

**VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)**

**VISAKHAPATNAM**

Course Outcomes of I, II & III B. Tech (Regular)

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**I B.Tech COURSE OUTCOMES (VR-19)**

**CIVIL ENGINEERING**

## **I Year CE Semester-I Course Outcomes:**

### **Mathematics-I:**

- To understand the mean value theorems and evaluate maxima and minima of functions of two variables without constraints.
- To understand different analytical methods to solve higher order linear differential equations.
- To understand Laplace transform technique to solve initial and boundary value problems arising in engineering stream.
- To understand solution of first order linear partial differential equations.

### **Engineering Physics:**

- **Understand** the basic concepts of crystal structures. **Identify** various planes in a crystal and **apply** these concepts for the structural determination of crystal using X-ray diffraction.
- **Understand** the basic concepts of optical fiber and lasers. Also, working principle of Ruby, He-Ne & semiconductors lasers.
- **Apply** the concepts of light in optical fibers, light wave communication systems and understanding their applications in day to day life.
- **Understand** the knowledge of Ultrasonic to understand non-destructive testing. **Understand** the nature and characterization of acoustic design.
- **Understand** the synthesis and properties of nanomaterials.
- **Apply** the knowledge to produce nanomaterials for different applications.

### **Technical English Communication:**

- The students will be able to read, understand and interpret material on Environment, Science and Technology, tourism, Energy Sources, Social Awareness
- The students will be able to analyze the functions of language and grammar in spoken and written forms.
- The students will be able to write effectively on various domains.
- The students will be able to prepare and exhibit oral presentation skills by using ICT.(Individual/Team)

### **Engineering Mechanics:**

- Analyze the force systems for equilibrium conditions and able to draw free body diagram.
- Evaluate the frictional forces between contact surfaces.
- Able to differentiate between centroid and centre of gravity and determine Centroid, centre of gravity and second moment of area for composite sections.
- Analyse the motion and calculate trajectory characteristics.

### **Problem Solving and Programming using C:**

- Write compile and debug Programs in C language
- Use operators, data types and write programs
- Select the best loop construct for a given problem
- Design and implement C programs

**Constitution of India (Audit Course):**

- Have general knowledge and legal literacy and thereby to take up competitive examinations.
- Understand state and central policies, fundamental duties.
- Understand Electoral Process, special provisions.
- Understand powers and functions of Municipalities, Panchayats and Cooperative Societies

## **I Year C.E. Semester-II Course Outcomes:**

### **Mathematics-II:**

- To understand to solve approximate roots of an equation by using different numerical methods.
- To understand different operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.
- To understand different numerical methods to solve integrations and ordinary differential equations.
- To understand to solve the system of Linear equations by direct and iteration methods, and compute Eigen values and Eigen vectors of a matrix and study the nature of Quadratic form.

### **Transforms and Vector Calculus:**

- Find or compute the Fourier series of periodic signals
- Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
- Apply double integration techniques in evaluating areas bounded by region
- Interpret the physical meaning of different operators such as gradient, curl and divergence
- Estimate the work done against a field, circulation and flux using vector calculus

### **Engineering Chemistry:**

- Identification of different polymers and their functionalities
- Measurement of water quality parameters
- Analysis of corrosive environments and protection of precious metal
- Adoption of different green methodologies

### **Engineering Chemistry Laboratory:**

- Analyze & generate experimental skills.
- Enhance the thinking capabilities in the modern trends of engineering & technology.
- learn and apply basic techniques used in chemistry laboratory for preparation of Organic compounds.
- Learn safety rules in the practice of laboratory investigation.

### **Fundamentals of Electrical and Electronics Engineering:**

- Apply Ohms Law and Kirchhoff's Laws and solve electrical circuits
- Describe the constructional features of DC machines, select suitable starters for DC motors estimate losses and efficiency of DC motor.
- Outline the constructional details and operating principles of AC machines and calculate the efficiency identify the characteristics, losses and efficiency of a three phase induction motor.
- Identify the structure, operation and characteristics and applications of measuring instruments and semiconductor devices.

### **Engineering Drawing:**

- Understand the use of drawing instruments to construct the polygons and curves
- Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.
- Draw the various types of planes and solids its views in different Positions
- Draw isometric views of simple objects

### **Civil Engineering Workshop:**

- Set out of building in the field
- Construct a wall of thickness 1½ bricks using English bond
- Install plumbing the fixtures like Tap, T-Joint, Elbow, Bend, Threading
- Apply wall putty, painting of wall base coat and laying of tile flooring
- Casting and test fly ash blocks

### **Engineering Exploration:**

- Realize the purpose/Role of Engineer for solving social problems
- Learn to Design a component/system in an engineering way
- Learn to use mechanisms, Arduino, sensors, motors.
- Integrating different systems (mechanical/Electrical/computer) to work as a unit

### **Extra-curricular Activities, Sports and Games (Audit Course):**

**ELECTRICAL AND ELECTRONICS**  
**ENGINEERING**



## **I Year EEE Semester-I Course Outcomes:**

### **Mathematics-I:**

- To understand the mean value theorems and evaluate maxima and minima of functions of two variables without constraints.
- To understand different analytical methods to solve higher order linear differential equations.
- To understand Laplace transform technique to solve initial and boundary value problems arising in engineering stream.
- To understand solution of first order linear partial differential equations.

### **Solid State Physics:**

- **Understand** the basic concepts of crystal structures. **Identify** various planes in a crystal and **apply** these concepts for the structural determination of crystal using X-ray diffraction.
- **Understand** the principles of semiconductor Physics and **make use of** these concepts to understand the applications of semiconductors
- **Understand** the basic concepts of magnetic materials and their classifications and **apply** the concepts for use of magnetic materials for device applications.
- **Understand** the concepts of superconductivity. Gain the knowledge of applications of superconductors in modern technology
- **Understand** the properties of dielectric materials and the types of polarizations

### **Mathematics-II:**

- To understand to solve approximate roots of an equation by using different numerical methods.
- To understand different operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.
- To understand different numerical methods to solve integrations and ordinary differential equations.
- To understand to solve the system of Linear equations by direct and iteration methods, and compute Eigen values and Eigen vectors of a matrix and study the nature of Quadratic form.

### **Engineering Mechanics:**

- Analyze the force systems for equilibrium conditions and able to draw free body diagram.
- Evaluate the frictional forces between contact surfaces.
- Able to differentiate between centroid and centre of gravity and determine Centroid, centre of gravity and second moment of area for composite sections.
- Analyse the motion and calculate trajectory characteristics.

### **Problem solving and Programming using C:**

- Write compile and debug Programs in C language
- Use operators, data types and write programs
- Select the best loop construct for a given problem
- Design and implement C programs

**Constitution of India (Audit Course):**

- Have general knowledge and legal literacy and thereby to take up competitive examinations.
- Understand state and central policies, fundamental duties.
- Understand Electoral Process, special provisions.
- Understand powers and functions of Municipalities, Panchayats and Cooperative Societies

**Extra-curricular Activities, Sports & Games  
(Audit Course):**

## **I Year EEE Semester-II Course Outcomes:**

### **Transforms and Vector Calculus:**

- Find or compute the Fourier series of periodic signals
- Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
- Apply double integration techniques in evaluating areas bounded by region
- Interpret the physical meaning of different operators such as gradient, curl and divergence
- Estimate the work done against a field, circulation and flux using vector calculus

### **Applied Chemistry:**

- Identification of different polymers and their functionalities
- Determination of structure to many compounds and can analyze structure-property relationship
- Analysis of corrosive environments and protection of precious metal
- Adoption of different green methodologies

### **Applied Chemistry Laboratory:**

- Analyze & generate experimental skills.
- Enhance the thinking capabilities in the modern trends of engineering & technology.
- Learn and apply basic techniques used in chemistry laboratory for preparation of Organic Compounds.
- Learn safety rules in the practice of laboratory investigation.

