO2. Students will be able to use Arrays and Functions in C programs, like in different

operations on Matrices (Addition, Subtraction, Multiplication, and Transpose). To be able to write the programs using pointers. Will be familiarized with Structures and Union. Students are familiarized with Functions and Pointers in C language and their usage in solving the various problems.

3. CO3. Students are able to know about the various Data Structures like Linked List, Stack, Queue and their implementations by developing the comprehensive 'C' programs for each.
4. CO4. Students are familiarized with the Non-Linear Data Structures Graph and Tree, their usage and Implementation by developing the comprehensive C programs
5. CO5. Students will get to know about the various searching and Sorting techniques and 'C' implementation of all techniques.

Course Title: Internet and web Technologies

Course Code: MIT-142

CO1. The students will get knowledge about the Internet, internet security issues and website development. The students will get to know about various concepts related to client side and server-side programming to make them proficient in web applications.

CO2. The students will learn how to design various web pages using various html tags and controls.

CO3. The students will learn how to present and style various web pages using cascading style sheets.

CO4. The students will get knowledge about client and server side scripting. The students will learn Java script to design various dynamic web pages.

CO5. The Student will learn various XML elements and XML schemas and write simple sheets using various parsers.

Course Title: Operating System

Course Code: MIT-143

COURSE OUTCOMES:

CO1. Student will be able to understand the concepts of Evolution, types and structure of Operating System.

CO2. Student will understand the concepts of Process management in Operating System. CO3. Student will be able to understand Inter-process Communication & Synchronization & Deadlocks in Operating System.

CO4. Student will be able to understand the memory management concepts like Multiprogramming, Paging, TLB, Segmentation.

CO5. Student will be able to understand the memory management concepts like Virtual Memory Demand Paging, Page Replacement algorithms and Disk management concepts

Course Title: Digital Electronics

Course Code: MIT-144

COURSE OUTCOMES:

CO1. Students will be able to understand Number Systems, Computer Arithmetic and the Various Coding Schemes.

CO2. Students will be able to understand the Logic Gates, Various Logic Simplification Methods and get familiarized with the combinational Circuits.

CO3. Students will get to know, the working of different kinds of Flip Flops and their Conversions in-between.

CO4. Students will get to understand the Counters (Synchronous and Asynchronous).

CO5. Students will be able to know the shift registers and the Data Movements within and between the Registers besides the various logic Families.

Course Title: Lab-1 Data Structure

Course Code: MIT-171

COURSE OUTCOMES:

CO1. Students will be familiarized with the basic 'C' language syntax and will be able to use the basic constructs (Control statements, Loops) in programming. Will also be able to develop the logic by writing various C programs.

CO2. Students will be able to use Arrays and Functions in C programs, like in different operations on Matrices (Addition, Subtraction, Multiplication, and Transpose). To be able to write the programs using pointers. Will be familiarized with Structures and Union. Students are familiarized with Functions and Pointers in C language and their usage in solving the various problems.

CO3. Students are able to know about the various Data Structures like Linked List, Stack, Queue and their implementations by developing the comprehensive 'C' programs for each. CO4. Students are familiarized with the Non-Linear Data Structures Graph and Tree, their usage and Implementation by developing the comprehensive C programs

CO5. Students will get to know about the various searching and Sorting techniques and 'C' implementation of all techniques.

Course Title: Lab-2 Web Technologies      Course Code: MIT-172

COURSE OUTCOMES: CO1. The students will be able to develop various web pages containing the tags for formatting text, controlling fonts, etc. the students will be able to develop pages containing

various ordered and unordered lists, tables, images, hyperlinks, etc. CO2.

The students will get proficient in developing the web pages with audio, video, framesets. The students will get proficient in developing pages containing forms with various elements (text boxes, radio buttons, dropdown menu, buttons, etc.).

CO3. The students will learn how to style the web pages created by using html. The students will get expertise in using various inline, internal and external stylesheets.

CO4. The Students will be able to style the html pages by using various CSS properties like text formatting, border, margin, color, list, background images, etc. the students will learn to use div and span tags to make the web pages more presentable.

CO5. The Students will be able to create various dynamic web pages using JavaScript. The students will get acquainted with the various control structures, operators, functions, etc. used in java script.

CO6. The Students will be able to validate the text box entries, checkboxes, radio buttons, email address and date. The students will get well versed with the use and handling of various possible events while developing the dynamic web pages.

CO7. The students will get well versed with using the XML features, writing elements, attributes, etc. The students will be able to write simple sheets using XSLT, SAX and DOM parsers.

Course Title: Java programming          Course Code: MIT-241

#### COURSE OUTCOMES:

CO1. The students will get an understanding about Java and various object oriented programming concepts related to problem-solving.

CO2. The students will learn about the various control structures used in java and various fundamentals of classes, objects, methods, etc.

CO3. The students will get an understanding about various important concepts in Java like inheritance, packages and interfaces. The students will learn to handle exceptions during program execution.

CO4. The Student will be familiarized with concepts and use of Multithreading, synchronization and deadlocks. The students will learn to handle strings and use various in-built java packages.

