# Program Outcomes,

# Program Specific Outcomes and

# Course Outcomes

**Standard Engineering Program Outcomes (Same for All Programs)**

1. An ability to apply knowledge of mathematics, science and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. An ability to function on multidisciplinary teams.
5. An ability to identify, formulates, and solves engineering problems.
6. An understanding of professional and ethical responsibility.
7. An ability to communicate effectively.
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. A recognition of the need for, and an ability to engage in life-long learning.
10. A knowledge of contemporary issues.
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Department: Computer Engineering**

**Program Specific Outcomes**

1. Design, synthesize, analyze and manage software systems of varying complexities at different abstraction levels.

2. Join a technically sophisticated work force as a practicing engineer in a wide range of multidisciplinary industries.

3. Contribute knowledge by performing research and pursing higher degrees in engineering, business or other professional fields.

4. Demonstrate entrepreneur abilities in variety of domain.

5. Engage in lifelong learning in order to be at the forefront of constantly evolving technological society.

**Year: S.Y** **Semester –III**

**Course Outcomes**

**Discrete Mathematics**

1. Explain and Apply basics about set theory
2. Use prepositions and truth tables of logical connectives
3. Explain predicates and Quantifiers, Types of quantifiers
4. Explain and apply mathematical Induction Principle.
5. Calculate permutation and combination.
6. Explain concept of Relations and properties of Relation.
7. Identify type of relation (Reflexive, Symmetric….etc).

8 Calculate transitive Closure of relation.

9. Explain functions and types of functions.
10. Compute composite function from the simple function.
11. Apply pigeonhole principle.
12. Define recurrence relation and solve rec. relation by homogeneous solution.
13. Solve recurrence relation by particular and total solution..
14. Explain basic terminology of graph and types of graph.
15. Define path and circuit.
16. Explain Hamilton path and Hamilton circuit.
17. Explain Eulerian path and Circuit.
18. Explain basics of tree and types of tree.
19. Apply Krushkal's Algorithm to find minimal spanning tree.
20. Apply Prim's Algorithm to find minimal spanning tree.
21. Find Fundamental circuit and cutest.

