

# Ballarpur Institute of Technology, Ballarpur

**Krushī Jivan Vikas Pratishtan- Yenbodi, Reg.No F-294**

## ❖ Vision:

To be a premier institution of engineering education and research, preparing students for leadership in their fields in a caring and challenging learning environment.

## ❖ Mission:

- To provide necessary Technical Skills through excellent standards of quality education, keeping pace with ever changing technologies.
- To bring students together to be trained in leadership skills, engage in activities that promote ethical manners, exhibit social liabilities and inspire a dedication to excellence.
- To develop the spirit of entrepreneurship among the students through entrepreneurial Awareness Campaign, training, and Research and Development etc.

## Program Outcome (Pos)

- **PO1 - Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
- **PO2 – Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3 - 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 public health and safety, and 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.



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- **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 professional 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 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.
- **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 change.

## Program Specific Outcome (PSOs)

### Department of Electrical Engineering

- **PSO 1:** Make use of the basic concepts in Electrical Engineering and its specialization to solve the complex problems in power systems, control systems and electrical drives
- **PSO 2:** Able to provide socially acceptable technical solutions to complex electrical engineering problems with the application of modern and appropriate techniques for sustainable development.
- **PSO 3:** Able to apply the knowledge of ethical and management principle required to work in a team as well as to lead a team.



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Mauza Bamni, Dist. C.

## Department of Electronics and Telecommunication Engineering

- **PSO1:** Understand fundamentals concepts and acquire co-design skills of E&TC to apply them to its cognitive areas.
- **PSO2:** Enhance programming skills for efficient coding practices using open source platform.
- **PSO3:** Develop analytical skills to achieve optimized and cost-effective technological solutions for challenges in E&TC.
- **PSO4:** Bringing awareness about electromagnetic radiation hazards for the work environment.

## Department of Computer Science and Engineering

- **PSO01:** Professional Skills -The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems
- **PSO2:** Problem Solving Skills – The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality products for business success
- **PSO3:** Successful Career and Entrepreneurship – 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

## Department of Mechanical Engineering

- **PSO1:** Apply their scientific and technical knowledge, critical thinking and problem solving skills in professional engineering practice or in non-engineering fields, such as law, medicine or business.
- **PSO2:** Continue their intellectual development, through, for example, professional development courses.
- **PSO3:** Embrace leadership roles in their careers.
- **PSO4:** Design, construct and analyze Mechanical Engineering Systems.
- **PSO5:** Have the ability to use associate Computerized Numerical Control software to improve the performance of Mechanical Systems.



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## Department of Civil Engineering

- **PSO1:** Enhancing the employability skills by making the students capable of qualifying National level competitive examinations
- **PSO 2:** Competency in professional and Industrial areas
- **PSO 3:** Inculcating in students tech saviness to deal with practical aspects of civil engineering

## Department of Mining Engineering

- **PSO1:** Analyze, design, operate, maintenance and evaluate various components, methods and system using state –of-art technology in Mineral extraction and process up.
- **PSO2:** Effectively practice as professional engineers, managers, and leaders in the mining Industries and/or a wide variety of other fields as engineers.

## Department of Master of Business Administration

- **PSO1:**Exhibit professionalism, self-awareness, leadership, and effective communication skills
- **PSO2:**Assimilate tools and concepts from varied functional areas (i.e. finance, marketing, HR, operations, Services, etc.) to solve problems pertaining to business.
- **PSO3:** Encourage student on their professional development plans by reflecting on their first year's learning and Summer Internship experiences.
- **PSO4:** Help students to explore practical application of the management concept.
- **PSO5:** "Providing a Strong analytical foundation in key functional areas and the other, enabling a high degree of academic flexibility, thereby allowing students to customize their MBA experience.

## Department of Master of Computer Application

- **PSO01:** Understand, analyze and develop computer programs in the areas related to algorithms, Process and solutions for specific application development using appropriate data modeling concepts.
- **PSO02:** Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success.
- **PSO03:** Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.



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# Ballarpur Institute of Technology, Ballarpur

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Course outcomes for all programs offered by the Institution

## Department of Electrical Engineering

### COURSE OUTCOMES (COs)

#### III SEMESTER

##### EP-301: Applied Mathematics-III

- Solve higher order differential equations.
- Find Laplace transform of function and how solve diff. equations using L.T.
- Solve Fourier integral.
- Solve differential eq. using Z – transform.
- Gain the knowledge of vector calculus.
- Find curl and divergence of vector field function

##### EP-302: Network Analysis

- To analyze behavior of basic circuit elements and to apply concept of mesh and node analysis in circuit theory.
- Apply various network theorems to determine the circuit response / behavior.
- To apply transformation of a network to analyze time domain, differential eq.
- To study necessary conditions for driving point functions, transfer function for their application to a given network for analyzing circuit design.
- To analyze the sinusoidal steady state for different electric network and apply concepts of Fourier series for analyzing non sinusoidal periodic waveforms.

##### EP-302: Network Analysis (Practical)

- Verify different network theorems as applicable to electric circuits.
- Measure AC power & evaluate power factor for different electrical circuits.
- Compute various network parameters.

##### EP-303: C & Data Structure

- Able to develop algorithms for mathematical and scientific problems.
- Able to understand the components of computing systems.
- Able to choose data types and structures to solve mathematical and scientific problem.

- Able to develop modular programs using control structures.
- Able to develop the programming skills in general, this will create the backbone of programming concepts in future.

#### **EP-303 C & Data Structure (Practical)**

- Learn the concept of DOS system commands and editor.
- Learn the concept of simple programs with decision taking concept.
- Learn the concepts of programs with loop control structure. Learn the concept of programs with Arrays, Pointers, Structures, Union and Files.
- Implement the concepts of Files through C programming Languages.

#### **EP-304 :Electronic Devices & Circuits**

- To understand the function and operation of Semiconductor devices in different Electronics Circuits.
- Calculate different performance parameters of Transistors
- Understand working of amplifier-based circuits.
- Design different electronics circuits using amplifiers and oscillators.
- Studies basic differential amplifier using transistor and its configuration
- Study Logic gates and truth tables of digital circuits.

#### **EP-304: Electronic Devices & Circuits (Practical)**

- Identify and analyze the various semiconductor devices.
- Analyze and distinguish various characteristics of transistor.
- Design the digital circuits using slogic gates and Boolean expression

#### **EP-305: Power Generation Systems**

- To impart knowledge on arrangement, construction and working of thermal and hydro power plant.
- To impart knowledge on arrangement, construction and working of nuclear and diesel power plant.
- Students will be able to estimation of solar radiation and their constants for power generation in different technologies.
- Students will be able to understand the principles of electrical generation with wind energy and terminology.
- Students will be able to learn to different technique of conversion of biomass, biogas, geothermal energy and MHD power generation.

## **IV SEMESTER**

### **EP-401: Electrical Engineering Mathematics**

- Gain the knowledge how to find the harmonic function.
- Gain the knowledge how to solve complex integration along closed curve.
- Solve partial diff. eq.
- Solve special function.(Legendre's and Bessel's)
- Find the probability.
- Find the correlation coefficient and regression between variables

### **EP-402: Electrical Machines – I**

- Understand electrical principle, laws, and working of DC machines.
- Analyze the construction and characteristics and application of various types of DC generators.
- Analyze the construction and characteristics and application of various types of DC motors and testing of motors according to Indian standard.
- Understand electrical principle, laws, and working of 1 phase transformer and losses and also conduct various tests on the transformer.
- Understand electrical principle, laws, and working of 3 phase transformer and losses and also conduct various tests on the transformer.
- Analyze the transformer and convert 3 phase transformer to multi-phase transformer.

### **EP-402: Electrical Machines – I (Practical)**

- Evaluate the electrical parameters, efficiency, and regulation of transformers.
- Experiment with the operation and characteristics of DC Machines.
- Analyze asynchronous machines for its operation and performance.

### **EP-403: Analog & Digital Circuits**

- Understand the basics of op-amp and its characteristics.
- Apply the basic knowledge of op-amp in developing various linear, nonlinear application of op-amp.
- Learn about the other linear IC's like 723, 78\*\*, 79\*\*, 555 timer, 565 PLL and their applications.
- Understand the digital characteristics of various logic circuits like NMOS, CMOS, TTL, and ECL.
- Design various combinational circuits and hence can develop more complicated once.
- Analyze sequential circuit and can apply the knowledge of flip flops in designing more complicated circuits

#### **EP-404: Electrical Measurements & Instrumentation**

- Understand the details of different bridges used for measurement of RLC
- Understand the details of different electrical measuring instruments.
- Measure the electrical power and energy and use of CT, PT
- Study the generalized instrumentation system with the help of a block diagram
- Know the transducers and its use for measurement of force, torque, velocity, acceleration.
- Understand the basic idea about measurement of temperature, pressure & flow measurement.

#### **EP-404: Electrical Measurements & Instrumentation (Practical)**

- Carry out measurement of various electrical circuit parameters using AC & DC bridges.
- Calibrate various electrical measuring instruments and measure power & energy.
- Measure various non-electrical quantities using Transducers.

#### **EP-405: Electro Magnetic Fields**

- Understand vector analysis using different coordinate system.
- Study coulomb's law and able to calculate Electric field intensity, Flux density for difference form of charges.
- Understand and apply Gauss's law, Divergence theorem and calculation of Potential and Energy density in electrostatic field.
- Study Poisson's and Laplace equation and to calculate capacitance and their boundary condition for Dielectric Materials.
- Study various laws for steady magnetic fields and forces.
- Apply Maxwell's equation and analysis of uniform plane wave propagation and electromagnetic waves.

### **V SEMESTER**

#### **EP-501: Electrical Machines – II**

- Understand the Principle, construction, operation, types of winding, generation of EMF of synchronous machine.
- Analysis the steady state operation of 3-ph synchronous machines using different voltage Regulation methods & slip test.
- Understand and analyze parallel operation of synchronous machine.
- Examine the Synchronous machine on infinite bus, synchronous motor operation with variable excitation & load.
- Inspect the transient behavior of the Synchronous machines.
- Understand special motors like Repulsion, Hysteresis, Reluctance, Universal and BLDC motors.

### **EP-501 Electrical Machines – II (Practical)**

- Experiment with the basic operation of synchronous machines.
- Analyze various parameters, characteristics and assess the performance of synchronous machines.
- Defend the utility/application of special machines

### **EP-502 Microprocessors & Microcontroller**

- Learn internal organization of some popular microprocessor / microcontroller.
- Impart the knowledge about the instruction set.
- Understand the basic idea about data transfer schemes and its applications.
- Learn hardware and software interaction and integration.
- Learn the design of microprocessor / microcontroller base system.