### **Electrical Circuit Analysis-I:**

- Solve various electrical networks in presence of active and passive elements.
- Find response of any R, L, C network with sinusoidal excitations.
- Illustrate any magnetic circuit with various dot conventions
- Analyze AC networks in presence of active and passive elements.
- State network theorems and solve electrical networks by using the principles of network theorems.

### **Engineering Drawing:**

- Understand the use of drawing instruments to construct the polygons and curves
- Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.
- Draw the various types of planes and solids its views in different Positions
- Draw isometric views of simple objects

### **Technical English Communication:**

- The students will be able to read, understand and interpret material on Environment, Science and Technology, tourism, Energy Sources, Social Awareness
- The students will be able to analyze the functions of language and grammar in spoken and written forms.
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- The students will be able to prepare and exhibit oral presentation skills by using ICT.(Individual/Team)

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**MECHANICAL ENGINEERING**

## **I Year M.E. Semester-I Course Outcomes:**

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- Analyze the force systems for equilibrium conditions and able to draw free body diagram.
- Evaluate the frictional forces between contact surfaces.
- Able to differentiate between centroid and centre of gravity and determine Centroid, centre of gravity and second moment of area for composite sections.
- Analyse the motion and calculate trajectory characteristics.

### **Problem Solving and Programming using 'C':**

- Write compile and debug Programs in C language
- Use operators, data types and write programs
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- Integrating different systems (mechanical/Electrical/computer) to work as a unit

## **I Year M.E. Semester-II Course Outcomes:**

### **Mathematics-II:**

- To understand to solve approximate roots of an equation by using different numerical methods.
- To understand different operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.
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- To understand to solve the system of Linear equations by direct and iteration methods, and compute Eigen values and Eigen vectors of a matrix and study the nature of Quadratic form.

### **Transforms and Vector Calculus:**

- Find or compute the Fourier series of periodic signals
- Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
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- Interpret the physical meaning of different operators such as gradient, curl and divergence
- Estimate the work done against a field, circulation and flux using vector calculus

### **Engineering Chemistry:**

- Identification of different polymers and their functionalities
- Measurement of water quality parameters
- Analysis of corrosive environments and protection of precious metal
- Adoption of different green methodologies

### **Engineering Chemistry Laboratory:**

- Analyze & generate experimental skills.
- Enhance the thinking capabilities in the modern trends of engineering & technology.
- Learn and apply basic techniques used in chemistry laboratory for preparation of Organic compounds.
- Learn safety rules in the practice of laboratory investigation.

### **Basic Electrical and Electronics Engineering:**

- Apply Ohms Law and Kirchhoff's Laws and solve electrical circuits
- Describe the constructional features of DC machines, select suitable starters for DC motors estimate losses and efficiency of DC motor.
- Outline the constructional details and operating principles of AC machines and calculate the efficiency identify the characteristics, losses and efficiency of a three phase induction motor.
- Identify the structure, operation and characteristics and applications of measuring instruments and semiconductor devices.



**Engineering Drawing:**

- Understand the use of drawing instruments to construct the polygons and curves
- Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.
- Draw the various types of planes and solids its views in different Positions
- Draw isometric views of simple objects

**Extra-Curricularactivities, Sports and Games (Audit Course):**

**Constitution of India (Audit Course):**

- Have general knowledge and legal literacy and thereby to take up competitive examinations.
- Understand state and central policies, fundamental duties.
- Understand Electoral Process, special provisions.
- Understand powers and functions of Municipalities, Panchayats and Cooperative Societies

**ELECTRONICS AND COMMUNICATION**  
**ENGINEERING**

## **I Year ECE Semester-I Course Outcomes:**

### **Mathematics-I:**

- To understand the mean value theorems and evaluate maxima and minima of functions of two variables without constraints.
- To understand different analytical methods to solve higher order linear differential equations.
- To understand Laplace transform technique to solve initial and boundary value problems arising in engineering stream.
- To understand solution of first order linear partial differential equations.

### **Applied Chemistry:**

- Identification of different polymers and their functionalities
- Determination of structure to many compounds and can analyze structure-property relationship
- Analysis of corrosive environments and protection of precious metal
- Adoption of different green methodologies

### **Applied Chemistry Laboratory:**

- Analyze & generate experimental skills.
- Enhance the thinking capabilities in the modern trends of engineering & technology.
- Learn and apply basic techniques used in chemistry laboratory for preparation of Organic Compounds.
- Learn safety rules in the practice of laboratory investigation.

### **Mathematics-II:**

- To understand to solve approximate roots of an equation by using different numerical methods.
- To understand different operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.
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**Problem solving and Programming using C:**

- Write compile and debug Programs in C language
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- Select the best loop construct for a given problem
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## I Year ECE Semester-II Course Outcomes:

### **Complex Variables and Vector Calculus:**

- Define continuity and differentiability for complex functions and apply Cauchy Reimann equations to complex functions in order to determine whether a given continuous function is analytic or not.
- Evaluate Line integrals by using Cauchy's Integral theorem.
- Evaluate the Taylor and Laurent expansions of simple functions, determine the nature of the singularities and calculating residues.
- Interpret the physical meaning of different operators such as gradient, curl and divergence
- Estimate the work done against a field, circulation and flux using vector calculus

### **Network Analysis:**

- Apply the basic circuit analysis techniques, in DC circuits and To know the performance of the circuits
- Analyze steady state analysis of AC circuits
- Analyze steady state analysis of electrical circuits using theorems
- Gain the knowledge in characteristics of two port networks using parameters (Z, Y, ABCD, h) and Analyze Transient state analysis of AC circuits

### **Wave Optics and Semiconductor Physics:**

- **Understand** the concepts of physical optics phenomena like Interference, Diffraction and Polarization. **Apply** the concepts for understanding formation of interference pattern in thin films and Newton's rings.
- **Summarize** the importance of free electrons in determining the properties of metals, understand the concept of Fermi energy.
- **Understand** the concepts of electromagnetic fields and Maxwell equations.
- **Apply** the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system.
- **Understand** the concepts of bandgap in crystalline solids. **Apply** the knowledge of bandgap and semiconductor physics.

### **Data Structures:**

- Outline the need for data structure techniques
- Implement standard data structures like stack, queue, list, tree and graph
- Demonstrate the use of standard data structures using relevant applications
- Apply the C language concepts pointers, structure and recursion to solve problems

**Technical English Communication:**

- The students will be able to read, understand and interpret material on Environment, Science and Technology, tourism, Energy Sources, Social Awareness
- The students will be able to analyze the functions of language and grammar in spoken and written forms.
- The students will be able to write effectively on various domains.
- The students will be able to prepare and exhibit oral presentation skills by using ICT.(Individual/Team)

**Engineering Exploration:**

- Realize the purpose/Role of Engineer for solving social problems
- Learn to Design a component/system in an engineering way
- Learn to use mechanisms, Arduino, sensors, motors.
- Integrating different systems (mechanical/Electrical/computer) to work as a unit

**Extra-Curricularactivities, Sports and Games (Audit Course):**

**COMPUTER SCIENCE AND ENGINEERING**

## **I Year CSE Semester-I Course Outcomes:**

### **Mathematics-I:**

- To understand the mean value theorems and evaluate maxima and minima of functions of two variables without constraints.
- To understand different analytical methods to solve higher order linear differential equations.
- To understand Laplace transform technique to solve initial and boundary value problems arising in engineering stream.
- To understand solution of first order linear partial differential equations.

### **Applied Chemistry:**

- Identification of different polymers and their functionalities
- Determination of structure to many compounds and can analyze structure-property relationship
- Analysis of corrosive environments and protection of precious metal
- Adoption of different green methodologies

### **Applied Chemistry Laboratory:**

- Analyze & generate experimental skills.
- Enhance the thinking capabilities in the modern trends of engineering & technology.
- Learn and apply basic techniques used in chemistry laboratory for preparation of Organic Compounds.
- Learn safety rules in the practice of laboratory investigation.