22. Define algebraic system and Explain properties of algebraic System.

23. Calculate Boolean Function and Boolean Expression.

**Data Structure**

1. State the definition terminology & categorize of DS.

2. Use the basic concept of Arrays, Structure and Pointers in the application.

3. Explain the organization and operation of stack.

4. Explain the organization and operation of Queue.

5. Explain the organization and operation of Circular Queue.

6. Explain the inter conversion of polish notation.

7. Explain the working of algorithm for conversion of polish notation.

8. Show the expression evaluating using stack.

9. Demonstrate the stack application function call, recursion.

10. Use static & Dynamic Memory allocation.

11. Describe elements of link list and its operation.

12. Describe elements of Double link list and its operation.

13. Show the single and Multivariable polynomial representation using link list.

14. Demonstrate Single variable polynomial addition using link list.

15. Outline the organization and working of BST.

16. State the organization and purpose of threaded binary tree.

17. Demonstrate working of recursive & non recursive tree traversal.

18. Prepare Huffman Tree using Huffman Algorithm.

19. Explain the concept and working of AVL tree.

20. State the working of linear and binary search.

21. Show the working of Bubble, selection, radix, merge sort, Quick Sort.

22. Explain the Concept of time and space complexity.

23. State terms, Asymptotic Notation and use.

**Computer Architecture & Organization**

1. Explain Concept of computer organization and architecture

2.Explain various Instruction Formats

3. State General Addressing Modes with proper example.

4. Explain Expanding Op-codes and Bus Structure.

5. Solve arithmetic operations using algorithms.

6. Explain Number Representation in detail.

7. Explain Control Unit Design.

8. Explain memory hierarchies.

9. Explain Cache Memory and Virtual Memory.

10. State and Explain virtual address, physical address, and cache design.

11. Explain Daisy Chaining and Polling.

12. Describe External devices.

13. Describe Input/ Output Organization:

14. Explain Instruction pipe-lining

15. Distinguish SDRAM, RDRAM, and DDRSDRAM.

16. Apply Booth's Algorithm for the solution of a given problems.

17. Describe Floating Point System.

18. Apply Restoring Method to solve the problems.

**Demonstration of control structure in R.**

1. Implementation and demonstration of functions.

2. Implementation of various vector operations: create, name and select elements from vectors.

3. Implementation of Matrices in R.

4. Analyzing the Star Wars box office figures using vector and matrices in R.

5. Storing Categorical data in factors: create, subset and compare in R.

6. Implementation and demonstration of Data Frames: create, select and order.

7. Implementation and demonstration of List: Create, name and select elements.

8. Demonstration of Data visualizations using Graphics.

**Department: Mechanical Engineering**

**Program Specific Outcomes**

1. An ability to work in sectors like Manufacturing, Service, Operation and Maintenance, Design, Marketing and Finance.

2. An ability to deal with multidisciplinary automations and software product development.

3. To posses generic skills of communication, team work and work ethics.

4. An ability to pursue lifelong learning through formal or informal education.

5. An ability to apply knowledge for sustainable development.

**Year: S.Y** **Semester –III**

**Course Outcomes**

**Material Science and Metallurgy**

1. State the relation between Structure and properties of materials.

2. Identify Crystal defects and their effects on plastic deformation.

3. Describe basic of cold working hot working and phase transformation.

4. Describe stress strain curve.

5. Enlist and explain Brinell hardness Test, Poldi hardness Test, Rockwell hardness Test, Vickers hardness Test.

6. Enlist and explain Impact test- Charpy and Izod impact test.

7. Explain Fatigue and creep test.

8. Enlist and explain Non-destructive test like metals-dye penetrant test, magnetic particle test Ultrasonic testing, radiography and eddy current testing.

**Engineering Thermodynamics**

1. Analyze and study basics of thermodynamics and how it takes place and where it takes place, to identify various energy interactions.

2. Derive the basic equations of heat and work transfer.

3. Know the pressures and temperatures of system.

4. Know first law of thermodynamics applied to closed system.

5. Know first law of thermodynamics applied to open system.

6. Know methodologies of significance of vdp and pdv.

7. Know equivalence of statements of second law.

8. Derive Carnot theorem, clausius theorem.

**Manufacturing Engineering-I**

1. To be able to know about Metal processing techniques, casting process, Casting terminology, Sand casting and about various melting furnaces.

2. To be able to learn about various Forming Processes, basic principle and types of Rolling, Forging, Extrusion and Drawing process.

3. To be able to understand joining processes and welding techniques.

4. To be able to learn about Riveting, soldering and brazing.

5. To be able to know Lathe machine parts and lathe specifications.

6. To be able to know about Lathe machine operations and finishing processes.

7. To understand basics of Powder metallurgy, its products and testing.

**Strength of Material**

1. State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, K, G, μ, etc. calculate thermal stresses and stresses of composite bars.

2. Discriminate between uniaxial and multi-axial stress situation and calculate principal stresses, max. Shear stress, their planes and max, normal and shear stresses on a given plane.

3. Analyze given beam for calculations of SF and BM and draw SFD & BMD for a given beam.

4. To calculate bending stresses shearing stresses and their distributions using flexural formula.

5. Calculation of shaft diameters and stresses on the basis of tensional moment and bending moment criteria, calculation of various parameters of pressure vessels like thickness, change in volume and different types of stresses.

**Fluid Mechanics**

1. Able to apply of various properties in solving the problems in fluids.

2.Able to apply the basic equation of fluid statics to determine forces on plane and curved surfaces that are submerged in a static fluid, to the determination of buoyancy and stability

3. Able to apply of Euler's and Bernoulli's equation to determine velocities, pressures in incompressible fluid.

4. Able to estimate the flow-rate of fluid using different flow measuring devices and losses in fluids-flow through pipes.

5. Able to estimate the friction and measure the frictional losses in fluid flow.

6. Able to explain laminar flows on flat plates and through circular pipes.

7. Able to determine flow rates, pressure changes minor and major head losses for through pipes.

8. Able to explain pumping of water with energy efficiency.

**Year: S.Y** **Semester –IV**

**Course Outcomes**

**Manufacturing Engineering -II**

1. To be able to know single point cutting tool, Angle & forces of single point cutting tool.

2. To be able to know tool life & Tool wear, Measurement of cutting forces, Cutting power.

3. To be able to know jigs and fixtures, Design principle.

4. To be able to select clamping, Drill bushes, Fixtures.

5. To be able to understand press tools, Design of dies.

6. To be able to select and design die and presses.

7. To be able to know Broaching, Gear manufacturing.

8. To be able to know numerical controls and machine centers.

**Applied Thermodynamics**

1. Analyze and study basics of thermodynamics and how it takes place and where it takes place, to identify various energy interactions.