### **EP-502 Microprocessors & Microcontroller (Practical)**

- Describe the Components of Microprocessor development Board.
- Write program using Assembly Language.
- Describe architecture, programming and Interfacing of peripheral IC's with 8085 Microprocessor.

### **EP-503 Signals & Systems**

- Classify systems based on their properties and determine the response of LSI system using convolution.
- Examine system properties based on impulse response the Fourier analysis.
- Use the fourier transform to analyse continuous and discrete time signal and system.
- Understand the process of sampling and the effects of aliasing.
- Apply the Z – transform to analyze the discrete – time signals and systems.

### **EP-504 Electrical Power System – I**

- Students will be able to learn the basics of various fundamentals of electrical power generation, transmission & distribution.
- Students will be able to learn transmission line parameters, their calculations also the effects on transmission lines & its effects on the communication system.
- Students will be able to learn electrical characteristics of transmission line such as types of transmission lines, various effects on transmission & per unit representation of power system.
- Students will be able to learn load flow studies and its equation, Comparison of various methods like GS & NR.
- Students will be able to learn Mechanical design along with the types of insulators also the knowledge of voltage distribution across the string and introduction to HV, LV and EHV.

- Students will be able to learn information regarding conductors and insulation, different types of underground cable parameters.

### **EP-505 Industrial Economics & Management**

- Understand various terminologies related to market like demand, elasticity of demand, factors of production and advertising elasticity.
- Comprehend monopoly, oligopoly, depreciation and methods to evaluate depreciation.
- Understand the role of central and commercial bank to govern the economy and also understand taxation, fiscal policy.
- Understand the functions of management – planning, organizing, Directing, Controlling and Communicating.
- Understand the various functions of Marketing management
- Understand the various functions of financial management, budget and its importance

## **VI SEMESTER**

### **EP-601 High Voltage Engineering**

- Analyze different breakdown mechanism in solid, liquid and gaseous medium.
- Understand Lightning and switching over-voltages and Evaluate protection measures by lightning arrestors, ground wires and surge absorbers.
- Interpret the behavior of travelling waves and understand insulation co-ordination.
- Discuss different techniques for high voltage and current generation.
- Analyze different methods of measurement for high voltage and current in laboratories.
- Discuss and Determine various non destructive and high voltage testing of electrical apparatus

### **EP-601 High Voltage Engineering (Practical)**

- Evaluate the performance of breakdown testing of various dielectrics, lightning arrestors.
- Calibrate the voltmeter using sphere-gap assembly.
- Visualize and analyze the corona effect.
- Distinguish between different types of Insulators.

### **EP-602 Digital Signal Processing**

- Acquire knowledge about the time domain representation and classification of discrete time signals and systems.
- Acquire knowledge about the time domain analysis of linear time invariant discrete time systems and representation of total response in various formats.
- Acquire knowledge about the application of discrete time Fourier transform, Discrete Fourier series and z-transform for discrete time signal representation and analysis of linear time invariant systems discrete time systems.

- Acquire knowledge about the application of discrete Fourier transform in signal representation and system analysis and DFT computation using FFT algorithms.
- Acquire knowledge about the design methods for IIR and FIR filters and their realization structures.
- Acquire knowledge about the finite word length effects in the implementation of digital filters.

### **EP-603 Control System Engineering-II**

- Understand linear systems, deduce mathematical model, obtain block diagrams/signal flow graphs and to obtain Transfer function.
- Understand the control system components and able to find sensitivity to parameter variations, obtain transfer function of servomechanisms.
- Analyze the time response and time response specifications with steady state error for various types of input.
- Apply various methods to find the stability and understand the concept of Root Locus Technique.
- Understand the Frequency response analysis using Bode plot, Polar Plot and Nyquist plot Method.
- Understand the introductory concepts of state variable approach.

### **EP-603 Control System Engineering-II (Practical)**

- Analyze the use of various error detectors in control systems and distinguish between each one of them.
- Comprehend and evaluate the performance of various position control systems.
- Build, simulate and analyze different control systems for their time responses and frequency responses using MATLAB.
- Compare different speed control mechanism used to control the speed of various servomotors

### **EP-604 Electrical Power System – II**

- Students will be able to:
- Analysis of power system using symmetrical components transformation.
- Analysis of symmetrical fault C702T.3 Analysis of unsymmetrical fault
- Illustrate the concept of steady state and transient stability.
- Understand the economic scheduling of power system.
- Understand the various types of neutral grounding and compensation

### **EP-605 Electrical Machine Design**

- Select proper material for design of a machine.
- Design main dimensions of transformer

- Estimate the performance characteristics of transform as per requirements and constraints specified.
- Design rotor core of Induction Motor.
- Estimate the performance characteristics of Induction motor as per requirements and constraints
- Design overall dimensions of synchronous machines.

## **VII SEMESTER**

### **EP-701 Power Electronics**

- Understand basic operation SCR
- Understand basic operation of various power semiconductor devices and switching circuits.
- Analyze and design of power electronic converter circuit.
- Study power electronics for performance and improvement of power system and electric machines.
- Study principle and operation of DC choppers.
- Study and analyze power electronic inverter circuits

### **EP-701 Power Electronics (Practical)**

- Deduce the characteristics of Power Electronic switches with various parameters.
- Study and analyze power electronic converters.
- Simulate and analyze various power electronic circuits.

### **EP-702 Power System Protection & Switchgear**

- Understand the general philosophy of protective relaying
- Comprehend over current relaying for medium voltage line protection
- Understand distance relaying for high voltage line protection.
- Learn & design Protection systems used for electric machines, transformers, bus-bars, transmission lines.
- Comprehend basic idea of static relays to synthesize different relay characteristics using comparators
- Understand theory, construction and applications of main types of circuit breakers.

### **EP-702 Power System Protection & Switchgear (Practical)**

- Analyze the magnetization characteristics of protective CTs and differentiate between protective CTs and measuring CTs.
- Verify standard time – current characteristic of over current relays and suggest suitable relays for different applications.
- Evaluate the performance of various static and numerical Relays.
- Examine the performance of differential relays and defend the role of percentage bias.

### **EP-703 Electrical Energy Utilization**

- Application of electric energy for industrial heating
- Application of electric energy for industrial welding
- Understand basics of Illumination and design of lighting schemes for various applications.
- Understand basics of Refrigeration and Air conditioning system.
- Understand application of Fans & Pumps.
- Understand compressors and DG systems and evaluate their performance.

### **EP-704 Control System Engineering-II**

- Understand the basic knowledge of compensation in time and frequency domain.
- Develop solution of state equation.
- Design and analyze practical system for the desired specifications through state variable approach.
- Analyze the optimal control with and without constraints.
- Analyze the non-linear control system for various non-linearity.
- Analyze the digital control system

### **EP-705 Elective I- EHV AC-DC Transmission**

- Demonstrate the knowledge of Power handling capacity of different Transmission systems.
- Study the Effect of Electrostatic and electromagnetic fields and corona due to EHVAC lines.
- Understand Various kinds of Dc link , earth electrodes & Multi terminal HVDC system
- Understand Voltage control and current control systems for power flow controls in HVDC system.
- Understand design parameters of AC filters as well as DC filters and Reactive power compensation.
- Learn about the HVDC protection schemes

## **VIII SEMESTER**

### **EP-801 Computer Applications in Power System**

- Evaluation of incidence and network matrices
- Developing algorithm for the determination of bus Impedance & Admittance matrices for a single phase circuits
- Developing algorithm for the determination of bus Impedance & Admittance matrices for a three phase circuits
- Study Load flow a power system by Newton-Raphson and Gauss-Seidal iterative method.
- Do Short circuit studies.

- Learn Transient stability by using Euler's, Modified Euler's and RK-4th order differential method.

### **EP-801 Computer Applications in Power System (Practical)**

- Construct programs using MATLAB to obtain different power system matrices.
- Develop programs using MATLAB to study power flow of system.
- Construct programs to assess the performance of synchronous machines

### **EP-802 Power System Operation & Control**

- Students will be able to:
- Students will be able to make students express Economic operation of power system and importance of LFC control.
- Students will be able to allow students discuss about thermal and power plants operation in meeting the load demand optimally. (State and central wide installation).Also expressing importance of reactive power control through seminars.
- Students will be able to improve student's ability in solving problems (numerical problems at present) by posing different problem models related to Economic Load Dispatch, Load Frequency Control and reactive power control.
- Students will be able to apply their knowledge in PSOC for competitive exams like GATE, IES, and Public sector etc.
- Students will be able to discuss single area load frequency control and two area load frequency control.
- Students will be able to model and design turbine and Automatic controller.
- Students will be able to express variation of frequency in the power system with varying load.

### **EP-803 Advanced Electrical Drives**

- To solve numerical on starting, speed control and braking.
- To solve numerical on heating and cooling of motors.
- To work on the drives used in the Industry
- To work with PLC's in the Industry.
- To gain an insight in the working of drives used in traction

### **EP-804 Elective – II FACTS & Reactive Power Controller**

- Understand basic concept of FACTS
- Understand voltage and current source converters for FACTS.
- Understand basic knowledge of shunt compensator.
- Understand basic knowledge of series compensator.
- Understand static voltage and phase angle regulators.
- Understand basic knowledge of combined series and shunt compensators.

## **ELECTRONICS AND TELECOMMUNICATION DEPARTMENT**

### **III SEMESTER**

#### **ET-301: Applied Mathematics III**

- Evaluate and understand Laplace transform, their properties inverse Laplace transform..
- Analyze and perform matrix inverse matrix and their numerical, system of linear simultaneous equations and getting the detail knowledge of Eigen values and Eigen vectors
- Preparation of Matrices Cayley-Hamilton Theorem, Sylvester's Theorem (statements only) Solution of second order linear differential equation with constant coefficient by matrix method.
- Able to study Partial Differential Equations and understand the constant coefficients method of separation of variables
- Determining the Various numerical about Fourier series and Fourier transforms periodic function and their numerical.

#### **ET -302: Electronic Devices And Circuits**

- Able to learn bipolar junction transistor circuit configurations, static characteristics Transistor biasing and thermal.
- Learning the Field effect transistors introduction operation their V-I characteristics, FET and MOSFET
- Preparing students for h-parameter Models for CB, CE, CC configurations and their Interrelationship, Analysis and Comparison of the three Configurations, Simplified Models and Calculation for CE and CC Amplifiers, Design of amplifiers
- Able to learn Large signal amplifiers characteristics, class A amplifiers class A amplifier, class A push pull amplifiers, and detail knowledge of design of transformer less class AB amplifier.
- Detail study of FEEDBACK AMPLIFIERS Types of Feedback, Feedback Topologies Classification of Amplifiers, Advantages of negative feedback, Oscillators: Positive Feedback, Bark Hausa.