### **Engineering Drawing:**

- Understand the use of drawing instruments to construct the polygons and curves
- Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.
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- Draw isometric views of simple objects

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- The students will be able to read, understand and interpret material on Environment, Science and Technology, tourism, Energy Sources, Social Awareness
- The students will be able to analyze the functions of language and grammar in spoken and written forms.
- The students will be able to write effectively on various domains.
- The students will be able to prepare and exhibit oral presentation skills by using ICT.(Individual/Team)

### **Problem Solving & Programming using C:**

- Write compile and debug Programs in C language
- Use operators, data types and write programs
- Select the best loop construct for a given problem
- Design and implement C programs



**Engineering Exploration:**

- Realize the purpose/Role of Engineer for solving social problems
- Learn to Design a component/system in an engineering way
- Learn to use mechanisms, Arduino, sensors, motors.
- Integrating different systems (mechanical/Electrical/computer) to work as a unit

**Extra Curricular Activities, Sports and Games (Audit course):**

## **I Year CSE Semester-II Course Outcomes:**

### **Probability and Statistics:**

- **Explain** the notion of random variable and **evaluate** the expected value and probability of random variables.
- **Apply** Binomial, Poisson, Normal, gamma and weibull distributions for real data to **compute** probabilities, theoretical frequencies.
- **Evaluate** the confidence levels and maximum error for large and small samples
- **Apply** the concept of hypothesis testing for large and small samples in real life situations to draw the inferences and estimate the goodness of fit.
- **Examine** correlation for the bi-variate data and fit the different curves using principle of least squares and to **predict** the regression analysis

### **Applied Physics:**

- **Understand** the concepts of physical optics phenomena like Interference, Diffraction, and Polarization. **Apply** the concepts for understanding formation of interference pattern in thin films and Newton's rings.
- **Summarize** the importance of free electrons in determining the properties of metals, understand the concept of Fermi energy.
- **Understand** the basic concepts of optical fiber and laser. Also working principle of Ruby, He-Ne, semiconductors lasers and optical fibers. **Apply**, the concepts for understanding their applications in day to day life.
- **Apply** the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system.
- **Understand** the concepts of bandgap in crystalline solids and working principle of Solar cells and LEDs.

### **OOPS through C++:**

- Understand the basic terminology used in object oriented programming
- **Describe the object-oriented programming approach in connection with C++**
- Apply the concepts of object-oriented programming
- Apply virtual and pure virtual function & complex programming situations

### **Fundamentals of Electrical and Electronics Engineering:**

- Apply Ohms Law and Kirchhoff's Laws and solve electrical circuits
- Describe the constructional features of DC machines, select suitable starters for DC motors estimate losses and efficiency of DC motor.
- Outline the constructional details and operating principles of AC machines and calculate the efficiency identify the characteristics, losses and efficiency of a three phase induction motor.
- Identify the structure, operation and characteristics and applications of measuring instruments and semiconductor devices.

**Mathematics-II:**

- To understand to solve approximate roots of an equation by using different numerical methods.
- To understand different operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.
- To understand different numerical methods to solve integrations and ordinary differential equations.
- To understand to solve the system of Linear equations by direct and iteration methods, and compute Eigen values and Eigen vectors of a matrix and study the nature of Quadratic form.

**IT Workshop:**

1. Identify various kinds Computing devices and their components.
2. Identify the different peripherals, ports and connecting cables in a PC.
3. Assemble and disassemble components of a PC

**Constitution of India(Audit course):**

- Have general knowledge and legal literacy and thereby to take up competitive examinations.
- Understand state and central policies, fundamental duties.
- Understand Electoral Process, special provisions.
- Understand powers and functions of Municipalities, Panchayats and Cooperative Societies

# **INFORMATION TECHNOLOGY**

## **I Year IT Semester-I Course Outcomes:**

### **Mathematics – I:**

- To understand the mean value theorems and evaluate maxima and minima of functions of two variables without constraints.
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- To understand Laplace transform technique to solve initial and boundary value problems arising in engineering stream.
- To understand solution of first order linear partial differential equations.

### **Applied Chemistry:**

- Identification of different polymers and their functionalities
- Determination of structure to many compounds and can analyze structure-property relationship
- Analysis of corrosive environments and protection of precious metal
- Adoption of different green methodologies

### **Applied Chemistry Laboratory:**

- Analyze & generate experimental skills.
- Enhance the thinking capabilities in the modern trends of engineering & technology.
- Learn and apply basic techniques used in chemistry laboratory for preparation of Organic Compounds.
- Learn safety rules in the practice of laboratory investigation.

### **Engineering Drawing:**

- Understand the use of drawing instruments to construct the polygons and curves
- Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.
- Draw the various types of planes and solids its views in different Positions
- Draw isometric views of simple objects

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### **Technical English Communication:**

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**Engineering Exploration (EE):**

- Realize the purpose/Role of Engineer for solving social problems
- Learn to Design a component/system in an engineering way
- Learn to use mechanisms, Arduino, sensors, motors.
- Integrating different systems (mechanical/Electrical/computer) to work as a unit

**Extracurricular Activities, Sports and Games (Audit Course):**

## **I Year IT Semester-II Course Outcomes:**

### **Mathematics – II:**

- To understand to solve approximate roots of an equation by using different numerical methods.
- To understand different operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.
- To understand different numerical methods to solve integrations and ordinary differential equations.
- To understand to solve the system of Linear equations by direct and iteration methods, and compute Eigen values and Eigen vectors of a matrix and study the nature of Quadratic form.

### **Applied Physics:**

- **Understand** the concepts of physical optics phenomena like Interference, Diffraction, and Polarization. **Apply** the concepts for understanding formation of interference pattern in thin films and Newton's rings.
- **Summarize** the importance of free electrons in determining the properties of metals, understand the concept of Fermi energy.
- **Understand** the basic concepts of optical fiber and laser. Also working principle of Ruby, He-Ne, semiconductors lasers and optical fibers. **Apply**, the concepts for understanding their applications in day to day life.
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**ELECTRONICS AND COMPUTER**  
**ENGINEERING**

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**Engineering Exploration:**

- Realize the purpose/Role of Engineer for solving social problems
- Learn to Design a component/system in an engineering way
- Learn to use mechanisms, Arduino, sensors, motors.
- Integrating different systems (mechanical/Electrical/computer) to work as a unit

## **I Year ECM Semester-II Course Outcomes:**

### **Transforms and Vector Calculus:**

- Find or compute the Fourier series of periodic signals
- Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
- Apply double integration techniques in evaluating areas bounded by region
- Interpret the physical meaning of different operators such as gradient, curl and divergence
- Estimate the work done against a field, circulation and flux using vector calculus

### **Wave Optics and Semiconductor Physics:**

- **Understand** the concepts of physical optics phenomena like Interference, Diffraction and Polarization. **Apply** the concepts for understanding formation of interference pattern in thin films and Newton's rings.
- **Summarize** the importance of free electrons in determining the properties of metals, understand the concept of Fermi energy.
- **Understand** the concepts of electromagnetic fields and Maxwell equations.
- **Apply** the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system.
- **Understand** the concepts of band gap in crystalline solids. **Apply** the knowledge of band gap and semiconductor physics.