2. Derive the basic equations of boiler performance and boiler selection and the basic equations of heat balance sheet.

3. Know the boiler draught calculation.

4. Know various thermodynamic cycles, its comparison specifically Rankinevapour power cycle with derivation and analysis

5. Know condenser and its various efficiencies.

6. Know fundamentals of nozzle and diffuser with its analysis.

7. Analyze thermodynamic relations of reciprocating compressor, FAD and selection of compressors

8. Know thermodynamic analysis of rotary compressor

**Theory of Machine-I**

1. Mechanism to transfer linear motions to rotary motion, rolling pair/ sliding pair relation.

2. Graphical Methods (ICR, relative velocity, Klien's construction) of velocity and acceleration analysis.

3. Non graphical methods of velocity and acceleration analysis.

4. Friction laws, friction circle.

5. Belt, chain and rope drives - sleep, creep, power transmission.

6. Dynamic equivalent system, compound pendulum, bi-fillar and tri-fillar suspension.

**Basic Electricals and Device Controls**

1. Explain power measurements by watt meter method and requirement of good lighting scheme.

2. Explain working principal of DC Machine and servo motor, stepper motor.

3. Explain working principal, construction of single phase and three phase transformer.

4. Explain basic principal of induction motor, their types and different types of starter for induction motor.

5. Explain basic principal of induction motor, their types and different types of starter for induction motor.

6. Explain different types of sensors, relays and DAS.

**Engineering Mathematics-III**

1. Explain power measurements by watt meter method and requirement of good lighting scheme.

2. To find the Applications of Linear differential equations and partial differential equations.

3. To study the concept of Laplace transform and apply it to find the solution of differential equations.

4. The student will able to develop an ability to find the mean, mode, median, standard deviation, variance and coefficient of variation.

5. Evaluate the relation between variables i.e., correlation and regression.

6. Study the Binomial, Poisson and Normal distributions.

7. Evaluate the Fourier integral theorem, Fourier transform and inverse transform.

8. Apply the vector differentiation to find curl and Divergence of vector field, Solenoid and irrational vector fields.

**Department: Electronics & Telecommunication Engineering**

**Program Specific Outcomes**

**1.** Possessing strong educational background in Science, Mathematics and Electronics & Telecommunication Engineering for pursuing successful career in emerging technologies.

**2.** Graduates will be able to function professionally in an increasingly international and rapidly changing world due to the advances in technologies and concepts and contribute to the needs of the society.

**3.** Creating capability to function effectively in multi-disciplinary environment.

**4.** Shall develop the ability to engage in lifelong learning, research and develop in a responsible, professional, dedicated and ethical manner for the benefit of the industry and society at large without detriment to environment and sustainable development.

**Year: S.Y** **Semester –III**

**Course Outcomes**

**Engineering Mathematics-III**

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

1. Solve higher order linear differential equation using appropriate techniques for modelling and analyzing electrical circuits.

2. Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing.

3. Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.

4. Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.

5. Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.

6. To find Homogeneous Linear differential equations. To find the applications of Linear differential equations.

7. To study Analytic functions, Cauchy's Integral Formula, Residues Formula and Bilinear transformation.

8. To study the concept of Laplace transform and apply it to find the solution of differential equations.

9. To study the Fourier integral theorem, Fourier transform and inverse transform.

**Analog Circuits**

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

1. Understand the characteristics of IC and Op-Amp and identify the internal structure.

2. Understand and identify various manufacturing techniques.

3. Derive and determine various performances based parameters and their significance for Op Amp.

4. Comply and verify parameters after exciting IC by any stated method.

5. Analyze and identify the closed loop stability considerations and I/O limitations.

6. Analyze and identify linear and nonlinear applications of Op-Amp.

7. Understand and verify results (levels of V & I) with hardware implementation.

8. Implement hardwired circuit to test performance and application for what it is being designed.

9. Understand and apply the functionalities of PLL.

**Electronic Devices & Circuits**

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

1. Comply and verify parameters after exciting devices by any stated method.

2. Implement circuit and test the performance.

3. Analyze small signal model of FET and MOSFET.

4. Explain behaviour of FET at low frequency.

5. Design an adjustable voltage regulator circuits.

6. Able to explain working and application of semiconductor devices, such as, FET and MOSFET.

7. Able to apply various biasing techniques to FET and MOSFET amplifier circuits.

8. Able to apply various biasing techniques to FET and MOSFET amplifier circuits. Evaluate various ac performance parameters of amplifiers using FETs, and MOSFET.

9. To analyze effect of input and output impedance on bandwidth of feedback amplifiers, to explain and utilize oscillators.

10. To apply power supplies in various applications at different fields.

**Network Analysis**

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

1. Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.

2. Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters.

3. Identify issues related to transmission of signals, analyze different RLC networks.

4. Students should be able to apply the Laplace transform to linear circuits and systems, analyze RLC circuits and observe the frequency response of circuits containing inductors and capacitors.

5. The student will be able to discover Network functions and pole and zero concepts.

6. The student will be able understand concept & types of resonance & significance of Q factor, resonance frequency & calculate Bandwidth & selectivity of series/parallel resonance.