#### **ET 303: Network Theory**

- Learning the introduction about nodal and mesh analysis of network, source transformation and detail study of nodal analysis.
- Understanding the concept of network Theorems Network theorems, superposition theorem, reciprocity theorem, mill man's theorem and taking detail knowledge
- Analyze and understanding Fourier series and graph theory Fourier series Evaluation of Fourier coefficients

- Apply Laplace Transforms & Transient Response of Networks Definition of Laplace transforms theorems.
- Understanding the various two port variables short circuit admittance parameters open circuit impedance parameters transmission parameters hybrid parameters

### **ET 304: Digital Electronics**

- Learning introduction motivation for digital system-logic and Boolean algebra, truth tables Simplification and synthesis of Boolean functions using gates, K Maps
- Designing various Digital logic Families Characteristics of digital ICs transistor as a switch, Study of logic families RTL, DTL CMOS logic to understand tristate logic.
- Analyze and design Combinational logic arithmetic circuits as half and full adder and subtract or, 4-bit adder / Subtract or BCD adder, digital comparator multiplexer de-multiplexer encoder, decoder realization of simple.
- Minimize and design SEQUENTIAL LOGIC Single cell memory element, Registers: SISO, SIPO, PISO, PIPO, Latch, Master Slave JK.
- Understand the concept of SEMICONDUCTOR MEMORIES AND VHDL Semiconductor memories: RAM, ROM, PROM, EPROM, flash memory, Introduction to CPLD and FPGA

### **ET 305: Electronic Measurements And Instrumentation**

- Able to learn and introduce statically analysis of measurement of errors, accuracy, precision types of errors Digital Voltmeter characteristic features in detail.
- Design and Develop bridges & their Applications Bridges wheat stone, kelvin, max-well Ray Schering we in bridge.
- Learning sensors and transducers I generalized instrumentation systems active & passive transducers, static & passive type LVDT.
- Understand sensors & Transducers II Laws of thermoelectric circuits, thermocouples, cold junction compensation thermistors Resistance temperature detector.
- Design and analyses signal conditioning and bus standards signal conditioning techniques linearization, gain clipping Filtering, differential amplification shielding techniques.

## **IV SEMESTER**

### **ET 401: Applied Mathematics IV**

- Learning Z transform Definition and properties, Inverse Z-transform by partial fractions and convolution theorem
- Understanding the complex variables analytic functions Cauchy Riemann conditions, conjugate functions, singularities Formula (statements only) Laurent's Theorem.

- Apply Numerical Methods solution of algebraic and transcendental equations by False Position method Newton-Rap son method nonlinear simultaneous equations by Newton-Rap son Method.
- Analyze and Evaluate Numerical Methods Solution of ordinary first order first degree differential equation.
- Learning Random Variables, and Probability Distribution Random variables Distribution functions of discrete and continuous random variables.

#### **ET 402: Microprocessor And Interfacing**

- Understanding learn introduction to 8085 Architecture and pin diagram addressing modes, instruction set assembly and detail study of timing diagram.
- Learning INTERFACING TECHNIQUES Stack and subroutines, counters and time delays, Interrupt system of 8085
- Able to learn MICROPROCESSOR PERIPHERALS Internal architecture of 8255-programmable peripheral interface, interfacing of 8255 with 8085
- Detail study of PRINCIPLE OF DATA CONVERSION Study of ADC 0809 and DAC 0808, Analog-to-Digital and Digital-to-Analog, conversion.
- Preparing principle of DATA Conversion study of ADC 0809 and DAC 0808 Analog-to-Digital

#### **ET 403: Electromagnetic Fields**

- Detail study of Scalar and vector Fields Different coordinate system (Cartesian, cylindrical, spherical, divergence, curl, gradient 7)
- Understanding the Electrostatics coulomb's Electric field intensity, field due to point, line and sheet of charge, Electric flux density, Gauss's law
- Able to learn MAGNETOSTATICS Lorentz law of force, Magnetic fields intensity, Biot-Savert law, Ampere's law, Stokes theorem, and magnetic field.
- Learning TIME VARYING FIELDS & MAXWELL'S EQUATIONS Faradays law, induced emf, transformer and motional emf, Maxwell's equations
- Able to learn ELECTROMAGNETIC WAVES Electromagnetic wave equations, wave parameters, velocity, intrinsic impedance and lossless dielectric, conductor-skin depth.

#### **ET 404: Analog Circuits**

- .Detail study of the feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifier.
- Able to learn frequency response of amplifiers classification of amplifiers distortion in amplifiers, frequency response of an amplifier, Bode plots.

- Able to learn Multi-vibrators and sweep generators Bistable multivibrators (BMV) - fixed bias, self-bias.
- Learning Differential amplifiers Differential amplifiers: Introduction, differential amplifier circuit configurations- DIBO- ac and dc analysis, DIUO, SIBO, SIUO, techniques.
- Understanding Wave shaping circuits clipping and comparator circuit, Diode & transistor clipper, diode-differentiator comparator, Clamping.

#### **ET 405: Electronic Engineering Materials And Components**

- Learning Magnetic and Dielectric materials Magnetic materials ferri magnetic antiferro magnetic, types of polarization, internal or local electric field.
- Detail study Students will try to learn CONDUCTING AND SUPERCONDUCTING MATERIALS Conductivity & fixed.
- Learning SEMICONDUCTING MATERIALS Semiconductors, band gap, electron & hole mobilities. Purification & doping of semiconductor materials.
- Understanding SEMICONDUCTOR FABRICATION AND OPTICAL PROPERTIES OF Absorption reflection and refraction of light.
- Able to learn NANOMATERIALS Introduction - Nanomaterial's: definition, properties, Types: Nanoparticles, Synthesis by Chemical reduction method, Nano porous, Mechanical and electrical properties.

#### **V SEMESTER**

##### **ET 501: Linear Electronic Circuits**

- Able to learn Basic Operational Amplifier, Differential Amplifier Stages, Level Shifting Techniques.
- Preparing students to get the knowledge Characteristics of Ideal and Non Ideal Op Amp, Error Measurement of Various Parameters.
- 3.Learning Non-Linear Application Like Limiters, Precision Rectifier, Log Amplifier, Antilog Amplifier, Multiplier, Divider a stable Mon stable comparator
- Understanding & design of active filter 1<sup>st</sup> and 2<sup>nd</sup> order Butterworth filter sinusoidal oscillators D/A and A/D.
- Learning Application of ICs like LM741, LM 555 Timer ICs phase locked loop Lm 566 and detail study of knowledge.

##### **ET 502: Signals and System**

- Determine and analyze of signals: Continuous time and Properties of Fourier Transform, Convolution theorem, sampling theorem.

- Apply various formula and detail study of Linear Time Invariant Systems: Introduction, Discrete Time LTI Systems: The Convolution sum and the convolution Integral.
- Examine and Applying various Fourier Transform Analysis: Fourier series representation of periodic Signals.
- Learning Z-Transform: Definition, properties of z-transform, z-transform of standard sequences, inverse Z-transform, and relationship of z-transform with Fourier transform.
- Able to understand Time and Frequency characterization of signals and systems First & Second order continuous Sampling and detail knowledge representation.

### **ET 503: Power Electronics**

- Understanding Power Electronics Engineering Development of Power controllers, Working Principal, Application of, Flip Flop
- Learning of Phase Controlled Rectification Principle of Phase Control, Line Commutation, and Single phase half Three Phase fully controlled & half controlled.
- Able to learn Inverters principle of Inversion Various Techniques of Forced Commutation & their designs.
- Able to learn Choppers & Cycloconverter principle of working, cycloconverter using single phase bridge circuits detail working.
- Design and learn Multiple Connection & Protection Need & methods of multiple connections of SCRs, Design of Equalizing Circuits.

### **ET 504: Microcontroller And Its Applications**

- Evolution of microcontrollers The 8051 Microcontroller Block diagram, programming model ,pin diagram, flag register
- Learning I/O ports, Interrupts, counters and timers, serial data Input/output, external memory
- Detail study of Addressing modes, Instruction set Data transfer, logical, arithmetic, branching Assembly language
- Able to learn Interfacing: keyboard, LED and LCD, ADC/DAC, stepper motor interfacing
- Explaining AT89c51 microcontroller pin diagram,Architecture,features of flash memory AT89C2051 microcontroller the baby 8051, pin diagram ,architecture.

### **ET 505: Theory Of Communication Engineering**

- Understanding Amplitude modulation, AM-DSB, SSB –SC, Demodulation of AM signals, vestigial sideband transmission Frequency modulation Demodulation of FM signal.
- Design and generate ,Filter Characteristics of linear systems ,Distortion less transmission Ideal and practical filters, Energy and power density

- Describe the Probability, Conditional Probability, Random Variables Cumulative Distribution function & Gaining detail knowledge of Distribution of Introduction to random process.
- Explaining Pulse modulation, PAM, PCM, DPCM, Delta modulation, Adaptive delta modulation, Matched filter
- Detail study of Information measure, Entropy, channel capacity of discrete & continuous channel, Shannon's theorem Hamming codes and detail structure of trellis diagram.

## **VI SEMESTER**

### **ET 601: Principles Of Communication Engineering**

- Identify the different Kinds of Noise Fundamentals of electromagnetic waves, Ground wave propagation sky wave, space wave and troposphere communication systems
- Explain Amplitude modulation(AM), double side band (DSB),double side band
- Suppressed carrier (DSB-SC), Single Side band (SSB), Vestigial side band modulation (VSB) generation, frequency spectrum.
- Able to learn bandwidth, phasor comparison of narrowband FM and AM waves, Generation of FM, Demodulation of FM, interference in FM system, pre-emphasis and de-emphasis technique
- Description of Radio Receiver TRF and super heterodyne receiver ,AGC FM receiver ,sensitivity selectivity, image frequency rejection communication receiver and its special features transceiver
- Explaining Pulse modulation Sampling theorem, Pulse Amplitude Modulation (PAM) ,Pulse width Modulation (PWM), Pulse position Modulation (PPM), Differential Pulse code Modulation (DPCM)

### **ET 602: Fields And Radiating Systems**

- Basic principles of Transmission lines, Line Equations Transmission line parameters, characteristic impedance, propagation constant and phase knowledge of reflection coefficient
- Learn Parallel planes Wave Guide: Field Equation, TE, TM, TEM waves and their characteristics,
- Radiation and Antenna: Scalar and vector potentials, Concept of retarded potentials, field due to a current elements, power radiated and radiation resistance for field due to a dipole
- Antenna Array Various forms of Antenna Arrays : Broadside Array, End Fire Array, Array of Point Sources.
- Parabolic reflectors, Lens antennas, Folded dipole, Turnstile Antenna, Yagi Uda antenna and detail explanation of cassegrain antenna.