### **Data structures:**

- Outline the need for data structure techniques
- Implement standard data structures like stack, queue, list, tree and graph
- Demonstrate the use of standard data structures using relevant applications
- Apply the C language concepts pointers, structure and recursion to solve problems

### **Network Analysis:**

- Apply the basic circuit analysis techniques, in DC circuits and To know the performance of the circuits
- Analyze steady state analysis of AC circuits
- Analyze steady state analysis of electrical circuits using theorems
- Gain the knowledge in characteristics of two port networks using parameters ( $Z$ ,  $Y$ ,  $ABCD$ ,  $h$ ) and Analyze Transient state analysis of AC circuits

**Technical English Communication:**

- The students will be able to read, understand and interpret material on Environment, Science and Technology, tourism, Energy Sources, Social Awareness
- The students will be able to analyze the functions of language and grammar in spoken and written forms.
- The students will be able to write effectively on various domains.
- The students will be able to prepare and exhibit oral presentation skills by using ICT.(Individual/Team)

**IT Workshop:**

- Assemble and disassemble components of a PC
- Construct a virtual machine
- summarize various linux operating system commands
- Build interactive presentations and websites

**Constitution of India (Audit Course):**

- Have general knowledge and legal literacy and thereby to take up competitive examinations.
- Understand state and central policies, fundamental duties.
- Understand Electoral Process, special provisions.
- Understand powers and functions of Municipalities, Panchayats and Cooperative Societies

**Extra-Curricular Activities, Sports & Games (Audit Course):**

**II B.Tech VR-17 COURSE OUTCOMES**

**CIVIL ENGINEERING**

## **II Year CE Semester-I Course Outcomes:**

### **Probability and Statistics:**

- Recall the basics of permutations and combinations in probability.
- Classify discrete and continuous distribution functions.
- Determine the cumulative distribution function, mean and variance of discrete and continuous random variables.
- Calculate probabilities using normal distribution and describe sampling distribution of means.
- Describe and compute confidence intervals for the mean of a population. Prepare null and alternative hypothesis concerning single mean and test its validity based on random samples.
- Prepare null and alternative hypothesis concerning two mean, proportions and variances and test its validity based on random samples. Determine Linear and non linear regression for the given data.
- Calculate correlation coefficient for the given bi variate data.

### **Concrete Technology:**

- Describe types and classification of aggregates, cement and admixtures & manufacturing process of cement.
- Describe different tests on fresh concrete and factors effecting workability.
- Describe different tests on Hardened Concrete and Elasticity, Creep & Shrinkage of concrete
- Describe the Indian standard concrete mix design, its proportions and factors influencing
- Describe special concretes include ready mixed concrete, shotcrete, light weight concrete etc

### **Strength of Materials-I**

- Determine the simple stresses and strains of steel bars and strain energy.
- Compute the shear force and bending moment of beams
- Determine the flexural stresses and shear stresses in beams
- Compute the deflection of beams by various methods
- Analyze and design of thin and thick cylinders of simple and compound

### **Building Materials and Construction:**

- Describe the properties, characteristics, uses, classification and manufacturing processes of stones, bricks & tiles.
- Describe the types of masonry and the properties, types, defects and alternatives of wood.
- Describe the ingredients, constituents, properties, types, methods of manufacturing of lime and cement.
- Distinguish and Describe the building components include lintels, staircases, floors, roofs and trusses.
- Distinguish the finishings include proofing, plastering, pointing, washing, paints and describe formwork and scaffolding.



**Surveying-I:**

- Describe various types of surveying instruments along with understanding of basic concepts of surveying.
- Describe the chain survey include chaining, ranging with and without obstacles on even or uneven grounds and cross staff survey for taking offsets.
- Describe compass traversing along with understanding of basic concepts of compass surveying.
- Describe three point problem, two point problem, mechanical and graphical methods of plane table survey.
- Describe levelling survey to find elevations followed by contour mapping

**Fluid Mechanics:**

- Describe the physical properties of fluids & their influences on fluid motion and Compute hydro static forces on various sub merged Surfaces.
- Describe the concepts kinematics and dynamics of fluid flow.
- Describe the concepts of boundary layer, laminar and turbulent flows.
- Describe and analyze the closed conduit flow.
- Compute measurement of flow by pitot tube, venturi meter, orifice meter, orifices, notches and weirs

**Surveying Field Work-I:**

- Determine the distance across obstacles and area of traversing using chain or tape.
- Determine the distance across obstacles and area of traversing using compass.
- Determine the area of traversing by plane table survey.
- Determine elevations at various points across sections either longitudinal or cross section.
- Determine the location and elevation at required points

**Concrete Technology Lab:**

- Determine the normal consistency, fineness, Initial setting, final setting time, specific gravity and soundness of cement.
- Determine the grading, fineness modulus, specific gravity of coarse aggregate.
- Determine the grading, fineness modulus of fine aggregate and bulking of sand.
- Determine the workability, compressive strength young's modulus and split tensile strength of concrete.
- Determine the non-destructive testing on concrete (for demonstration).

**Professional Ethics and Human Values:**

- Recognize importance of human values, harmony and ethical behavior in real life situations.
- Describe the core values that shape the ethical behaviour of an engineer.
- Recall basics of professional ethics and human values.
- Listing sustained happiness through identifying the essentials of human values and skills.
- Describe the practical importance of trust, mutually satisfying human behaviour and enriching interaction with nature.

## **II Year CE Semester-II Course Outcomes:**

### **Building Planning and Drawing:**

- Understand the building byelaws and regulations
- Describe the orientation, standards, requirements, types and planning of various residential and public buildings
- Draw the sign conventions of various types of building materials and bonds
- Draw the various types doors, windows, ventilators and roofs
- Design, plan and draw of various residential and public buildings

### **Strength of Materials-II:**

- Compute the principal stresses and strains by analytical and graphical solutions.
- Compute the torsion and power transmitted in circular shafts and Design shafts according to theories of failure.
- Determine direct and bending stresses in columns and compute deflections in springs.
- Analyze columns and struts subjected to axial loading under various end conditions.
- Determine the stresses in beams subjected to unsymmetrical bending.

### **Management Science:**

- Define management and its nature scope and functions and hierarchical levels and organizational structure and managing the culture.
- Illustrate various functions of production and inventory management.
- Determine the various concepts of strategic management and project management.
- Analyze the process of matching manager qualifications with position requirements and concept of marketing mix.
- Compare the various contemporary issues of management.

### **Hydraulics and Hydraulics Machinery:**

- Describe the concepts of uniform flow in open channels.
- Describe the concepts of non-uniform flow in open channels.
- Describe the concepts of Hydraulic Similitude and Basics of Turbo Machinery.
- Describe the concepts of the Hydraulic Turbines in detail.
- Describe the concepts of Centrifugal-Pumps and Reciprocating-Pumps in detail.

### **Surveying-II:**

- Describe concepts of theodolite surveying include traversing and trigonometric leveling.
- Describe concepts of Tacheometric surveying include distances & elevations measuring and traversing.
- Describe the concepts curve setting include simple and compound curves using various methods.
- Compute areas and volumes of embankments, cuttings, reservoir etc. by various methods.
- Describe the basic concepts of Total station along with traversing survey and Trilateration

### **Structural Analysis – I:**

- Analyze the S.F, B.M and deflection of propped cantilevers.
- Analyze the S.F, B.M and deflection of fixed beams.
- Analyze the S.F, B.M and deflection of continuous beams.
- Analyze the deflection of beams, frames, trusses by strain energy method.
- Analyze S.F and B.M of simply supported beams for moving loads.

### **Transportation Engineering-I:**

- Understand the history and basic concepts highway planning and alignment.
- Design of geometric elements of highway includes cross section, sight distance, alignment both vertical and horizontal, curves etc.
- Describe traffic engineering studies include traffic studies like volume parking, signaling, accident etc.
- Distinguish the highway materials include aggregates, concrete, bitumen which are used for base, sub base and so on.
- Design of the pavements include flexible and rigid along with maintenance of highways

### **Fluid Mechanics & Hydraulic Machinery Lab:**

- Determine Coefficient of discharge Venturimeter. Orifice meter, rectangular Notch and /or Triangular Notch, a small orifice, an external mouth piece.
- Determine bernoulli's equation, impact of jet on vanes and hydraulic jump.
- Determine performance of Pelton wheel turbine and Francis turbine.
- Determine the efficiency centrifugal pump.
- The efficiency of reciprocating pump

### **Strength of Materials Lab:**

- Determine the tensile force on steel bar.
- Determine the bending stress on cantilever and simply supported beam.
- Determine the Torsion, deflection in spring, compression force on wood or concrete.
- Determine Force shear force on steel bar.
- Determine the deflection test on beams include cantilever, simply supported and continuous beam.