7. Student will be able to apply the knowledge about Z, Y, H & ABCD parameters, and reciprocity & symmetry condition.

8. Be able to analyze interconnection & inter conversion networks for finding two port networks

9. The student will be able to use the attenuators of their project & will have a broad knowledge in understanding the impact of various types of filters. The student can able to design a filter circuits by their own.

**Digital Logic Design**

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

1. Use the basic logic gates and various reduction techniques of digital logic circuit in detail.

2. Design combinational and sequential circuits.

3. Design and implement hardware circuit to test performance and application.

4. Understand the architecture and use of VHDL for basic operations and Simulate using simulation software.

5. Manipulate logical expression and determine the minterms and the maxterms. Minimize logical expression using k-map and implement function using basic /universal gates.

6. Convert one type of flip flop to another type. Implement function using multiplexer & decoders.

7. Design & analyze asynchronous & synchronous counters. Use shift register for converting data from serial to parallel & vice versa.

8. Determine the state diagram and the minimized state table for a given sequential system.

9. Design sequential network using SR, JK T and D flip-flop.

10. Compare specification of digital ICs and select proper IC required for design of digital

**Basic Human Rights**

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

1. Simply put, human rights education is all learning that develops the knowledge, skills, and values of human rights.

2. Strengthen the respect for human rights and fundamental freedoms.

3. Enable all persons to participate effectively in a free society.

4. Learn about human rights principles, such as the universality, indivisibility, and inter dependence of human rights.

5. Learn about regional, national, state, and local law that reinforces international human rights law.

6. Learn and know about and being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights.

**Year: S.Y** **Semester –IV**

**Course Outcomes**

**Electrical Machines and Instruments**

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

1. The ability to formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.

2. The skill to analyze the response of any electrical machine.

3. The ability to troubleshoot the operation of an electrical machine.

4. The ability to select a suitable measuring instrument for a given application.

5. The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument.

**Analog Communication Engineering**

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

1. Understand and identify the fundamental concepts and various components of analog communication systems.

2. Understand the concepts of modulation and demodulation techniques.

3. Design circuits to generate modulated and demodulated wave.

4. Equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.

5. Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).

6. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.

7. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.

8. Be able to demonstrate about various stages in AM, FM, single & independent receivers.

**Microprocessor**

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

1. Students get ability to conduct experiments based on interfacing of devices to or interfacing to real world applications.

2. Students can identify and formulate control and monitoring systems using microprocessors.

3. Learn use of hardware and software tools.

4. Develop interfacing to real world devices.

5. Identify the basic elements and functions of 8085 microprocessor.

6. Explain the architecture and operation of 8085 microprocessor.

7. Identify and explain the operation of peripherals and memories typically interface with 8085 microprocessor and Explain the functions of the chip selection 4. Identify and explain the instruction set of 8085 microprocessor with opcode and operand.

8. Analyze the timing sequence of different instruction and applying programming in the instruction set of 8085 microprocessor.

9. Apply programming techniques in designing simple ALP for solving simple problems by using 8085 microprocessor.

10. Familiar with the machine cycles 8085 microprocessor.

11. Familiar with the subroutines of 8085 microprocessor and Discriminate between memory mapped I/O and I/O mapped I/O

**Signals and Systems**

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

1. Understand mathematical description and representation of continuous and discrete time signals and systems.

2. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.

3. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.

4. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.

5. Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.

**Product Design Engineering**

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

1. Create simple mechanical or other designs

2. Create design documents for knowledge sharing

3. Manage own work to meet design requirements

4. Work effectively with colleagues.

**Numerical Methods and Computer Programming**

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

1. Able to solve algebraic and transcendental equations by using numerical techniques and will be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.

2. Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques.

3. Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values.

4. Prepare them to write computer programs for the numerical computational techniques.

5. Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetic etc.

6. Understand procedure-oriented and object oriented programming concepts.

7. Capable of writing C and C++ programs efficiently.

**Department: Civil Engineering**

**Program Specific Outcomes**

**1. Preparation:** To prepare the students for successful career in civil engineering profession that meets the needs of Indian and Multinational companies. Also to prepare the students to excel in higher studies.

**2. Core Competence:** To provide students with a strong fundamental, scientific and technical knowledge-base and critical thinking skills to serve as the foundation for lifelong learning in civil engineering career.

**3. Breadth:** To develop students having expertise in all areas of civil engineering such as structural analysis, water resources and environmental engineering, transportation systems engineering, soil mechanics and foundation engineering, construction management etc. and broad & well integrated background in the concepts, theories and methodologies needed to plan, design, analyze, develop, organize and manage civil engineering projects.

**4. Professionalism:** To develop, in students, professional and ethical attitude, effective communication skills, team work, multidisciplinary approach and ability to relate engineering issues to social needs.