### **ET 603: Control System**

- Systems and their representation Basic elements in control systems, Open loop and closed loop system,
- Electrical analogy of mechanical and thermal systems, Transfer Function, Block diagram reduction.
- Time response Analysis Time response, Time domain specification, First and Second order system response,
- stability of Control System Stability of control system, location of roots in S plane for stability, characteristics equation, Routh-Hurwitz criterion,
- Frequency response methods frequency response of linear system, Bode plots, Nyquist criterion, Nyquist Plots and stability analysis detail study.
- State Space Analysis of Control System State variable method of analysis, Characteristics of system state,

### **ET604: Digital Signal Processing**

- Discrete time systems, Z transform & properties, DFT its properties, radix 2 decimation in time FFT and IFFT, radix 2 decimation in frequency FFT and IFFT in detail.
- Structures for realization of discrete time systems, Basic structures for FIR systems:
- linear phase filters, symmetric and anti-symmetric filters, Window method,
- Butterworth approximation, Chebyshev approximation, Design of IIR filter: impulse invariance method
- MultiMate Digital Signal Processing, Decimation by a factor D, Interpolation by a factor

### **ET605: Computer Architecture And Organization**

- Levels Of Design Basic structure and characteristics of computer hardware and software, functional units, basic operational concepts, bus structures, software. Component details, Combinational and sequential components,
- Understanding Processor Design The processing unit: some fundamental concepts, Computer peripherals
- Micro-programmed Control Micro-programmed control: Microinstructions, grouping of control signals, micro program sequencing
- Number Format & Arithmetic Algorithms Floating point arithmetic, IEEE 754 floating point format, Single precision and double precision IEEE format, addition of positive numbers

- Number Format & Arithmetic Algorithms Floating point arithmetic, IEEE 754 floating point format, Single precision and double precision IEEE format, addition of positive numbers, addition
- Memory organization Basic concepts of memory, semiconductor RAM memories, memory system considerations, semiconductor ROM memories.

## **VII SEMESTER**

### **ET 701: UHF and microwave**

- Explaining Causes of Failure of Conventional Tubes at Microwave Frequencies, Velocity Modulation and Detail description of Klystron.
- Describing Slow Wave Structure, Traveling Wave Tube and Backward Wave oscillator, Electron Motion in Parallel Plane Magnetron and Cylindrical Magnetron.
- Able to learn Scattering Matrices and their Properties, Scattering Matrices, H Plane Tee, Magic Tee and Transmission Lines.
- Determining and analyzing Phase Shifter, Attenuator, Tees, Directional Coupler, Circulator, Isolators, Gyrotors, and Transmission Line Resonant Circuits
- Detail study of Low, Medium and High Power Measurement, Measurement of VSWR, Measurement of Impedance, Micro strip Lines.

### **ET 702: Digital Communication**

- Determining Basic building blocks of Digital communications, analog versus digital communication, Advantages disadvantages of digital communications.
- Explaining Pulse code modulation, Signal to quantization ratio, non-uniform quantization commanding, BW calculations.
- Explaining Delta Modulation, Adaptive delta modulation, DPCM, ADPCM, Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio.
- Able to learn the Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Binary ASK, FSK & PSK Differential Phase Shift Keying
- Understanding Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization.

### **ET 703: Opto-electronics devices and communication**

- Explaining the Step Index and Graded Index Fibers. Multimode Fibers, and Multipath Dispersion, Electromagnetic Wave Equation

- Getting knowledge of Manufacture of Fibers, Fiber Joints, Splices and Connectors. Attenuation, Material Dispersion, Mode Coupling.
- Learning Direct and Indirect Band Gap Materials, LED Structures, Light Source Materials, Quantum Efficiency and LED Power, Resonant Frequencies and Temperature effects
- Able to learn Pin and APD Diodes, Photo-Detectors, Noise SNR Detector Response Ti, Comparison of Photo Detectors , Fundamental Receiver Operation.
- Learning Point to Point Links, WDM, Data Buses, Star and T-Coupler, NRZ, RZ and Block Codes. Measurement in Optical Fibers, Attenuation, Dispersion

#### **ET 704: Modern TV Engineering**

- Able to learn Television basics: Factors of TV systems, Composite video signal, Signal transmission and channel bandwidth, Colour TV systems, Colour fundamentals.
- Describing NTSC, PAL, SECAM systems, colour TV transmitter, high level, low level transmitters, colour TV receivers, remote control, antennas for transmission
- Study and learn Introduction to Digital TV, Principle of Digital TV, Digital TV signals and parameters, Digital TV receivers, Basic principles.
- Able to learn geostationary satellites, Satellite communication systems, Cable signal sources, Cable signal processing and distribution, Cable signal converters.
- Preparing and learning HDTV standards and systems, HDTV transmitter and receiver/encoder, Digital TV, CATV, direct to home TV, set top box with recording facility.

#### **ET 705: VLSI Design**

- Explaining History of CMOS Technology, MOS transistors, MOS transistor switches, CMOS logic, Inverter, Combinational logic, NAND gate, NOR gate, Compound gates, Multiplexers.
- Design and Building NMOS enhancement Transistor, PMOS enhancement Transistor, Threshold Voltage and Body Effect, Signal AC Characteristics, CMOS Inverter DC Characteristics,  $B_n$  &  $B_p$  ratios.
- Demonstrate NMOS enhancement Transistor, PMOS enhancement Transistor, Threshold Voltage and Body Effect, MOS Device Equations, Second order Effect.
- Detail study of Silicon Semiconductor Technology, Wafer Processing, Oxidation, Epitaxy, Deposition, Ion Implantation, and Diffusion, Silicon Gate Process, Basic CMOS technology
- Understanding the CMOS Logic Gate Design, Basic Physical Design of Simple logic gates, inverter, NAND, NOR gates, Euler Graphs, CMOS Logic Structures.

## **VIII SEMESTER**

### **ET 801: Computer Networks**

- Study and Examine Protocol hierarchies, connection oriented & connectionless services, service primitives, relationship of services to protocols.
- Design and Develop Guided transmission media, wireless transmission media, data link design issues: framing, flow control, error detection and correction, HDLC.
- Able to learn Basic Multiple access protocols such as aloha, CSMA, CSMA/CD, collision free protocols, limited contention protocol, wavelength division multiple access protocol.
- Understanding Virtual circuit and datagram network, network layer design issues, routing algorithms: hierarchical routing, flooding, IP protocol.
- Describing the Domain name system, electronic mail, world wide web, multimedia, cryptography, symmetric key algorithm, communication.

### **ET 802: Digital System Design**

- Design Concepts, Digital Hardware, Design Process, Introduction to CAD tools, Design Entry, Synthesis, Functional Simulation, introduction to VHDL.
- Explaining Assignment Statements, Selected Signal Assignment, Conditional Signal Assignment, Generate Statements, Statements, and Process Statements.
- Able to study Basic Design Steps, State diagram, State table, State assignment, Choice of flip 9 -flops, Design of Moore and Mealy circuits using VHDL
- Basic Design Steps, State diagram, State table, State assignment, Choice of flip 9 -flops, Design of Moore and Mealy circuits using VHDL
- Basic Design Steps, State diagram, State table, State assignment, Choice of flip 9 -flops, Design of Moore and Mealy circuits using VHDL

### **ET 803: Wireless communication**

- Able to study Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems.
- Learning Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Narrowband and Wideband models.
- Describing the various Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, Differential Quadrature Phase Shift Keying, Phase Shift Keying, and Binary Frequency Shift Keying.
- Understanding Principle of Diversity, Macro diversity, Signal Combining Techniques, Transmit diversity, Equalizers- Linear and Decision Feedback equalizers.

- Explaining Spread Spectrum Systems- Cellular Code Division Multiple Access Systems Principle, Power control, Effects of Orthogonal Frequency Division Multiplexing.

#### **ET804: Satellite Communication**

- Understanding Kepler's three Laws of planetary motion, motion locating the satellite in the orbit and with respect to the earth, orbital elements, calculation of Geo-stationary orbits radius, Leo, elliptical orbit.
- Able to study Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis.
- Describing Modulation and Multiplexing: Voice, Data, Video, and Analog – digital transmission systems
- Preparing and learning Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, Test methods
- Studying Orbital considerations of GPS satellites, Radio and Satellite Navigation, GPS time, GPS receivers, C/A code, and satellite signal acquisition.

#### **ET 805: Antenna and Radar Systems**

- Understanding the Radio Communication Link, Field from Oscillating Dipole, Antenna Field Zone, Shape-impedance
- Able to study Loops, Dipoles and Slots, Opened-Out Coaxial-Line Antennas, Opened-Out 2-conductor (Twin-Line) Antennas, Opened-Out Waveguide Antennas.
- Preparing Basic Concepts, Reciprocity in Antenna Measurements, Near-Field and Far-Field, Coordinate System, Typical Source of Error in Antenna Measurements.
- Studying Basic Principles-Fundamentals, RADAR Performance Factors, Pulsed System Basic Pulsed RADAR System, Antennas and Scanning, Display Method.
- Explaining CW Doppler RADAR, Frequency Modulated CW RADAR, Phased Array RADAR, 9 Planner Array RADAR

# Department of Computer Science and Engineering

## COURSE OUTCOMES (COs)

### III SEMESTER

#### CS-301: Applied Mathematics-III

- Solve higher order differential equations.
- Find Laplace transform of function and how solve diff. equations using L.T.
- Solve Fourier integral.
- Solve differential eq. using Z – transform.
- Gain the knowledge of vector calculus.
- Find curl and divergence of vector field function

#### CS-302: Electronic Devices & Circuits

- Understand the current voltage characteristics of semiconductor devices,
- Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation,
- Design and analyze of electronic circuits,
- Evaluate frequency response to understand behavior of Electronics circuits

#### CS-303: Object Oriented Programming

- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- Demonstrate the use of various OOPs concepts with the help of programs.

#### CS-304: Data Structure

- Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
- Understand basic data structures such as arrays, linked lists, stacks and queues.
- Describe the hash function and concepts of collision and its resolution methods
- Solve problem involving graphs, trees and heaps
- Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

#### CS-305: Computer Organization and Architecture

- Explain the organization of basic computer , its design and the design of control unit.,

- Demonstrate the working of central processing unit and RISC and CISC Architecture. Be familiar with the functional units of the processor such as the register file and arithmetic-logical unit,
- Describe the operations and language of the register transfer, micro operations and input- output organization.
- Understand the organization of memory and memory management hardware.
- Elaborate advanced concepts of computer architecture, Parallel Processing, inter-processor communication and synchronization.