**ELECTRICAL AND ELECTRONICS  
ENGINEERING**

## **II Year EEE Semester-I Course Outcomes:**

### **Electrical Circuit Analysis – II:**

- Solve three- phase circuits under balanced and unbalanced condition
- Analyze the transient response of electrical networks for different types of excitations
- Determine parameters for different types of network.
- Realize electrical equivalent network for a given network transfer function
- Extract different harmonics components from the response of a electrical network

### **Electrical Machines-I:**

- Explain the electromechanical Energy Conversion, Performance and testing of D.C. Machines
- Demonstrate the performance of 1- $\phi$  transformers
- Analyze various tests to determine the performance of 1- $\phi$  transformers
- Illustrate auto transformer and various types of 3- $\phi$  connections.

### **Basic Electronic Devices and Circuits:**

- Distinguish the characteristics of different diodes and choose appropriate diode for an application based on the operation
- Explain the operation and design aspects of rectifiers, filters and regulators
- Design different biasing and stabilization circuits and explain compensation techniques for a transistor
- Explain the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers

### **Electro Magnetic Fields:**

- Calculate electric field from various charge distributions and find magnetic field from various current distributions
- Determine polarization in dielectrics, electric current density, and resistance of conductors and also Calculate force in electric and magnetic fields and torque in magnetic fields
- Compute inductance, capacitance of different physical configurations
- Apply Faraday's Law to calculate induced Emf.

### **Thermal and Hydro Prime Movers:**

- Explain the basic cycles and calculations involved in the operation of steam and gas turbines
- Discuss the operation and performance of reciprocating and centrifugal pumps
- Explain basic concepts of turbo machines and describe the working of Pelton, Francis and Kaplan along their performance parameters
- Summarize the layout and components in a hydroelectric power plant and extend their knowledge to power plant economics

**Electrical Circuits Laboratory:**

- To determine and predetermine the performance of DC machines and 1-phase Transformers
- To control the speed of DC motor
- To achieve three phase to two phase transformation

**Hydraulic Machines laboratory:**

- Apply basic concepts of turbo machines and describe the working of Pelton, Francis and Kaplan along their performance parameters
- Evaluate the performance of reciprocating and centrifugal pumps.

## **II Year EEE Semester-II Course Outcomes:**

### **Electrical Machines-II:**

- Describe the performance of 3-phase induction motor and induction generator and quantifying terms of torque and slip
- Analyze the torque producing mechanism of a single phase induction motor
- Study parallel operation and control of real and reactive powers for synchronous generators
- List out starting methods of synchronous motors

### **Control Systems:**

- Derive the transfer function for Linear Time Invariant (LTI) systems by using block diagram and signal flow graph methods
- Analyze the Transient & Steady State Performance for LTI system
- Acquires the skill to analyze stability of LTI systems using different stability methods
- Design the controllers/compensators for LTI systems and Also represent physical systems as state models and their responses. Describe the concepts of controllability and observability.

### **Power Generation Engineering and Economics:**

- Explain the operation of different components of thermal and hydro power stations
- Explain the operation of different components of Nuclear, Gas Power Stations
- Discuss the concepts of solar energy, the concepts of wind energy, geothermal, ocean energy and fuel cells
- Discuss the concept of Economics of Power Generation and determine different methods of tariff.

### **Analog Electronics:**

- After completion of this course student can able to differentiate “Analog Circuits & Digital Circuits”.
- The course content gives an insight in to the fundamentals so that one can design the “Linear Circuits” with their own innovative skills.
- They can design their own circuits which may be useful for current industry needs.
- Able to design various types of filters using Op-amp.

### **Data Structures:**

- Understanding the basic data structure concepts. And implementation of linear data structures using C.
- Apply various searching and sorting techniques in the area of performance.
- Incorporate data structures into the non-linear representation.
- Implement advanced concepts in trees and their performance and tradeoffs.

### **Managerial Economics & Financial Analysis:**

- Describe the economic activities performed by the businessmen in the business for profit earning. Understand the significance of demand, its analysis, measurement of demand and its Forecasting
- Evaluate the production theories and pricing policies of various enterprises
- Design and implement different structures of market covering how price is determined under different market structures. Also can able to take decisions using business cycles
- Analyze different forms of business organizations existing in the modern business and able to choose suitable form of business.
- Able to prepare financial statements and understand and implement the capital budgeting tools and techniques.

### **Electrical Machines –II Laboratory:**

- Able to assess the performance of single phase and three phase induction motors
- Able to control the speed of three phase induction motor.
- Able to predetermine the regulation of three–phase alternator by various methods
- Able to find the  $X_d/ X_q$ ratio of alternator and asses the performance of three–phase synchronous motor.

### **Electronic Devices & Circuits Laboratory:**

- To Measure voltage, frequency and phase of any waveform using CRO.
- Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.,



# **Mechanical Engineering**

## **II Year M.E. Semester-I Course Outcomes:**

### **Metallurgy & Materials Science:**

- Recognize the various phases in metals and alloys and how metallographic structure influences the mechanical properties
- Select different class of materials based on the applications.
- Quantify mechanical integrity and failure in materials.
- Explore the new combinations of alloys, composites and nano-materials suitable for specific purposes.

### **Mechanics of Solids:**

- Establish the concept of stresses in members.
- Identify the deflection of beams.
- Analyze the application of vessels.
- Analyze the torsion in shafts.

### **Thermodynamics:**

- Identify and use units and notations in thermodynamics
- State and illustrate the first and second laws of thermodynamics
- Identify and explain the concepts of entropy, enthalpy, specific energy, reversibility, and irreversibility.
- Apply the first and second laws of thermodynamics to formulate and solve engineering problems for
- (i) closed systems, (ii) open systems under steady-state and transient conditions, and (iii) power cycles.
- Use thermodynamic tables, charts, and equation of state (e.g. the ideal gas law) to obtain appropriate property data to solve thermodynamics problems

### **Fluid Mechanics & Hydraulic Machines:**

- Explain the kinematic and dynamic behavior of fluid through various laws of fluids.
- Apply the concept of boundary layer in resolving continuity, momentum and energy equations.
- Evaluate the performance characteristics of Hydraulic Turbines.
- Evaluate the performance characteristics of Hydraulic Pumps and to understand working principles of various hydraulic systems.

### **Computer Aided Machine Drawing:**

- Reproduce and use the techniques of conventions of machine parts and their necessity.
- Apply their knowledge and skills of drawing to draw simple machine elements including screw threads, bolts, nuts, keys.
- Draw machine elements including cotter joints, riveted joints and bearings.
- Construct and draw assembly drawings as well as to analyze and interpret assemblies of various engine parts, machine parts from part drawings.

**Managerial Economics & Financial Analysis:**

- Describe the economic activities performed by the businessmen in the business for profit earning. Understand the significance of demand, its analysis, measurement of demand and its Forecasting
- Evaluate the production theories and pricing policies of various enterprises.
- Design and implement different structures of market covering how price is determined under different market structures. Also can able to take decisions using business cycles, Analyze different forms of business organizations existing in the modern business and able to choose suitable form of business
- Able to prepare financial statements and understand and implement the capital budgeting tools and techniques.

## **II Year M.E. Semester-II Course Outcomes:**

### **Kinematics of Machinery:**

- Explain the importance of joint in the behavior of mechanism
- Describe different types of mechanisms based on type of pairs
- Analyse the different mechanism and its motion transmission
- Apply different mechanisms in real time applications

### **Thermal Engineering – I:**

- Demonstrate the functional requirements of internal combustion engines and their systems
- Explain the normal combustion phenomenon and knocking in S.I. and C.I. Engines with respect to the several engine operating parameters that affect the engine performance.
- Describe and assess benefits and improvements to thermodynamic systems and related engine parameters that affect the performance of internal combustion engines.
- Elucidate the performance and evaluation of reciprocating and rotary compressors.

### **Manufacturing Technology –I:**

- Design patterns, gating, runner and riser systems. Select a suitable casting process based on the component material, geometry and application.
- Select various fusion and solid state welding Processes based on the application.
- Estimate the force requirements for various bulk and sheet metal forming operations.
- Describe powder metallurgy process and processing of plastics

### **Design of Machine Members –I:**

- Explain the different types of simple and variable stresses.
- Apply the knowledge of simple and variable stresses in the design of fasteners like riveted, welded and bolted joints.
- Design the various cotter joints, knuckle joint and shaft couplings.
- Estimate the force requirements for various bulk and sheet metal forming operations.
- Select suitable springs against static and dynamic loading.