CO5. The Student will learn how to use and access files and directories using I/O streams. The students will learn the concepts of Applets, various AWT controls and connecting to database using JDBC.

Course Title: Database Management System    Course Code: MIT-242

CO1: Distinguish database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit. The student shall also be able to define the terminology, features, classifications, and characteristics embodied in database systems.

CO2: Model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model and also demonstrate an understanding

of the relational data model and also Formulate, using relational algebra, solutions to a broad range of query problems.

CO3: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. The students shall know why normalization and what role it plays in the database design process and also its various normal forms 1NF, 2NF, 3NF, BCNF, and 4NF.

CO4: Determine the Acid properties (Atomicity, Consistency, Isolation and Durability) of a given Transaction and also explore the various locking protocols and database backup and recovery mechanisms so as to implement the same in the real world.

CO5: write various DDL/DML/DCL SQL commands to insert/update/delete data, and query data in a relational DBMS. Students shall solve a broad range of query and data update problems.

Course Title: Data Communication and Computer Networks

Course Code: MIT-243

COURSE OUTCOMES: CO1. Students will be familiarized with the basics of Data communication, the functions of the different layer of the TCP and OSI reference mode. Will be able to know and understand the different Transmission Media.

CO2. Understanding of the Digital and Analog transmission and will be able to understand the concept of Multiplexing.

CO3. Understanding of the existing protocols at Data Link Layer which include Error detection and Correction.

CO4. To have the knowledge of network layer which include internetworking, IP addressing and various routing protocols.

CO5. To have the knowledge of Transport layer and understanding of Firewalls.

Course Title: Soft skills in Information Technology

Course Code: MIT-202

COURSE OUTCOMES: CO1. The students will get an insight about the various Internet and Communication Technologies and role of IT in different fields and emerging trends in IT.

CO2. The students will learn about the various number systems (binary, decimal, octal, hexadecimal) and basic concepts of IT regarding data processing.

CO3. The students will learn various communication technologies and generations of mobile phone technologies.

CO4. The Students will be familiarized with various Internet Technologies and taught how to develop various web pages using HTML.

CO5. The Students will learn about various concepts related to Information Security like types of attacks, security threats, Cyber-crime and various cyber laws.

CO6: The students will get the knowledge about the role of IT in various sectors (Education, banking, industry, medicine, and engineering). The students will get to know about latest trends in IT.

Course Title: Lab-3: Java programming

Course Code: MIT-271

COURSE OUTCOMES:

CO1. The students will learn how to use various datatypes, how to declare and initialize variables, type conversion, etc. The students will learn the use of various types of operators in Java (Arithmetic, Assignment, Relational, Boolean, Bitwise, etc.).

CO2. The students will get proficient in using single and Multidimensional Arrays, various control structures, etc. The students will be able to define classes, declare objects, using various new keywords and constructors. The students will also learn how to use command-line arguments.

CO3. The students will learn how to use inheritance, creating multi-level hierarchy, dynamic method dispatch, etc. The students will be able to write programs illustrating the use of abstract classes, various keywords,(static, final, super, etc). The students will learn the use of packages and interfaces as well as the tactics of handling exceptions (user-defined and in-built)

CO4. The Students will be able to write programs demonstrating the use of multithreading, synchronization and deadlocks. The students will learn the use of various ways to handle Strings and the usage of Util package in Java.

CO5. The Students will be made to write programs that use the I/O streams like reading and writing to console, accessing files, etc. the students will be able to create applets, use AWT controls and connect to the database using JDBC.

Course Title: Lab-4: PL/SQL

Course Code: MIT-272

CO1: Write various DDL/DML/DCL SQL commands to insert/update/delete data in/from the table(s).

CO2: Write various queries to extract the data from the table(s) based on the problem in hand.

CO3: Implement locking on the databases.

CO4: Write various PL/ SQL Blocks to work on Functions, Cursors, and Triggers.

Course Title: Net Technology using C#

Course Code: MIT-341

COURSE OUTCOMES:

CO1. The student will get familiar with the basic concept of .Net framework and its components and experience with IDE of Visual Studio. Students able to develop application using c sharp programming language on window form

CO2. The student will learn about the fundamental concepts of C Sharp programming language which included data types, conditional statements, and branching loops.

CO3. Student will be able to learn about the string manipulation techniques and how to manage errors and exception in C#

CO4. Student will be familiarizing with the Object Oriented principle which includes inheritance, encapsulation, interface and polymorphism. Students also get knowledge about delegate and event in C#.

CO5. Student will able to understand how to establish Data Base Connectivity using ADO .Net, Server Explorer, Data Adapter and Datasets, Creating New Data Connection in Code. Crystal Reports: Creating Crystal Reports, Creating Custom Reports, Report Field Validation &Exporting Reports.

Course Title: Wireless & Mobile Communication

Course Code: MIT-342

COURSE OUTCOMES:

CO1. Students will be able to explain different wireless technologies, their applications and future trends.

CO2. Students will be able to explain the working of cellular networks, frequency reuse, handoff techniques etc.