**Year: S.Y** **Semester –III**

**Course Outcomes**

**Material Science and Metallurgy**

1. Study various crystal structures of materials.

2. Understand mechanical properties of materials and calculations of same using appropriate equations.

3. Evaluate phase diagrams of various materials.

4. Suggest appropriate heat treatment process for a given application.

5. Prepare samples of different materials for metallography.

6. Recommend appropriate NDT technique for a given application.

**Fluid Mechanics**

1. Define fluid, define and calculate various properties of fluid.

2. Calculate hydrostatic forces on the plane and curved surfaces and explain stability of floating bodies.

3. Explain various types of flow. Calculate acceleration of fluid particles.

4. Apply Bernoulli's equation and Navier-Stokes equation to simple problems in

fluid mechanics.

5. Explain laminar and turbulent flows on flat plates and through pipes.

6. Explain and use dimensional analysis to simple problems in fluid mechanics.

7. Understand boundary layer, drag and lift.

**Machine Drawing and Computer Aided Drafting**

1. Interpret the object with the help of given sectional and orthographic.

2. Construct the curve of intersection of two solids.

3. Draw machine element using keys, cotter, knuckle, bolted and welded.

4. Assemble details of any given part. i. e. valve, pump, machine tool.

5. Represent tolerances and level of surface finish on production drawings.

6. Understand various creating and editing commands in Auto Cad.

**Thermodynamics**

1. Define the terms like system, boundary, properties, equilibrium, work, heat, gas, entropy etc. used in thermodynamics.

2. Study different laws of thermodynamics and apply these to simple thermal like balloon, piston-cylinder arrangement, compressor, pump, refrigerator, exchanger, etc. to study energy balance.

3. Study various types of processes like isothermal, adiabatic, etc. considering with ideal gas and represent them on p-v and T-s planes.

4. Apply availability concept to non-flow and steady flow type systems.

5. Represent phase diagram of pure substance (steam) on different thermodynamic planes like p-v, T-s, h-s, etc. Show various constant property lines on them.

**Basic Human Rights**

1. Understand the history of human rights.

2. Learn to respect others caste, religion, region and culture.

3. Be aware of their rights as Indian citizen.

4. Understand the importance of groups and communities in the society.

5. Realize the philosophical and cultural basis and historical perspectives of human rights.

6. Make them aware of their responsibilities towards the nation.

**Year: S.Y** **Semester –IV**

**Course Outcomes**

**Manufacturing Processes-I**

1. Identify castings processes, working principles and applications and list various defects in metal casting.

2. Understand the various metal forming processes, working principles and applications.

3. Classify the basic joining processes and demonstrate principles of welding, brazing and soldering.

4. Study center lathe and its operations including plain, taper turning, work holding devices and cutting tool.

5. Understand milling machines and operations, cutters and indexing for gear cutting.

6. Study shaping, planning and drilling, their types and related tooling's.

**Theory of Machines- I**

1. Define basic terminology of kinematics of mechanisms.

2. Classify planar mechanisms and calculate its degree of freedom.

3. Perform kinematic analysis of a given mechanism using ICR and RV methods.

4. Perform kinematic analysis of a given mechanism analytically using vector or complex algebra method.

5. Perform kinematic analysis of slider crank mechanism using Klein’s construction and analytical approach.

**Strength of Materials**

1. State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, μ, etc.

2. Recognize the stress state (tension, compression, bending, shear, etc.) and calculate the value of stress developed in the component in axial/eccentric static and impact load cases.

3. Distinguish between uniaxial and multiaxial stress situation and calculate principal stresses,

maximum shear stress, their planes and maximum normal and shear stresses on a given plane.

4. Analyze given beam for calculations of SF and BM.

5. Calculate slope and deflection at a point on cantilever /simply supported beam using double integration, Macaulay's, Area-moment and superposition methods.

6. Differentiate between beam and column and calculate critical load for a column using Euler's and Rankine's formulae.

**Numerical Methods in Mechanical Engineering**

1. Describe the concept of error.

2. Illustrate the concept of various Numerical Techniques.

3. Evaluate the given Engineering problem using the suitable Numerical Technique.

4. Develop the computer programming based on the Numerical Techniques.

**Interpersonal Communication Skill & Self Development**

1. Acquire interpersonal communication skills.

2. Develop the ability to work independently.

3. Develop the qualities like self-discipline, self-criticism and self-management.

4. Have the qualities of time management and discipline.

5. Present themselves as an inspiration for others.

6. Develop themselves as good team leaders.

**Department: Electronics Engineering**

**Program Specific Outcomes**

**1.** Possessing strong educational background in Science, Mathematics and Electronics & Telecommunication Engineering for pursuing successful career in emerging technologies.