### **Instrumentation & Control Systems:**

- The student will be able to apply the basic measurements using different instruments.
- The student will be able to analyze the usage of various measuring instruments to measure pressure, level, flow and speed
- The student would be able to analyze the importance of measurement of stress, strain, force, torque and power and humidity
- The student will be able to learn about various types of control systems and servomechanisms to measure temperature, speed and position.

### **Industrial Engineering and Management:**

- Apply the concepts of management and industrial engineering.
- Design a plant layout for specific industry
- Identify the governing factors for selection of plant location for setting a specific industry
- To choose the appropriate quality control technique in a manufacturing industry.
- Compute the project completion time for a specific project

### **Production Technology Lab:**

### **Electrical & Electronics Engineering Lab:**

### **Industrial Visit:**

**ELECTRONICS AND COMMUNICATION  
ENGINEERING**

## **II Year ECE Semester-I Course Outcomes:**

### **Electronic Devices and Circuits:**

- Explain the basic concepts of semiconductor physics and summarize the characteristics of PN junction diode in different modes of operation.
- Compare the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
- Summarize the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations and understand the various biasing techniques for BJT and FET.
- Explain the stabilization concepts with expressions and perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

### **Switching Theory and Logic Design:**

- Convert numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
- Convert simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

### **Signals and Systems:**

- Apply the knowledge of linear algebra topics like vector space and orthogonal basis to signals, Analyze the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.
- Understand the process of sampling and the effects of under sampling, Analyze system properties based on impulse response and Fourier analysis
- Apply convolution both in time domain and frequency domain.
- Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems.

### **Electrical Technology:**

- Explain the operation of DC generator, DC motor and analyze the characteristics of DC generator.
- Develop equivalent circuit and evaluate performance of transformers
- Explain the Principle of operation of Induction motor and Synchronous machine and also explain the speed-torque characteristics and starting methods of induction motor
- Explain various Electrical Measuring instruments like Ammeter, Voltmeter, Wattmeter

### **Random Variables and Stochastic Process:**

- Find Probability distribution and density functions for single and multiple random variables
- Evaluate Mean and variances of random signals.
- Find autocorrelation function of random process and Analyze the relationship between power density spectrum and auto correlation.
- Estimate the noise in the communication channels

### **Mathematics-IV:**

- Find derivatives of complex functions and solutions for special functions
- Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory.
- Solve for mean and variance for given samples, To apply basic probability techniques and models to analyze the performance of computer systems, and, in particular, of networks and queues
- To expose the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

### **Electronic Devices and Circuits Lab:**

- Able to analyze how diode acts as open switch, close switch and ideal switch.
- Able to know the efficiency of various rectifiers with and without filters
- Able to analyze how BJT is operated in different regions such as amplifier etc.
- Able to calculate current values when transistor is operated as amplifier.
- Able to know how FET is operated in different regions

### **Networks & Electrical Technology Lab:**

- Able to analyse RLC circuits and understand resonant frequency and Q-factor.
- Able to determine first order RC/RL networks of periodic non- sinusoidal waveforms.
- Able to apply network theorems to analyze the electrical network.
- Able to describe the performance of dc shunt machine.
- Able to investigate the performance of 1-phase transformer.
- Able to perform tests on 3-phase induction motor and alternator to determine their performance characteristics.



## **II Year ECE Semester-II Course Outcomes:**

### **Electronic Circuit Analysis:**

- Explain classification of amplifiers and analyze the CE, CB, CC amplifiers using small signal hybrid model and derive the voltage gain, current gain, input impedance and output impedance
- Design and analyze the cascaded RC coupled BJT amplifier and MOS Amplifier, single stage amplifiers and different types of the coupled amplifiers
- Design and analyze the different types of feedback amplifiers and oscillators
- Design and analyze different types of power amplifiers and learn the effects of cascading on single, double tuned amplifiers.

### **Control Systems:**

- Understands the concepts of feedback and its advantages to various control systems
- Understand the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis
- Analyze the system in terms of absolute stability and relative stability by different approaches.
- In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced

### **Electromagnetic Waves and Transmission Lines:**

- Analyze the Maxwell's Equations for static and time varying field
- Analyze the EM wave equation and explain the different types of polarization
- Explain the transmission line
- Explain the smith chart for solving the transmission line problem

### **Analog Communications:**

- Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
- Analyze noise characteristics of various analog modulation methods
- Analyze various functional blocks of radio transmitters and receivers
- Design simple analog systems for various modulation techniques.

### **Pulse and Digital Circuits:**

- Design linear and non-linear wave shaping circuits
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits
- Design different multi vibrators and time base generators
- Utilize the non sinusoidal signals in many experimental research areas

### **Management Science:**

- Describe the concepts of managerial economics like Demand, Law of Demand, Determinants of demand and demand forecasting techniques
- Express production functions of different variables
- Evaluate various forms of business organizations, Acquire the knowledge on Functional management
- Construct network diagram and solve problems of PERT and CPM

### **Electronic Circuit Analysis Lab:**

- Outline the concepts of various electronic components and devices.
- Determine the frequency response of BJT and JFETs amplifiers.
- Verify different configurations of feedback amplifiers and measure  $A_V, A_I, R_I, R_O$
- Design and analyze RC, LC oscillator circuits.
- Compute bandwidth and impedances of various amplifiers

### **Analog Communications Lab:**

- Design and verify linear modulation & demodulation systems using simulation and hardware.
- Design and verify non-linear modulation & demodulation systems using simulation and hardware.
- Demonstrate the characteristics of various functional blocks of Receiver.
- Analyze signal degradation in the channel at high frequencies through Pre-emphasis and De-emphasis.
- Demonstrate Frequency domain signal Analysis using Spectrum analyzer.

# **COMPUTER SCIENCE AND ENGINEERING**

## **II Year CSE Semester-I Course Outcomes:**

### **Statistics and R Programming:**

- Understand the R workspace and Programming with R.
- Explain the control statements, Loops, Operators and Functions of programming structures using R
- Apply math functions and simulation to calculate probability and statistical distributions using R.
- Perform statistical tests using R to create and visualize graphics and Explore data-sets to create testable hypotheses and identify appropriate statistical tests.

### **Mathematical Foundations of Computer Science:**

- To demonstrate skills in solving counting problem
- To develop reasoning skills to implement in programming
- To understand knowledge of mathematical modeling and proficiency in using mathematical software.
- To solve recurrence relations and able to implement structural models, design concepts using graph theory

### **Digital Logic Design:**

- Understand the conversions in number system and Develop the logic circuits using logic gates.
- Minimize the boolean logic circuits using K-maps.
- Construct and analyze the operation of combinational logic circuits.
- Develop the various types of sequential logic circuits like flip flops, registers and counters.

### **Java Programming :**

- Identify the concepts and features of object oriented programming in Java.
- Describe and implement the programs with command line arguments and Scanner Class.
- Analyze and implement the concepts of Inheritances and Multithreading with real world scenario.
- Develop GUI programs using Applets and Event Handling.

### **Data Structures Through C :**

- Understand data structures concepts for solving computing problems.
- Implement standard data structures like stack, queue
- Understand sorting and searching algorithms to the small and large data.
- Apply AND Implement basic data structures such as trees for real-time applications

**Problem Solving and Program Design Through C:**

- Explain the step by step notation to solve simple mathematical and logical problems
- Implement the “C” Programs for solutions of mathematical and logical problems
- Apply code reading and debugging techniques to analyze and interpret and describe the purpose of program code
- Apply the modular Programming techniques to simplify the programs

**Data Structures Lab Through C:**

- At the end of this lab session, the student will be able to design and analyze the time and space efficiency of the data structure be capable to identify the appropriate data structure for given problem
- Have practical knowledge on the application of data structures

**Java Programming Lab:**

- Understanding the basics of Java programming, Inheritance, Multithreading and Exception Handling.
- The skills to apply OOP and Java programming in problem solving.
- Use of GUI based concepts like Applets and AWT.
- Should have the ability to extend his/her knowledge in Java programming with his/her own business logic.