## **IV SEMESTER**

### **CS-401: Applied Mathematics –IV**

- Apply the Number Theory to different applications using theorem.
- Apply probability and understand PDF.
- Understand sampling theory and correlation.
- Apply the graphs and trees concepts to different applications.
- Understand group's theory. Understand the Lattice theory.

### **CS-402: Digital Circuits & Fundamentals of Microprocessor**

- Apply the principles of number system, binary codes and Boolean algebra to minimize logic expressions
- Develop K-maps to minimize and optimize logic functions up to 5 variables
- Acquire knowledge about various logic gates and logic families and analyze basic circuits of these families.
- Design various combinational and sequential circuits such as encoders , decoders and counters using multiplexers, and flip – flops
- Describe and compare various memory systems, shift registers and analog to digital and digital to analog conversion circuits

### **CS-403: Database Management System**

- Explain the features of database management systems and Relational database.
- Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
- Create and populate a RDBMS for a real life application, with constraints and keys, using SQL
- Retrieve any type of information from a data base by formulating complex queries in SQL.
- Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database. Build indexing mechanisms for efficient retrieval of information from a database.

### **CS-404: System Programming**

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

### **CS-405: Theory of Computation**

- Model, compare and analyse different computational models using combinatorial methods.
- Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
- Construct algorithms for different problems and argue formally about correctness on different restricted machine models of computation.
- Identify limitations of some computational models and possible methods of proving them.
- Have an overview of how the theoretical study in this course is applicable to an engineering application like designing the compilers.

## **V SEMESTER**

### **CS501 Object Oriented Analysis & Design**

- be able to use an object-oriented method for analysis and design
- be able to analyse information systems in real-world settings and to conduct methods such as interviews and observations
- have a general understanding of a variety of approaches and perspectives of systems development, and to evaluate other IS development methods and techniques
- know techniques aimed to achieve the objective and expected results of a systems development process
- know different types of prototyping .know how to use UML for notation

### **CS502 Computer Network**

- State the fundamentals related to network security and basics of IPv6 and IPsec.
- State the fundamentals related to network security and basics of IPv6 and IPsec.
- Explain various protocols related to internet key exchange.
- Study Adhoc network and its protocols. Define various examples of wireless communication system, standards related to 2G and 3G wireless networks.

- Design wireless mobile network according to parameters such as frequency reuse, handoff strategies and system capacity

### **CS503 Design & Analysis Algorithms**

- Identify the problem given and design the algorithm using various algorithm design techniques.
- Implement various algorithms in a high level language.
- Analyze the performance of various algorithms.
- Compare the performance of different algorithms for same problem.
- Students will be able to apply the greedy programming technique to solve the problems.

### **CS504 Software Engineering**

- Plan a software engineering process life cycle , including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements
- Able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project
- Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
- Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice
- Able to use modern engineering tools necessary for software project management, time management and software reuse.

### **CS505 Operating System**

- Understand the basics of operating systems like kernel, shell, types and views of operating systems
- Describe the various CPU scheduling algorithms and remove deadlocks.
- Explain various memory management techniques and concept of thrashing
- Use disk management and disk scheduling algorithms for better utilization of external memory.
- Recognize file system interface, protection and security mechanisms.
- Explain the various features of distributed OS like Unix, Linux, windows etc.

## **VI SEMESTER**

### **CS601 Java Programming**

- Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem

- Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
- Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
- Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events
- Identify, Design & develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture

### **CS602 Microprocessor & Microcontrollers**

- Understand the taxonomy of microprocessors and knowledge of contemporary microprocessors.
- Describe the architecture, bus structure and memory organization of 8085 as well as higher order microprocessors.
- Explore techniques for interfacing I/O devices to the microprocessor 8085 including several specific standard I/O devices such as 8251 and 8255.
- Demonstrate programming using the various addressing modes and instruction set of 8085 microprocessor
- Design structured, well commented , understandable assembly language programs to provide solutions to real world control problems

### **CS603 Computer Graphics**

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- Use of geometric transformations on graphics objects and their application in composite form.
- Extract scene with different clipping methods and its transformation to graphics display device.
- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
- Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

### **CS604 Web technology**

- Explain the history of the internet and related internet concepts that are vital in understanding web development.
- Discuss the insights of internet programming and implement complete application over the web.

- Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
- Utilize the concepts of JavaScript and Java
- Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

### **CS605 Principles of Management**

- Discuss and communicate the management evolution and how it will affect future managers
- Observe and evaluate the influence of historical forces on the current practice of management.
- Identify and evaluate social responsibility and ethical issues involved in business situations and logically articulate own position on such issues.
- Explain how organizations adapt to an uncertain environment and identify techniques managers use to influence and control the internal environment.
- Practice the process of management's four functions: planning, organizing, leading, and controlling.
- Identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.

## **VII SEMESTER**

### **CS701 Digital Image Processing**

- Remember the fundamental concepts of image processing.
- Explain different Image enhancement techniques
- Understand and review image transforms
- Analyze the basic algorithms used for image processing & image compression with morphological image processing.
- Contrast Image Segmentation and Representation 6. Design & Synthesize Color image processing and its real world applications.

### **CS702 TCP/IP and Internet**

- To understand the various standards on data communication
- To understand the functionality of reference model for data communication
- To understand the various layers of different protocols
- To understand the basic concept of socket programming and client server model

### **CS703 Data Warehousing & Mining**

- Identify the scope and necessity of Data Mining & Warehousing for the society
- Describe the designing of Data Warehousing so that it can be able to solve the root problems.
- To understand various tools of Data Mining and their techniques to solve the real time problems.

- To develop ability to design various algorithms based on data mining tools.
- To develop further interest in research and design of new Data Mining techniques.

#### **CS704: Elective-I**

##### **3. Mobile Computing**

- Determine solutions using problem solving principles, logic and systematic methodologies.
- Evaluate the architecture and principles of operation of computer systems and networks.
- Synthesize principles and theories of computer science and software engineering for application to different computing paradigms.
- Design and develop software systems for various application domains.
- Design and develop secure enterprise-grade information systems.
- Manage the development of software systems through a variety of development processes and methodologies.
- Design effective user interfaces using human computer interaction principles.
- Synthesize new knowledge in the field of computer science by using appropriate research methodologies.

#### **CS705: Elective-II**

##### **1. Enterprise Resource Planning**

- Understand the basic concepts of ERP.
- Identify different technologies used in ERP.
- Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules.
- Discuss the benefits of ERP 5. Understand and implement the ERP life cycle.
- Apply different tools used in ERP.

### **VIII SEMESTER**

#### **CS801 Software Testing & Quality Assurance**

- know the definition of quality, cost of quality, quality model;
- apply white-box testing, black-box testing, and inspection techniques;
- know how test tools can be used in the testing life cycle;
- use testing metrics for product and process;
- Understand how to do performance testing and usability testing.

#### **CS802 Compiler Construction**

- Master using lexical analyzer and parser generator tools.
- Master building symbol tables and generating intermediate code.
- Master generating assembly code for a RISC machine
- Master programming in Java.

- Be familiar with compiler architecture.
- Be familiar with register allocation.
- Be exposed to compiler optimization.

### **CS803 Computer System Security**

- Define information security and outline its major components.
- Identify the major types of threats to information security and the associated attacks.
- Develop strategies to protect organization information assets from common attacks.
- Understand how security policies, standards and practices are developed.
- Understand the role of management in enforcing security policies, standards and practices.

### **CS804 Elective-III**

#### **1. Advanced Database**

- Explain and understand the concept of a transaction and how ACID properties are maintained when concurrent transaction occur in a database
- Measure query costs and design alternate efficient paths for query execution.
- Apply sophisticated access protocols to control access to the database.
- Implement alternate models like Distributed databases and Design applications using advanced models like mobile, spatial databases.
- Organize strategic data in an enterprise and build a data Warehouse.

### **CS805 Elective-IV**

#### **1. Distributed System**

- Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement,
- Design and develop distributed programs using sockets and RPC/RMI.
- Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems
- Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance.

## Department of Mechanical Engineering

### COURSE OUTCOME

#### III SEMESTER

##### ME301: Applied Mathematics-III

- Students are able to solve higher order Diff. Eq.
- Students are able to find Laplace Transform of function and how to solve Diff. Eq. using L.T.
- Students gain the knowledge how to solve complex integration along closed curve
- Students are able to find solution of system of linear equation & first order & first degree partial diff. eqn.
- Students gain the knowledge of probability distribution & mathematical expectations.

##### ME302: Fluid Mechanics

- Apply conservation laws to fluid flow problems in engineering applications.
- Design experimental procedure for physical model studies.
- Compute drag and lift coefficients using the theory of boundary layer flows.
- Analyze and design free surface and pipe flows
- Formulate and solve one dimensional compressible fluid flow problems

##### ME303: Kinematics Of Machines

- Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
- Analyze the planar mechanisms for position, velocity and acceleration.
- Synthesize planar four bar and slider crank mechanisms for specified kinematic conditions.
- Evaluate gear tooth geometry and select appropriate gears for the required applications.
- Design cams and followers for specified motion profiles.

##### ME304: Machining Processes

- Understand ASA and ORS systems of tool geometry and their inter-relations.
- Develop relations for chip reduction coefficient, shear angle, shear strain, forces, power, specific energy and temperature in orthogonal cutting.
- Select cutting fluids, tool materials and coatings to control tool wear and temperature.
- Evaluate cutting speed to minimize production cost and maximize production rate.
- Understand the working principles, applications and importance of modern machining processes.

### **ME305: Engineering Metallurgy**

- Understand the crystal structure and classification of materials.
- Understand methods of determining mechanical properties and their suitability for applications.
- Classify cast irons and study their applications.
- Interpret the phase diagrams of materials.
- Select suitable heat-treatment process to achieve desired properties of metals and alloys.

## **IV SEMESTER**

### **ME401: Applied Mathematics-IV**

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

- Apply the fundamental concept of Fourier series and be able to give Fourier expansions of a given function.
- Solve various first order differential equations with their applications.
- Illustrate the mathematical aspects that contribute to the solution of heat and wave equations.
- Students will learn Various methods of numerical analysis
- Students will gain the knowledge of Z-transform.

### **ME402: Engineering Thermodynamics**

- Understand the concepts of continuum, system, control volume, thermodynamic properties, thermodynamic equilibrium, work and heat.
- Apply the laws of thermodynamics to analyze boilers, heat pumps, refrigerators, heat engines, compressors and nozzles.
- Evaluate the performance of steam power cycles.
- Evaluate the available energy and irreversibility.
- Evaluate properties of pure substances and gas mixtures.
- Analyze air standard cycles applied in prime movers.