**2.** Graduates will be able to function professionally in an increasingly international and rapidly changing world due to the advances in technologies and concepts and contribute to the needs of the society.

**3.** Creating capability to function effectively in multi-disciplinary environment.

**4.** Shall develop the ability to engage in lifelong learning, research and develop in a responsible, professional, dedicated and ethical manner for the benefit of the industry and society at large without detriment to environment and sustainable development.

**Year: S.Y** **Semester –III**

**Course Outcomes**

**Engineering Mathematics-III**

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

1. Solve higher order linear differential equation using appropriate techniques for modelling and analyzing electrical circuits.

2. Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing.

3. Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.

4. Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.

5. Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.

**Analog Circuits**

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

1. Understand the characteristics of IC and Op-Amp and identify the internal structure.

2. Understand and identify various manufacturing techniques.

3. Derive and determine various performances based parameters and their significance for Op Amp.

4. Comply and verify parameters after exciting IC by any stated method.

5. Analyze and identify the closed loop stability considerations and I/O limitations.

6. Analyze and identify linear and nonlinear applications of Op-Amp.

7. Understand and verify results (levels of V & I) with hardware implementation.

8. Implement hardwired circuit to test performance and application for what it is being designed.

9. Understand and apply the functionalities of PLL.

**Electronic Devices & Circuits**

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

1. Comply and verify parameters after exciting devices by any stated method.

2. Implement circuit and test the performance.

3. Analyze small signal model of FET and MOSFET.

4. Explain behaviour of FET at low frequency.

5. Design an adjustable voltage regulator circuits.

**Network Analysis**

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

1. Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.

2. Design passive filters and attenuators theoretically and practically. To applyknowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters.

3. Identify issues related to transmission of signals, analyze different RLC networks.

4. Find technology recognition for the benefit of the society

**Digital Logic Design**

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

1. Use the basic logic gates and various reduction techniques of digital logic circuit in detail.

2. Design combinational and sequential circuits.

3. Design and implement hardware circuit to test performance and application.

4. Understand the architecture and use of VHDL for basic operations and Simulate using simulation software.

**Basic Human Rights**

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

1. Simply put, human rights education is all learning that develops the knowledge, skills, and values of human rights.

2. Strengthen the respect for human rights and fundamental freedoms.

3. Enable all persons to participate effectively in a free society.

4. Learn about human rights principles, such as the universality, indivisibility, and inter dependence of human rights.

5. Learn about regional, national, state, and local law that reinforces international human rights law.

6. Learn and know about and being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights.

**Year: S.Y** **Semester –IV**

**Course Outcomes**

**Electrical Machines and Instruments**

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

1. The ability to formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.

2. The skill to analyze the response of any electrical machine.

3. The ability to troubleshoot the operation of an electrical machine.

4. The ability to select a suitable measuring instrument for a given application.

5. The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument.

**Analog Communication Engineering**

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

1. Understand and identify the fundamental concepts and various components of analog communication systems.

2. Understand the concepts of modulation and demodulation techniques.

3. Design circuits to generate modulated and demodulated wave.

4. Equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.

5. Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).

6. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.

7. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.

**Microprocessor**

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

1. Learner gains ability to apply knowledge of engineering in designing different case studies.

2. Students get ability to conduct experiments based on interfacing of devices to or interfacing to real world applications.

3. Students get ability to interface mechanical system to function in multidisciplinary system like in robotics, Automobiles.

4. Students can identify and formulate control and monitoring systems using microprocessors.

5. Students will design cost effective real time system to serve engineering solution for Global, social and economic context.

6. This course understanding will enforce students to acquire knowledge of recent trends like superscalar and pipelining and thus finds recognition of continuous updating.

7. Learn use of hardware and software tools.

8. Develop interfacing to real world devices.

**Signals and Systems**

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

1. Understand mathematical description and representation of continuous and discrete time signals and systems.

2. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.

3. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.

4. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.

5. Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.

**Product Design Engineering**

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

1. Create simple mechanical or other designs

2. Create design documents for knowledge sharing

3. Manage own work to meet design requirements

4. Work effectively with colleagues.

**Numerical Methods and Computer Programming**

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

1. Able to solve algebraic and transcendental equations by using numerical techniques and will be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.

2. Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques.

3. Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values.

4. Prepare them to write computer programs for the numerical computational techniques.

5. Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetic etc.

6. Understand procedure-oriented and object oriented programming concepts.

7. Capable of writing C and C++ programs efficiently.

**Department: Applied Science**

**Year: F.Y** **Semester –I& II**

**Course Outcomes**

**Engineering Mathematics-I**

1. The students will be able to develop an ability to find the rank, inverse, Eigen values and Eigen vectors of a matrix and consistency of linear equations using the concepts of rank.