## **II Year CSE Semester-II Course Outcomes:**

### **Database Management Systems:**

- Describe ER model and normalization for database design.
- Create, maintain and manipulate a relational database using SQL
- Design and build database system for a given real world problem
- Examine issues in data storage and query processing and can formulate appropriate solutions.

### **Software Engineering:**

- Apply the appropriate process models for the application development of SDLC
- Understand the phases of SDLC from requirement gathering phase to design phase via Analysis Phase
- Analyzing the strategies for coding and testing phase in Software product development
- Apply the knowledge about estimation and maintenance of software systems and modeling the software project by using CASE tools

### **Advanced Data Structures:**

- To understand graph representations, Minimum Spanning Trees and traversals
- Understand dictionaries, hashing mechanism which supports faster retrieval.
- Implement heaps, queues and their operations, B Trees and B+ Trees
- Illustration of tries which share some properties of table look up, various issues related to the design of file structures

### **Computer Organization:**

- To conceptualize the basics of organizational and architectural issues of a digital computer and to perform computer arithmetic operations.
- To analyze performance issues in processor and can calculate the effective address of an operand by addressing modes.
- Ability to design memory organization that uses banks for different word size operations to understand the concept of cache memory techniques
- Understand the concept of Input / Output organization.

### **Formal Languages and Automata Theory:**

- Employ finite state machines to solve problems in computing
- Classify machines by their power to recognize languages
- To Design PDA for solving computational Problems
- To design Turing Machine for arithmetic Operations

### **Operating Systems:**

- Summarize various concepts of Operating Systems
- Implement and Apply Process Scheduling Algorithms
- Illustrate concepts of Paging, Segmentation and Apply Concurrency, Deadlock Mechanisms in real world
- Analyze the concepts of file systems in operating systems

### **Advanced Data Structures Lab:**

- Implement heap and various tree structures like AVL, Red-black, B Trees.
- Implement various graph algorithms.

### **Database Management Systems Lab:**

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDI commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.

# **INFORMATION TECHNOLOGY**



## **II Year IT Semester-I Course Outcomes:**

### **Statistics with R Programming:**

- Understand the R workspace and Programming with R.
- Explain the control statements, Loops, Operators and Functions of programming structures using R
- Apply math functions and simulation to calculate probability and statistical distributions using R.
- Perform statistical tests using R to create and visualize graphics and Explore data-sets to create testable hypotheses and identify appropriate statistical tests.

### **Mathematical Foundations of Computer Science:**

- To demonstrate skills in solving counting problem
- To develop reasoning skills to implement in programming
- To understand knowledge of mathematical modeling and proficiency in using mathematical software.
- To solve recurrence relations and able to implement structural models, design concepts using graph theory

### **Digital Logic Design:**

- Understand the conversions in number system and Develop the logic circuits using logic gates.
- Minimize the boolean logic circuits using K-maps.
- Construct and analyze the operation of combinational logic circuits.
- Develop the various types of sequential logic circuits like flip flops, registers and counters.

### **Software Engineering :**

- Apply the appropriate process models for the application development of SDLC
- Understand the phases of SDLC from requirement gathering phase to design phase via Analysis Phase
- Analyzing the strategies for coding and testing phase in Software product development
- Apply the knowledge about estimation and maintenance of software systems and modeling the software project by using CASE tools

### **Data Structures through C :**

- Understand data structures concepts for solving computing problems.
- Implement standard data structures like stack, queue
- Understand sorting and searching algorithms to the small and large data.
- Apply AND Implement basic data structures such as trees for real-time applications

### **Python Programming:**

- Install Python IDE and run basic Python scripts.
- Understand the operators, functions, key Concepts of Object Oriented Programming in python.
- Access Python from various online resources and import packages to the current working environment.
- Develop front end GUI using Visualization Libraries and Multithreading techniques

### **Data Structures through C Lab:**

- Design and analyze the time and space efficiency of the data structure be capable to identify the appropriate data structure for given problem
- Have practical knowledge on the application of data structures

### **Python Programming Lab:**

- Understand how to write, test, and debug simple Python programs.
- Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python Develop Python programs step-wise by defining functions and calling them..
- Express different Decision Making statements and Functions
- Understand and summarize different File handling operations
- Explain how to design GUI Applications in Python and evaluate different database operations

## **II Year IT Semester-II Course Outcomes:**

### **Computer Graphics:**

- Describe the general software architecture of programs that use 3D computer graphics.
- Discuss hardware system architecture for computer graphics.
- Understand graphics pipeline, frame buffers, and graphic accelerators / co processors.
- Select among models for lighting/shading Color, ambient light, distant and light with sources, Phong reflection model and shading

### **Java Programming:**

- Identify the concepts and features of object oriented programming in Java.
- Describe and implement the programs with command line arguments and Scanner Class.
- Analyze and implement the concepts of Inheritances and Multithreading with real world scenario.
- Develop GUI programs using Applets and Event Handling.

### **E- Commerce:**

- Identify, interpret and analyze stakeholder needs
- Identify and apply relevant problem solving methodologies
- Design components, systems and/or processes to meet required specifications
- Demonstrate research skills

### **Computer Organization & Architecture:**

- To conceptualize the basics of organizational and architectural issues of a digital computer and to perform computer arithmetic operations.
- To analyze performance issues in processor and can calculate the effective address of an operand by addressing modes.
- Ability to design memory organization that uses banks for different word size operations to understand the concept of cache memory techniques
- Understand the concept of Input / Output organization.

### **Object Oriented Analysis and Design using UML:**

- Build solutions to the complex problems using object oriented approach
- Identify classes and responsibilities of the problem domain
- Apply UML tools for various case studies
- Represent classes, objects, responsibilities and states using UML notations.

**Language Processors :**

- Construct LL, SLR, CLR and LALR parse table.
- Understand Parser and its types i.e. Top-down and Bottom-up parsers.
- Classify machines by their power to recognize languages
- Syntax directed translation, synthesized and inherited attributes and analyze techniques for code optimization

**(50% Flat + 50% CD):**

**Unified Modeling Language Lab:**

- Sketch a Modeling with UML by Deploying Structural Modeling, Behavioral Modeling, Architectural Modeling.
- Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships
- Show the role and function of each UML model in developing object oriented software.

**Java Programming Lab:**

- Understanding the basics of Java programming, Inheritance, Multithreading and Exception Handling.
- The skills to apply OOP and Java programming in problem solving.
- Use of GUI based concepts like Applets and AWT.
- Should have the ability to extend his/her knowledge in Java programming with his/her own business logic

# **ELECTRONICS AND COMPUTER ENGINEERING**

## **II Year ECM Semester-I Course Outcomes:**

### **Electronic Devices and Circuits:**

- Explain the basic concepts of semiconductor physics and summarize the characteristics of PN junction diode in different modes of operation.
- Compare the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
- Summarize the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations and understand the various biasing techniques for BJT and FET.
- Explain the stabilization concepts with expressions and perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

### **Switching Theory and Logic Design:**

- Convert numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
- Convert simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

### **Signals and Systems:**

- Apply the knowledge of linear algebra topics like vector space and orthogonal basis to signals, Analyze the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis.
- Understand the process of sampling and the effects of under sampling, Analyze system properties based on impulse response and Fourier analysis.
- Apply convolution both in time domain and frequency domain.
- Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems.

### **Software Engineering:**

- Apply the appropriate process models for the application development of SDLC.
- Understand the phases of SDLC from requirement gathering phase to design phase via Analysis Phase.
- Analyzing the strategies for coding and testing phase in Software product development.
- Apply the knowledge about estimation and maintenance of software systems and modelling the software project by using CASE tools.