### **ME403: Mechanics Of Material**

- To develop an understanding in students the concept of direct, bending and shear stresses and strains, and their relationship under biaxial and tri-axial loading. Elastic constants and their relationship, stress-strain dig. And their characteristics for MS steel and other metals also able to understand and analyze the numerical problems in compound bars and uni-axial tension and compression and will able to understand temperature stress analysis in compound bars.
- To develop and understanding the analyzing skills of the student for axial force, shear force and bending movement for various support conditions with different loads for simply supported and cantilever beams. Also student should understand the simple bending theory, section modulus, moment of resistance, bending stress in solids, hollow built-up section and leaf springs.

- To develop and understand in students to analyze the shear stress distribution and power transmitted by shaft also able to understand the concept of helical spring.
- To develop and understand the analytical skill of the student for the calculation of internal pressure to thin and thick cylinders also spherical shapes.
- To develop and understand the concept of strain energy for various conditions and to understand the principle planes, stresses.

#### **ME404: Manufacturing Processes**

- Select materials, types and allowances of patterns used in casting and analyze the components of moulds.
- Design core, core print and gating system in metal casting processes
- Understand arc, gas, solid state and resistance welding processes.
- Develop process-maps for metal forming processes using plasticity principles
- Identify the effect of process variables to manufacture defect free products.

#### **ME405: Hydraulic Machines**

- Design the working proportions of hydraulic machines.
- Describe the operating characteristics of hydraulic machinery (pumps and turbines)
- The factors affecting hydraulic machinery's operation and specifications, as well as their operation in a system.

### **V SEMESTER**

#### **ME501: Design Of Machine Elements**

- Understand the customers' need, formulate the problem and draw the design specifications.
- Understand component behavior subjected to loads and identify the failure criteria.
- Analyze the stresses and strains induced in a machine element.
- Design a machine component using theories of failure.
- Design keys, cotters, couplings and joints including riveted, bolted and welded joints.

#### **ME502: Metrology And Quality Control**

- Identify techniques to minimize the errors in measurement.
- Identify methods and devices for measurement of length, angle, gear & thread parameters, surface roughness and geometric features of parts.
- Design the limit gauges.

#### **ME503: Industrial Economics & Entrepreneurship Development**

- Define and explain concepts and laws related to demand analysis and also solve problems of elasticity of demand.

- Define and explain concepts and laws related to production and also solve problems of BEP and Depreciation
- Explain the basics of entrepreneurship and Small Scale Industries.
- Explain the financial agencies and entrepreneurship support Government system & Agencies and Analyze the factors governing to project selection.

#### **ME504: Mechanical Measurement**

- Handle an instrument and understand the basic calibration, possible errors and measures to minimize them based on their characteristics.
- Acquire knowledge on sensors and their suitability in application of measuring different physical quantities and their ranges.
- Estimate errors and uncertainty in measurements using statistical analysis.
- Understand working principles in the measurement of field quantities.
- Identify sensors for measurement of vibration, thermo-physical properties and radiation properties of surfaces.
- Understand the conceptual development of zero, first and second order systems. Understand various display devices, principle of operation and their working.

#### **ME505: Heat Transfer**

- Understand the basic modes of heat transfer.
- Compute temperature distribution in steady-state and unsteady-state heat conduction.
- Understand and analyse heat transfer through extended surfaces.
- Interpret and analyze forced and free convection heat transfer.
- Understand the principles of radiation heat transfer.
- Design heat exchangers using LMTD and NTU methods.

### **VI SEMESTER**

#### **ME601: Control System Engineering**

- Students will understand the concept of open loop and closed loop system, transfer function, block diagram mathematical modeling and industrial controllers.
- Student will analyze steady and transient response of the TYPE-1, TYPE-2 system.
- Students will understand the concept of stability in time domain.
- Determination of stability of the system in frequency domain and speed control in prime movers in control system perspective will be understood by the students.
- Students will understand the types of systems, various industrial controllers, types of responses, concept of stability and various speed controllers.

### **ME602: Industrial Electronics**

- To get diode, BJT and JFET VI characteristics
- To verify zener diode as regulator and full wave rectifier and filters
- To test single stage BJT amplifier and single stage JFET amplifier
- To check RC phase shift oscillator's performance
- To verify logic gates using 74LS00 IC and op amp as inverting and non-inverting amplifier ( $\mu\text{A}741$ )

### **ME603: Operations Research Techniques**

- Understand the concepts of operations research modelling approaches.
- Formulate and solve engineering and managerial situations as LPP.
- Formulate and solve engineering and managerial situations as Transportation and Assignment problems.

### **ME604: Thermal Engineering**

- Students will be able to define a thermodynamic system, closed and open systems, state, equilibrium, process, cycle and system properties.
- Students will be able to define intensive/extensive properties and explain the Zeroth law of thermodynamics.
- Students will be able to define the pure substance, different phases (compressed liquid, saturated liquid phase, saturated liquid-vapor mixture and super-heated vapor).
- Students will be able to determine the properties of a pure substance using thermodynamic tables
- Students will be able to identify and analyze some ideal cycles: e.g. Rankine's cycle, Otto's cycle, Diesel's cycle and the Brayton's cycle, Ideal vapor compression cycles.

### **ME605: Dynamics Of Machinery**

- Understand free and forced vibrations of single degree freedom systems.
- Analyze balancing problems in rotating and reciprocating machinery.
- Characterize and design flywheels.
- Understand the gyroscopic effects in ships, aero planes and road vehicles.
- Analyze and design centrifugal governors.

## **VII SEMESTER**

### **ME701: Elective-I**

#### **ME7011: Automobile Engineering**

- Understand the basic lay-out of an automobile.

- Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
- Understand the principles of transmission, suspension, steering and braking systems.
- Study latest developments in automobiles.

### **ME7013: Tool Design**

- Students will be able to design single and multi-point cutting tools.
- Students will be able to identify the basic tool geometry.
- Students will exhibit their knowledge in estimating tool life and designing multipoint tools like twist drills, reamers, broach and milling cutters.
- Students will show the ability to design press working dies like punching, blanking and drawing.
- Students will be able to design customized jigs and fixtures for holding complex geometries.
- Students will demonstrate their skills and knowledge in modern cutting, forming, tools of the discipline to broadly defined engineering industry.

### **ME702: Industrial Engineering**

- Understand production systems and their characteristics.
- Evaluate MRP and JIT systems against traditional inventory control systems.
- Understand basics of variability and its role in the performance of a production system.
- Analyze aggregate planning strategies.
- Apply forecasting and scheduling techniques to production systems.
- Understand theory of constraints for effective management of production systems.

### **ME703: Refrigeration And Air-Conditioning**

- Understand the principles and applications of refrigeration systems.
- Understand vapour compression refrigeration system and identify methods for performance improvement.
- Study the working principles of air, vapour absorption, thermoelectric and steam-jet refrigeration systems.
- Analyze air-conditioning processes using the principles of psychrometry.
- Evaluate cooling and heating loads in an air-conditioning system.

### **ME704: Automation In Production**

- Enumerate principles, strategies and advantages of industrial automation.
- Select level of automation and calculate manpower requirement.
- Study of material handling and material storage systems for an automated factory.
- Automate shop floor controls and part/device identification methods.
- Study the effect of automation by simulation and experimentation.

- Understand the basic components of robots.
- Differentiate types of robots and robot grippers.
- Understand FMS and job-shop and mass production manufacturing systems.

#### **ME705: Design Of Mechanical Drives**

- Recognize the need for friction drives and positive drives.
- Apply BIS standards and catalogues in design and selection of belts and chain for requirement.
- Select suitable drive combination based on requirement.
- Explain failure modes in gears.
- Establish suitability of a given drive elements whether to meet the requirement.
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### **VIII SEMESTER**

#### **ME801: Industrial Management**

- Understand the evolutionary development of management thought and general principles of management.
- Apply marketing concepts and tools for successful launch of a product.
- Understand the role of productivity in streamlining a production system.
- Apply the inventory management tools in managing inventory.
- Apply quality engineering tools to the design of products and process controls.
- Apply project management tools to manage projects.

#### **ME802: I. C. Engines And Gas TurbineS**

- Understand working and performance of IC Engines through thermodynamic cycles.
- Understand combustion phenomena in SI and CI engines and factors influencing combustion chamber design.
- Outline emission formation mechanism of IC engines, its effects and the legislation standards.
- Understand working principles of instrumentation used for engine performance and emission parameters.
- Evaluate methods for improving the Gas Turbine performance.
- Understand the latest developments in IC Engines and Gas Turbines.

#### **ME803: ELECTIVE-II**

##### **ME8031: Power Plant Engineering**

- Understand functions of the components of power plant.
- Understand the working of nuclear, thermal and oil based power plants.
- Evaluate the design layout and working of hydro electric power plants.
- Evaluate economic feasibility and its implications on power generating units.

### **ME8033: Machine Tool Design**

- The student will be able to understand basics of machine tool design, different types of machine tools, identify various applications of machine tools in different manufacturing Processes & to define the standard procedure of gear box, feed box design.
- The student will be able to understand selection procedure of power drives required for machine tools and standard design procedures for machine tool parts like beds, carriage, and column.
- The student will be able to understand design procedure of slide ways and guide ways & selection of different protecting device.
- The student will be able to understand design procedure spindles and bearings etc. in aligned with productivity and economic aspects. Design different machine tools considering static and dynamic loads.
- The Student will be able to consider several other important aspects like vibration minimization, removal of chatters increasing cutting tool life, maintainability of machine tools.

### **ME804: Elective-Iii**

#### **ME8041: Unconventional Energy Systems**

- Identify renewable energy sources and their utilization.
- Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems.
- Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas and hydrogen.
- Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
- Identify methods of energy storage for specific applications.

### **ME805: Computer Aided Design**

- Formulate and solve problems in one dimensional structures including trusses, beams and frames.
- Formulate FE characteristic equations for two dimensional elements and analyze plain stress, plain strain, axi-symmetric and plate bending problems.
- Understand geometric transformation techniques in CAD.
- Develop mathematical models to represent curves and surfaces.
- Model engineering components using solid modeling techniques.

## **Department of Civil Engineering**

### **COURSE OUTCOMES (COs)**

#### **III SEMESTER**

##### **MAT-301: Engineering. Mathematics- III**

- Evaluate Fourier series of function in different interval.
- Solve P.D.E and apply it for initial value problems and boundary value problems.
- Extend the concept of matrices to Eigen value & Eigen vector and use it to solve various engineering problem.
- Evaluate numerical solution of algebraic, simultaneous & first order D.E.
- Numerical Solution of ordinary differential equation
- **CE-301: Engineering. Geology**
- Explain the importance of geology and compare the geological features with engineering importance definitions and classifications of minerals.
- Explain about fault, folds, unconformity and joints which are present in the strata of the earth crust, by which they can able to compare the particular area with their construction site or engineering projects.
- Apply knowledge regarding the underline rock formation to get complete idea about igneous, sedimentary and metamorphic rock.
- Explain the characteristic and impact of the naturally occurring disasters and they would be able to evaluate and create the precaution related to civil engineering.
- Explain the importance of ground water regarding the civil engineering point of view and they would be able to create a planning for ground water for the future purpose.