2. To find the partial derivatives of functions using ordinary laws of partial differentiation and Euler's theorem, and total derivatives.

3. To apply the concepts of partial differentiation to find the percentage error in the measurement of quantities, series expansions and maxima and minima of functions containing two variables.

4. To find Reduction formula of Trignometric function, algebraic and Exponential , algebraic & logarithmic function..

5. To evaluate the double and triple integrals and apply the same to calculate area, volume, surface area, moment of inertia, centre of gravity, etc.

6. To check the ordinary, absolute and conditional convergence of the infinite series by using suitable tests.

**Engineering Physics**

1. Discuss the different types of oscillations & its derivation. Also describe how ultrasonic waves are generated by different methods.

2. Describe the phenomenon of Interference in thin film, Newton's Rings & classify different methods for production of plane polarized light.

3. Classify & explain different types of LASER & discuss principle, structure & working of Optical Fiber.

4. Describe the different methods for measurement of "e / m" & discuss GM counter, Heisenberg's uncertainty principle & derive Schrodinger's wave equations.

5. Describe the basics of Crystal Structure, its parameters & methods for producing continuous spectra with formula.

6. Write down the different properties, classification & applications of Magnetic material & Superconductors.

7. Describe the Band theory of solids, concepts of semiconductor, Hall effect & dielectric parameters.

8. Classify & discuss types of polarization in dielectric materials. Write down Maxwell's equations in different forms & derive the formula for electromagnetic wave in free space.

**Engineering Chemistry**

1.The students will be able to develop water treatment method like – Zeolite method Ion exchange method, Hot Lime –Soda method, and Analysis process(Titration method) such as water characteristics like - Hardness, Dissolve oxygen (DO), Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD).

2.Describe and Explain the, Phase Rule, terms–Phase, Components, Degrees of freedom, One component system–Water and Sulphur, Reduced phase rule equation, Two components alloy system-Phase diagram of Silver-Lead alloy system.

3. Explain the Metallurgy, and classify Types of ores, concentration of ores, physical methods-Crushing and Sizing, Froth- Flotation, Magnetic Separation, Gravity separation method. Chemical methods-Calcinations, Roasting, Reduction of Ore- by Pyrolysis, Chemical reductions, Refining of Metals.

4. Explain and classification of fuel and Lubricants, properties of fuel and lubricant characteristics fuel and lubricant Analysis of fuel, properties of lubricants, Physical properties and Chemical properties.

5 .Describe the Electrochemistry in Debye-Huckel theory, Ostwald's theory of acid base indicator, Quinonoid theory Conductometric titrations, Electrodes – i)Glass electrode, ii) Quinhydrone electrode.

**Basic Electrical & Electronics Engineering**

1. To teach student Basics concepts of Electronics, Atomic theory, Types of materials, Classification of Engineering materials.

2. To teach student Mechanism related to current flow, Relation between magnetic field and electric field, introduction to periodic table differ by compounds type..

3. To teach student semiconductor device and their application.

4. To teach student colour coding, material used, standards, Frequency error, power factor related to Passive Components.

5. To teach student working principle and types of Measuring Instruments, Transducer.

6. To teach fundamental of digital system, symbol, working and Introduction to Sequential and Combinational Logic circuits.

7. To teach ohm- law, voltage, current, work, power, energy and its SI unit.

8. To teach wires and wire gauges.

**9.** To teach energy resources and their utilization , AC & DC power transmission.

10. To teach circuit breakers & Actuators.

11. To teach measurement of Voltage, Current, and Power of 1-phase and 3-phase

12. To teach electrical storage devices such as batteries.

**Basic Computer Programming**

1. Explain the introduction to C programming. Design algorithm and flowchart.

2. Explain data types of C, Variables and Identifiers. Explain operators and expressions in C.

3. Design simple C programs. Introduction to decision control statements with conditional branching statements.

4. Explain concepts of loops. Design the program using break, continue and go to statements.

5. Explain the concept of array. Write a program for string operations with and without library functions.

6. Explain the concept of function. Write a program for function by using call by value and call by reference parameters.

7. Explain the concept of structures. Write a program to initialize and access member of structure.

8. Explain the limitation of procedural oriented programming.

9. Describe the Basic concepts of object-oriented programming with example.

10. Introduction to pointers.

**Energy and Environmental Engineering**

1. List the energy forms, different types of energies, conventional and non conventional.

2. Explain energy conservation principles, methods of energy conservation applied to different equipment's. (Remember Level).

3. Explain the operation of conventional power plants and working principle of renewable power generation (Understand Level).

4. Compare merits and demerits of the conventional power generation and renewable power generation methods (Understand Level).