CO3. Students will be able to explain the wireless transmission concepts such as antennas, Modulation techniques, and spread spectrum etc.

CO4. Students will be able to understand and explain the CDMA technology concepts.

CO5. Students will be able to understand and explain the GSM technology concepts.

Course Title: Design and Analysis of Algorithm

Course Code: MIT-343

COURSE OUTCOMES: CO1. For a given algorithm student will be able to analyze the algorithms to determine the computational complexity and justify the correctness.

CO2. For a given sorting techniques (Count, Radix, Bucket, Merge, Quick) student will be able to write algorithm and calculate time complexity.

CO3. Student will be able to solve different kind problems using Divide and Conquer algorithm, Greedy approaches and Dynamic programming.

CO4. Student will be familiarize with Advance Data Structures such as Hashing and different Hashing techniques.

CO5. Student will be able to understand, distinguish and solve P, NP and NPcomplete problems

Course Title: Information Security

Course Code: MIT-345

CO1. After study student will learn about Security attacks, services And mechanisms, Introduction to cryptology. Conventional Encryption model, classical encryption techniques substitution ciphers.

CO2 Public Key Encryption, Public Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithms, Key Management, Diffie Hellman Key Exchange.

CO3. Student will be able to learn about Authentication Protocols which include Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithms, Digital Signatures, Authentication Protocols, And Digital Signature Standards.

CO4. Student will be able to learn about Network Security Authentication Applications: which include Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy. Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction

CO5. Student will be able to understand the fundamental concept of System Security Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles, Virtual Private Networks

Course Title: Bioinformatics

Course Code: MIT-346

CO1. Student will learn the Aim and branches of Bioinformatics basic biomolecular concepts: Proteins and amino acids, DNA & RNA, Sequence, structure and function. Forms of biological information, Types of Nucleotide Sequence Gene expression data.

CO2. Student will get the knowledge about Sequence databases Nucleic acid sequence databases: GenBank,EMBL, DDBJ Protein sequence databases: UniprotKB:SWISS-PROT, TrEMBL, UniParc; Structure Databases: PDB,NDB, PubChem, ChemBank. Sequence file formats.

CO3. Student will be able to understand the fundamental concept of Sequence Analysis Basic concepts of sequence similarity, identity and homology, definitions of homologues, orthologues, paralogues and xenologues. Scoring matrices.



CO4. Student will be able to understand the fundamental concept of Sequence alignment: Measurement of sequence similarity; Similarity and homology. Pairwise sequence alignment.

CO5. The student will acquaint the basic Bioinformatics Resources: NCBI, EBI, ExPASy, RCSB, DDBJ: The knowledge of databases and bioinformatics tools available at these resources, organization of databases.

Course Title: Cloud Computing

Course Code: MIT-347

CO1. Student will be able to know the Overview of Existing Hosting Platforms, Grid Computing, Utility Computing and Autonomic Computing.

CO2. Student will be introduced to Cloud Computing.

CO3. Student will be able to know the Classification of Cloud Implementations: IaaS, PaaS and SaaS.

CO4. Student will be familiarize with Cloud Environment like Windows Azure Platform

CO5. Student will be familiarize with Cloud Environment like Microsoft Office Live - SaaS, LiveMesh.com, Google Apps

Course Title: Distributed Computing

Course Code: MIT-350

CO1. Student will be able to know about the basics of Parallel Computers. CO2. Student will be able to know about parallel solutions like Problems in Parallel, Temporal parallelism, Data Parallelism.

CO3. Student will be able to know about structure of parallel computers. CO4. Student will be familiarize with Distributed computing goals like transparency, openness, scalability and Software concepts in Distributed computing.

CO5. Student will be able to understand, communication in distributed computing like Remote procedure call and Message passing interface.

Course Title: Lab-5: C#

Course Code: MIT-371

COURSE OUTCOMES: CO1. Create windows application in C# to enter the marks of 4 subjects of a student and calculate the sum and average of the marks

CO2. Create windows application to show the use of check boxes & radio buttons.

CO3. Write a windows application in C# to define a new class in its own file and create its objects.

CO4. Create C sharp program that takes user-id and password as input and after three wrong attempt user will be rejected.

CO5. Create windows application in C# to perform and display the string manipulations using different string methods.

CO6. Create a windows application in C# to demonstrate function overloading and Operator overloading.

CO7. Create a windows application in C# to illustrate the traffic control signal system

Course Title: Lab-6: Algorithm Design Techniques

Course Code: MIT-372

COURSE OUTCOMES: CO1. For a given algorithm student will able to analyze the algorithms to determine the computational complexity and justify the correctness.

CO2. For a given sorting techniques (Count, Radix, Bucket, Merge, Quick) student will able to write algorithm and calculate time complexity.

CO3. Student will be able to solve different kind problems using Divide and Conquer algorithm, Greedy approaches and Dynamic programming.

CO4. Student will be familiarize with Advance Data Structures such as Hashing and different Hashing techniques.

CO5. Student will able to understand, distinguish and solve P, NP and NP complete problems