##### **CE-302: Strength of Material**

- Analyze the statically determinate and indeterminate problems.
- Determine the stresses and strains in the members subjected to axial, bending loads.
- Evaluate the bending stresses in simple beam.
- Determine the stresses and strains in the member's torsion of shafts and deflection of beams.
- Determine the principal stresses and strains in structural members.

##### **CE-303: Fluid Mechanics- I**

- Develop a basic understanding about the properties of fluid their behavior under static and dynamic condition and measure the fluid pressure in manometer.
- Apply the principle of hydrostatic and explain the concept buoyancy and state of equilibrium.

- Classify the different type of flow and solve the problem on continuity equation, stream function and velocity potential function.
- Demonstrate fluid measuring devices like venture meter, orifice meter, notches, orifice and mouthpiece. Apply the Bernoulli's equation to solve the problem of fluid
- Explain the concept of dimensional analysis and develop basic concept related to laminar and turbulent flow

#### **CE-304: Geotechnical Engineering.-I**

- Introduction to soil and various relations.
- Find the index and engineering properties of the soil.
- Determine properties & demonstrate interaction between water and soil.
- Determine properties & demonstrate interaction between water and soil.
- Evaluate the stresses in the soil mass.
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### **IV SEMESTER**

#### **CE-401: Structural Analysis-1**

- Classify & discuss statically determinate & indeterminate structure
- Analysis of continuous beam and simple portal frames.
- Apply & Analyze the concept of influence lines for deciding the critical forces and sections while designing
- Apply concept of strain energy and analyze redundant frames
- analysis of buckling in members and arches

#### **CE-402: Environmental Engg.-1**

- Explain the importance and necessity of water supply. Analyze the capacity of water supply scheme.
- Classify and Compare between the conveyance systems and the appurtenances used in water supply system
- Distinguish the characteristics of water relevant to drinking water standards and determine the necessity of treatment and also able to differentiate it.
- Design various units of conventional water treatment plant and water supply system.
- Identify necessity of treatment, types of treatment processes and disposal methods for Solid Waste.

#### **CE-403: Concrete Technology**

- Identify Quality Control tests on concrete making materials
- Understand the behavior of fresh and hardened concrete

- Apply various methods for testing of plastic and hardened concrete
- Design concrete mixes as per IS and ACI codes
- Understand the need for special concretes

#### **CE-404: Hydrology & Water Resources**

- Apply the knowledge of hydrology in day to day life and utilize its basics for the measurement of precipitation.
- Define and explain Infiltration, Evaporation and Transpiration and apply its knowledge to measure Infiltration and Interception.
- Utilize the technique of the Hydrograph to forecast Flood discharge for different duration.
- Apply the statistical technique to analyze the flood occurrence and frequency.
- Explain the concept of ground water recharge and multipurpose project for water resources.

#### **CE-405: Surveying & Leveling – I**

- Determine angle and distance
- Explain different methods and their procedure for leveling.
- Experimental study of Theodolite.
- Explain techniques used in tachometry surveying
- Explain curve and minor instruments

#### **CE-406: Building material & construction**

- The students should able to understand different types of foundation, causes of failure and remedial measure.
- The students should able to understand classification of bricks & different types of brickwork. Also understand the stone masonry, lintel and arches.
- The students should able to understand different types & methods of construction of roof & floor
- The students should able to understand functional design of different types of staircase, door & window.
- The students should able to understand plastering, pointing, centering & painting.

### **V SEMESTER**

#### **CE-501: Environmental Engineering – II**

- Explain the concept related to water & its quality, sewage, sewer, storm water, etc in its hydraulic design.

- Classify and Compare the different components of sewer in construction, testing & maintenance of sewers.
- Design various units of conventional sewage treatment plant and the regulation of functional planning.

### **CE-502:Transportation Engineering –I**

- Exhibit the knowledge of planning, design and the fundamental properties of highway materials in highway engineering.
- Undertake various Traffic studies and apply the knowledge in planning and design of pavement and geometrics
- Understand and use the concept of different methods in design, construction, inspection and maintenance of the pavement.
- Understand and describe the terms related to bridge, hydrological parameters and sub-structures

### **CE-503: Design of RCC Structure- I**

- Understanding to the Working Stress Method of RCC design. Basic concepts in a Design for flexure,
- Understanding to Limit State Design: Concept of probabilistic design and limit State design.
- To understand Limit state of Collapse in Flexure: Analysis & Design of the Tee & L-beam Section.
- Design of circular water tank with roof slab/ dome resting on ground by approximate methods/ IS code method.
- To understand the Design of one-way, simply supported, single span and cantilever slabs, and Continuous slab/ beam with IS coefficients.

### **CE-504: Project Management**

- Understand about engineering economics.
- Understand about planning of project management.
- Planning for safety construction hazards, safety in construction, industry and at work site.
- Understand about Management information System, Material Management and equipment management.
- Equipment's of Major projects.

### **CE-505: Building Design and Drawing**

- Importance of Building drawing as Engineer's Language in construction & costing
- Understand the methods of drawing

- Graph paper design (line plans )based on various requirements for residential, public, education and industrial buildings
- Two point perspective of Residential building neglecting small elements of building such as plinth offset, chajja projections etc.

### **CE-506:Surveying – II**

- Apply Tachometric surveying for horizontal and vertical sights.
- Evaluate horizontal and vertical distances in hilly terrain
- Apply survey technique to align highways curves
- Astronomical terms and definitions
- Photogrammetry - Introduction - Terrestrial and aerial Photographs - Stereoscopy - Parallax - Electromagnetic distance measurement.

## **VI SEMESTER**

### **CE-601:Design of Steel Structures**

- Use the knowledge of structural properties in assessing its strength for the construction purpose.
- Understand basic types of connections in a structure by use of weld, rivet, bolt, etc.
- Apply the knowledge of various techniques in analyzing the steel structural components of a building.
- Make use of knowledge of analysis in structural planning of various components.
- Make use of knowledge of analysis in design of various components.

### **CE-602: Structural Analysis-II**

- Apply the Kanis methods for analysis of frames
- Apply MDM for analysis of Beam and frames and to understand the behavior of different structural members"
- To formulate the global stiffness matrix, load matrix for analysis purpose for plan truss.
- Introduction to Flexibility Method of structural analysis, compatibility equations.
- Strain energy method applied to simple composite structures.

### **CE-603:Fluid Mechanics – II**

- "Understand the concepts related to boundary layer theory and determination of drag and lift forces."
- "Apply the knowledge of theories and equations of pipe flow in analyzing and designing the pipe network systems and its components including water hammer pressures."

- "Use the concepts of uniform and critical flow through open channels including design of efficient channel sections."
- Difference between model and prototype. Classification of turbines; component part and working principles
- Understand and apply basics related to Turbines & Pumps in Water Resources planning

#### **CE-604: Geotechnical Engg.- II**

- Use the knowledge of different soil techniques to ascertain the properties of soil. Practice of ground improvement techniques.
- Analysis of stability of natural slope, safety and sustainability of slopes.
- Design of retaining structure, reinforced earth wall.
- Design of shallow foundation
- Design of Pile foundation.

#### **CE-605: Computer Application in Civil Engineering**

- To understand Data input and output, Interactive programming preparing and running a complete simple program.
- Student able to program preparing using all such statements.
- To understand the Fundamentals of Numerical methods, Interpolation and Extrapolation. Numerical Integration techniques.
- To understand Functions, different types of functions, storage class, Arrays.
- To understand the Initial & two point boundary value problems, Eulers method, Runga- Kutta, Milnes method and Interactive Computer program development.

### **VII SEMESTER**

#### **CE-701: Irrigation Engineering**

- Understand the importance of irrigation engineering, the methods of irrigation and crop water requirement"
- Understand the planning, design and operation of storage reservoir and make use of it in the practical situation."
- Understand the basic profile of dams and use the knowledge in checking stability of Gravity dams and Earth dams. Gain the knowledge of types of spillways and design of diversion head works.
- Understand the theories of canal design and apply the concept to design lined and unlined canals and detail out the cross sections
- Understand Canal regulation work, cross drainage work and Diversion head works.

### **CE-702: Structural analysis-III**

- Understand Formulation of element/local stiffness matrix and global stiffness matrix for beam members
- Understand the Formulation of element/ local stiffness matrix and global stiffness matrix for Plane frame members
- Know the Basic concept, Degree of Freedom, Basic concept of Direct Stiffness Method
- Understand to structural dynamics, D'Alembert principle, inertia force, equation of motion
- Understand to finite Element method, basic concepts, discretization of structures.

### **CE-703: Design of RCC Structure – II**

- To know about Limit state of collapse in flexure: Analysis and design of doubly reinforced rectangular, Tee and L-sections.
- Understand the Limit state of serviceability: Deflection calculations for beams and one way slabs.
- To know the Analysis and design of columns subjected to biaxial moments. Design of long columns
- Understanding Moment redistribution Analysis and Design of Fixed beam , propped Cantilever
- Analysis and design of portal frames (single bay single storey) hinged or fixed at base.
- Design of RCC Two way slab with various end conditions using with is code coefficient.

### **CE-706: Traffic Engineering**

- To understand the Scope, Various organization working in traffic research, Elements of traffic , characteristics of vehicle, road user and road.
- To understand the Traffic Control & Safety and Enforcement & Education: Traffic signs, road markings, traffic signals-design of signalized intersections and signaling systems, conflict points,
- To know about the Motor Vehicle act and Rules, Education, Need and Methods, Air pollution & Noise Pollution by Traffic, Pollution standards for auto vehicles.
- To understand the Traffic Control Devices: Traffic signs, markings and signals; principles of signal design.
- To understand the Traffic Regulation & Management: Speed, vehicle, parking, enforcement regulations.