5. Demonstrate the sources, effects and control measures of air, water, noise and soil pollution (Understand Level).

6. Explain the methods of water conservation, rainwater harvesting, disaster management and solid waste disposal (Understand Level).

7. List the different environmental protection acts (Remember Level).

**Communication Skills**

1. Spell the pronunciation of English words, Stress, Intonation pitch at particular word sentences etc.

2. Detect errors in simple and complex sentences of English.

3. Expand their vocabulary in English.

4. Debate and discuss cordially but fervently on any given issue.

5. Write corporate letters and take further other corporate communication.

6. Augments his/ her performance in personal as well as technical interviews.

7. Increase the ability to calmly handle the pressure in Interviews, Public Speaking and Group Discussion.

8. Understand the basic laws of team-workmanship viz. its importance and excellence.

9. Augment the ability to lead a team under any circumstances and create an example for others.

**Basic Civil Engineering**

1. Understand the role of civil engineer in various construction activities, uses and properties of engineering materials.

2. Know important national projects..

3. Understand the different components of building, their functions, bearing capacity.

4. Explain different types of foundations with their suitability according to the site conditions. Factors to be considered for selection of foundation.

5. Explain different types of building plan, principles of planning, building bye laws.

6. Discuss various precautions to be taken while selecting site for building. Explain the concept of load bearing and framed structure.

7. Know the principles of survey, location sketches, triangulation and traversing.

8. Explain different types of surveying, base line and offsets, instruments used for surveying.

9. Explain different modes of transportation, elements of road structure and their functions.

10. Explain rigid and flexible pavements, traffic sign and signals.

11. Know environment and its component, important sources of water.

12. Explain methods of irrigation, need of sewage treatment, air pollution and its control measures

**Engineering Mathematics-II**

1. The students will be able to develop an ability to find roots of complex numbers by using De-Mover's theorem, relations between circular and hyperbolic functions.

2. To find real and imaginary parts of circular and hyperbolic functions, Logarithm of Complex quantities.

3.To find the Solutions - variables separable, homogeneous equations, equations reducible to homogeneous form, linear equations, Bernoulli's equation, exact differential equations, equations reducible to exact equations; Application to physical and electrical systems.

4.To find the complementary function, particular integral, rules for finding complementary function and particular integral, method of variation of parameters, homogeneous linear equations.

5. To find expansions of odd and even periodic functions, half - range series, Harmonic analysis.

6. To evaluate radial and transverse components of velocity and acceleration, Law of central orbits – orbital motion; Tangential and normal components of velocity.

7. The students will be able to develop an ability to find Gradient, divergence and curl; Solenoid, irrotational vector fields, Vector identities.

8. To find Integrals – line, surface and volume; Green's theorem, Gauss' divergence theorem and Stokes' theorem (without proofs).

**Engineering Mechanics**

1. Student should be able to identify the types of forces and force systems.

2. To compute resultant of co-planer force system.

3. Decribe concept of equilibrium and to draw FBD.

4. Analyze bodies under equilibrium condition.

5. Describe and calculate quantities such centroid, Moment of inertia etc.

6. Analyze the forces in trusses, frames, cables and beams.

7. Define friction, Laws of Friction and know applications of friction.

8. State and explain basic concepts of rectilinear motion.

9. State and explain basic concepts of curvilinear motion.

10. Apply equations of kinematics to solve rectilinear motion.

11. Apply equations of kinematics to solve curvilinear motion.

12. Describe and apply Newtons 2$^{nd}$ law for rectilinear and curvilinear motion.

13. Describe principle of work and energy, principle of impulse and momentum.

14. Analyze and solve numerical on kinematics and kinetics of curvilinear motion of rigid bodies.

**Engineering Graphics**

1. State and identify SP46 standard for lettering and dimensioning.

2. Divide straight lines and angles.

3. Draw polygons with usual methods and different special methods.

4. Draw orthographic projection and point.

5. Draw projections of lines.

6. Draw projections of planes.

7. Draw projection of solid.

8. Draw sections of solids.

9. Draw Isometric projections.

10. Draw development of Surfaces.

11. Use basic CAD commands.

**Energy and Environmental Engineering**

1. List the energy forms, different types of energies, conventional and renewable sources of energy (Remember Level).

2. Explain energy conservation principles, methods of energy conservation applied to different equipment's. (Remember Level).

3. Explain the operation of conventional power plants and working principle of renewable power generation (Understand Level).

4. Compare the merits and demerits of the conventional power generation and renewable power generation methods (Understand Level).

5. Demonstrate the sources, effects and control measures of air, water, noise and soil pollution (Understand Level).

6. Explain the methods of biomedical and solid waste disposal (Understand Level).