### **CE-709:Advanced R.C.C. design**

- To understand Analysis and design of Multistoried buildings up to three bays, calculation of loads,
- Understanding Analysis and Design of Elevated service Reservoirs, IS Recommendations for wind & earthquake
- Analysis and Design of bridges and Culverts
- Analysis and design of Silos and Bunkers.
- To understand the Analysis and Design of raft foundations, Pile foundation

## **VIII SEMESTER**

### **CE-801:Quantity surveying & Estimation**

- Prepare the preliminary estimate for administrative approval & technical sanction for a civil engineering project.
- Estimate the bill of quantities using different techniques of preliminary & detailed estimation of buildings.
- Write the specification of the works to be undertaken, Use the concept of SD, EMD, MAS, Running Bill, and Final Bill during the entire project.
- Prepare the tender documents, fill the contracts and make use of knowledge of different contract submission & opening in awarding the work to the contractor. Schedule the project for its timely completion.
- Derive the exact value of the asset (movable & immovable) using different Valuation techniques.

### **CE-802:Transportation Engineering – II**

- Geometric design of railway track, Types, functions facilities & equipment.
- Understand the functions of various elements of railways.
- Understand the basic knowledge about various elements of Tunnels.
- Understand the functions of various elements of airports.
- Understand the Airport layout, Airport classification

### **CE -806: Pavement design**

- Students will be able to understand design parameters of various pavements
- Students will be able to analyze flexible pavements, conduct tests & experiments and
- Students will be able to design flexible pavements and Rigid pavements by IRC methods to meet desired needs within realistic constraints interpret the data

- Students will be able to understand the airfields pavements.
- Students will be able to understand strengthening and maintenance of pavements.

### **CE-811: Design of water & waste water Treatment System**

- Photogrammetry - Introduction - Terrestrial and aerial Photographs - Stereoscopy - Parallax - Electromagnetic distance measurement
- Theory of coagulation, flocculation and sedimentation.
- Theory about filtration and Disinfection.
- Treatment Methods of Waste water treatment
- Biological unit processes

## **Department of Mining Engineering**

### **COURSE OUTCOMES (COs)**

#### **III SEMESTER**

#### **MN301: Mining Geology-I**

- Understand the Internal structure of earth and structural geology
- Know about the rocks and minerals and their properties.
- 3.Understand various geological structures and impacts on mining
- Generate the sub surface profiles from geological maps and plotting structures.

#### **MN302: Introduction To Mining Technology**

- Basic terminology of mining and mechanics of blasting
- Various phases of underground and open cast mining
- Various operations involved in drifting and shaft sinking
- Various types of explosive and their use in mines.

#### **MN303: Fluid Mechanics**

- Knowledge of basic principles of fluid mechanics
- Ability to analyze fluid flow problems with the application of the momentum and energy equations
- Capability to analyze pipe flows as well as fluid machinery.

#### **MN304: Mine Electrical Engineering**

- 1.Basic knowledge about mine cables and supply of electricity
- 2.working of transformer
- 3.Different types of cables used in mines and their application

### **MN305: Mechanical Engineering**

- 1.General Principles of Power Transmission
- 2.Concepts of Thermodynamics and Internal Combustion Engines
- 3.Air Standard Cycles and Air Compressors

### **IV SEMESTER**

#### **MN401: Mining Geology-II**

- Basic of Stratigraphy
- Economic geology
- Prospecting & Exploration
- Geohydrology
- Remote sensing

#### **MN402: Mine Surveying-I**

- Basic terminology of Surveying
- Various types of leveling
- Various operations involved field surveying and curve setting.

#### **MN403: MINING MACHINERY-I**

- Understand various surface layouts, wire ropes construction and size selection and its deterioration
- Transport systems in mines –its various features in detail, safety devices, braking systems and related calculation.
- Winding systems in mines –drum winder. There important features –construction, mechanical & electrical braking, safety features and torque time diagram.
- Winding systems in mines –friction winder There important features –construction, mechanical & electrical braking, safety features and torque time diagram.
- Aerial Ropeway –construction, safety features and calculation.

#### **MN404: Programming In C Language**

- The course is designed to provide complete knowledge of C language.
- Students will be able to develop logics which will help them to create programs, applications in C.
- Also by learning the basic programming constructs they can easily switch over to any other language in future.

### **MN405: Strength Of Material**

- Strength of materials is the main foundation for Mechanical, Civil Engineering and Mining Engineering in the upcoming design courses.
- Engineering design concepts are integrated into the Strength of Material course.
- Methods are learned for determining the stresses, strains and deflections produced in various members produced by applied loading.
- To provide training in a fundamental subject (mechanics and structural) necessary for careers mechanical, civil and Mining Engineering.

### **MN406: Statistical and Numerical Method**

- 1 Ability to flowchart and pseudo code logic for problem solving
- 2. Solve root finding problems using several methods
- 3. Solve systems of linear algebraic equations using Gauss elimination and LU decomposition
- 4. Perform regression and interpolation on datasets
- 5. Numerically differentiate and integrate equations and datasets 6. Numerically integrate ODEs for initial value problems

## **V SEMESTER**

### **MN501: Rock Mechanics**

- To make students conversant with different types of rock mass with regard to design of excavations and methods of designing
- To acquaint students with various types of supports and reinforcements as well as permanent supports of excavations
- To make them conversant with ground control and subsidence problems and preventive measures.
- To understand the knowledge basic of stress analysis, rock modeling and soil mechanics to be applied for design of rock structures.

### **MN502: Mine Climate Engineering**

- various gaseous pollutants including radon gas in metalliferous and coal mines. Their toxic effects, detection and means of their reduction in mine atmosphere. Statutory requirement of ventilation standards to be maintained.
- Salient features of heat and humidity, their effect on working efficiency of miners, measurement and reducing both to tolerable limits.
- Natural ventilation and its limitations. Types of Mechanical ventilators, various ventilation devices, selection, installation, working and necessary calculation including expenditure and necessary statute.

- Live case studies of mine ventilation, quantity & necessary pressure requirement, ventilation planning in underground coal and non-coal mines, auxiliary ventilation devices for improvement in ventilation.
- Computer application in solving complicated ventilation circuits and special problems associated with deep underground and deep opencast mines.

### **MN503: Drilling and Blasting Engineering**

- to understand the basic characteristics of explosives
- to know the mechanism of rock breakage utilization of explosives energy.
- Conduction of blasting operation in mine and its safer aspects.
- design of optimum blast and control measures

### **MN504: Mine Surveying-II**

- Students will get detail knowledge about how to do survey by theodolite,
- co-relation survey ,
- stope survey,
- photo theodolite.
- Areal Photography

### **MN505: Mining Machinery-II**

- Understand the necessity, construction, applications and selection of various winning machines in underground excavation including, coal formation and tunnels.
- Understand the necessity, construction, applications and selection of various loading machines in underground excavation including coal formation and tunnels.
- Understand the necessity, construction, applications and selection of various drilling machines in underground & surface excavation along with roof bolting machines.
- Understand the necessity, construction, applications and selection of various surface mining machines.
- Understand the necessity, construction, applications and selection of various ancillary equipment's. Construction and selection of various type of pumps used in underground and opencast mines and calculations.

### **MN506: Mine Support**

- Understand different types of supports used in mines and their capacity.
- Able to design stowing plant.
- Hydraulic support.
- Design of Systematic support

## **VI SEMESTER**

### **MN601: Mineral Processing**

- Understand the working principle and mechanism of Crushing and Grinding Operations
- Understand the basic principles of separation of minerals by Jigging, Tabling and Heavy media separation
- Understand froth flotation operation for up gradation of ores/minerals, Electrostatic/Magnetic separation operations.

### **MN602: Mine Rescue Engineering**

- Spontaneous heating & coal dust explosion
- Firefighting equipment's
- Causes and prevention on mine inundation.

### **MN603: Underground Coal Mining**

- Basic technology of coal mining 2. Various operations involved in depillaring
- Various operations involved in Long wall Mining and Contiguous seam working

### **MN604: Underground Metalliferous Mining**

- Students will gain the knowledge about various development headings, opening with their shape, locations and its driving technology
- Students can will learn about the unit operations and stopping parameters through models and visuals 3. Students will develop a skill to select the method of metal mining based on geo-mining parameters

### **MN605: Surface Mining**

- Importance of surface mining in today's mineral requirement and world mineral production of various minerals from surface mines.
- Understanding viability of surface mining and its design aspects.
- Various systems of surface mining and their applications. Opening of deposits under various conditions and haul road design
- Mining of deposits under various conditions using various equipment combination with layouts including in-pit-crushing technology. Problem solving of mine design covering –development, production, equipment capacity & strength calculation and layouts.
- Blast design under various geo-mining conditions with live problem solving.6 Conversion of underground developed to surface mines –its related problems and design of mines.7 Construction of external and internal dumps with problems.8 Reclamation and with real life problems.

## **VII SEMESTER**

### **MN701:Ground Control In Mines**

- Classify the rock based on their engineering properties
- Understand applicability of different types of supports.
- Understand various phases of stowing and back filling.
- Predict and control the subsidence, rock burst and bumps
- Analyze the stability of slopes

### **MN702: Surface Mine Environment**

- To be able to identify the need for environmental management and sustainability
- To understand various components of environmental impacts
- To design environmental management processes and prepare environmental management plans
- To familiarize with the legal requirement related to environment.

### **MN703: Computer Application In Mining**

- Students will have knowledge about various software application worldwide in the field of mining engineering
- Students will develop some skill to use the software with cases
- With Programming Student can develop software for design of Pillars, ventilation etc.

### **MN704: Mine Planning**

- To Understand Various Components Of Mine Planning
- To Learn General Planning Principles
- Design Of Various Components Of Mine System
- Planned Design An Overall Mine

### **MN705: Mine System Engineering**

- Students will acquire knowledge about different modeling techniques for mining and allied applications
- acquire some simulation knowledge useful for decisions making and management
- Students will acquire knowledge about Project Management with PERT & CPM

## **VIII SEMESTER**

### **MN801: Mine Management**

- To know managerial aspects of mines and its organization and structures,
- To understand the fundamentals of principles of management
- Application of management principles in mining industries
- To study the behaviour science , industrial psychology and motivations etc human aspects

**MN802: Mine Legislation And Safety**

- General principle of Mining Laws and their history
- Salient features of Mines Act and mines rules
- General provisions of CMR 1961 and MMR 1961
- Legal aspects of safety and health of Mine workers.

**MN803: Mineral Economics**

- Students will understand how the mineral industry is back bone of India
- They can compute ton age, average assay grade of mineral ore body.
- students will get awareness about mine valuation
- They will get idea about Budget and inventory control, price quotation small scale industry, fixing price of goods.

**MN804: Clean Coal Technology**

- Students will understand the life cycle of coal.
- Students will get knowledge about grade of coal.
- Students will get awareness about cleaning of coal.

**MN805: Management Information System**

- Students will get initial knowledge about database and its preparation
- Students can will develop skill handling database software
- Students will get the idea about database and MIS application to mining.

**Note:- All other course outcomes are available on college web site.**