**Object Oriented Programming:**

- Apply the basic terminology of C++.
- Write, compile and debug programs in C++ language. Use different data types in a computer program. Design programs involving decision structures, loops and functions.
- Explaining with classes, objects and member functions, concepts of inheritance. Define and compare/contrast constructors and destructors.
- Usage of generic programming, overloading of functions and operators, overriding and exception handling in various contexts.

**Managerial Economics and Financial Analysis:**

- Describe the economic activities performed by the businessmen in the business for profit earning. Understand the significance of demand, its analysis, measurement of demand and its Forecasting.
- Evaluate the production theories and pricing policies of various enterprises.
- Design and implement different structures of market covering how price is determined under different market structures. Also can able to take decisions using business cycles. Analyze different forms of business organizations existing in the modern business and able to choose suitable form of business.
- Able to prepare financial statements. Evaluate investment proposals using capital budgeting tools and techniques.

**Object-Oriented Programming Lab:**

- Understand the process of writing, compiling and executing programs in C++ using appropriate predefined functions in C++.
- Implement the object oriented concepts in developing application using C++.
- Developing applications in C++ using the understanding of Inheritance and polymorphism.
- Understand and use exception handling while developing a C++ application.
- Develop complex applications by identifying the appropriate features of object oriented programming to solve real world problems using C++.

**Professional Ethics and Human Values:**

- Recognize importance of human values, harmony and ethical behavior in real life situations.
- Describe the core values that shape the ethical behaviour of an engineer.
- Recall basics of professional ethics and human values.
- Listing sustained happiness through identifying the essentials of human values and skills.
- Describe the practical importance of trust, mutually satisfying human behaviour and enriching interaction with nature.

## **II Year ECM Semester-II Course Outcomes:**

### **Principles of Communications:**

- Explain the basic principle of communication system. Describe the principles of amplitude modulated and angle modulated communication systems and be able to analyze their performance in the presence of noise.
- Explain and solve communication system parameters for various types of modulation and demodulation techniques.
- Apply the concepts to practical applications in telecommunication.
- Analyze communication systems in both the time and frequency domains.

### **Control Systems:**

- Understands the concepts of feedback and its advantages to various control systems.
- Understand the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis.
- Analyze the system in terms of absolute stability and relative stability by different approaches.
- In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.

### **Management Science:**

- Define management and its nature scope and functions and hierarchical levels and organizational structure and managing the culture.
- Illustrate various functions of production and inventory management Determine the various concepts of strategic management and project management.
- Analyze the process of matching manager qualifications with position requirements and concept of marketing mix.
- Compare the various contemporary issues of management.

### **Computer Organization:**

- To conceptualize the basics of organizational and architectural issues of a digital computer and to perform computer arithmetic operations.
- To analyze performance issues in processor and can calculate the effective address of an operand by addressing modes.
- Ability to design memory organization that uses banks for different word size operations to understand the concept of cache memory techniques.
- To understand the concept of Input / Output organization.

### **Pulse and Digital Circuits:**

- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.
- Utilize the non sinusoidal signals in many experimental research areas.



### **Operating Systems:**

- Apply the appropriate process models for the application development of SDLC.
- Understand the phases of SDLC from requirement gathering phase to design phase via Analysis Phase.
- Analyzing the strategies for coding and testing phase in Software product development.
- Apply the knowledge about estimation and maintenance of software systems and modeling the software project by using CASE tools.

### **Pulse Digital Circuits and Communications Lab:**

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

- Generation and processing of sinusoidal and non-sinusoidal signals.
- Generation and processing of various modulation and demodulation techniques.
- Fundamentals of basic logic gates and its applications.
- Analysis and design of various multivibrators circuits.
- Design and analysis of UJT relaxation oscillator and boot-strap sweep circuits
- Process converting analog information into digital data via sampling, quantization, and coding.

### **Operating Systems Lab:**

Apply CPU Scheduling algorithms.

- Explain different problems related to process synchronization.
- Apply deadlock prevention and deadlock detection algorithms
- Describe the concepts of paging and segmentation for memory management.
- Apply different page replacement algorithms
- Describe different disk space allocation methods and free space management techniques.

## **III B.Tech VR-17 Course Outcomes**

**CIVIL ENGINEERING**

## **III Civil Engineering Semester-I:**

### **Managerial Economics and Financial Analysis:**

- Describe the economic activities performed by the businessmen in the business for profit earning. Understand the significance of demand, its analysis, measurement of demand and its Forecasting.
- Evaluate the production theories and pricing policies of various enterprises.
- Design and implement different structures of market covering how price is determined under different market structures. Also can able to take decisions using business cycles. Analyze different forms of business organizations existing in the modern business and able to choose suitable form of business.
- Able to prepare financial statements.
- Evaluate investment proposals using capital budgeting tools and techniques.

### **Engineering Geology:**

- Explain the case histories of failure of some civil engineering constructions due to geological draw backs.
- Distinguish the properties of various rock forming minerals and economic minerals.
- Distinguish megascopic study of igneous, sedimentary and metamorphic rocks.
- Describe the common geological structures associating with the rocks such as folds, faults, unconformities and joints.
- Describe importance of Geophysical studies and principles of geophysical study by various methods.

### **Structural Analysis-II:**

- Differentiate Determinate and Indeterminate Structures.
- Analyze the two hinged and three hinged arches for different support levels.
- Analyze structures using portal and cantilever methods.
- Analyze Cable and Suspension Bridge structures.
- Analyze structures using Moment Distribution, Kani's and Matrix methods.

### **Design of Reinforced Concrete Structures:**

- Explain different types of design philosophies.
- Design flexural members with detailing
- Design structures subjected to shear, bond and Torsion
- Design one way and two way slabs
- Design different types of compression members and footings

### **Transportation Engineering-II:**

- Design geometrics in a railway track.
- Design good transportation network
- Illustrate the master plan and site selection for airport.
- Design airport geometrics and airfield pavements.
- Plan, construct and maintain docks and harbours.

### **Surveying Field Work– II:**

- Compute the horizontal and vertical angles.
- Compute the heights and distances by method of trigonometric leveling.
- Find the distances and heights with tachometric.
- Design and set the simple curve.
- Compute the areas, heights, distances and setting out the structures.

### **Engineering Geology Lab:**

- Identify the minerals through their physical properties.
- Identify the rocks through megascopic study.
- Interpret the geological maps.
- Draw the sections of geological maps.
- Solve the structural geological problems

### **Transportation Engineering Lab:**

- Test aggregates and judge the suitability of materials for the road construction.
- Test the given bitumen samples and judge their suitability for the road construction.
- Compute the optimum bitumen content for the mix design.
- Determine the traffic volume, speed and parking characteristics.
- Determine the traffic Capacity and saturation flow.
- Design signal cycle times and find the Start-up Lost time.

## **Civil Engineering III B.Tech Semester-II:**

### **Design of Steel Structures:**

- Explain different types of Connections and relevant IS codes.
- Design beams of laterally supported and unsupported.
- Design compression members of different types with connection detailing.
- Design Plate Girder and Gantry Girder with connection detailing.
- Produce the drawings pertaining to different components of steel structures.

### **Geotechnical Engineering – I:**

- Summarize the physical properties of soil and establish their inter-relationships.
- Classify the different types of soil and recognize the various index properties of the soils.
- Analyze the effect of seepage in soil.
- Calculate the settlements and increase in the vertical stress due to super structure loads.
- Demonstrate the compaction characteristics, consolidation parameters and its significance.

### **Environmental Engineering-I:**

- Acquire the basic knowledge on sources, quality, quantity, demand, conveyance, treatment systems, storage and distribution of water; and water supply arrangements in buildings.
- Analyze problems associated with water supply engineering.
- Design water conveyance, treatment, storage and distribution systems.
- Solve water supply engineering problems through proper investigations and interpretation.
- Solve the water supply engineering problems by using appropriate techniques.
- Give solutions to water supply engineering problems ensuring health and safety.
- Maintain quality standards in analysis, treatment and distribution of water in water supply schemes.

### **Water Resources Engineering –I:**

- Describe the hydrologic cycle, precipitation and its relevance to civil engineering.
- Describe abstractions from precipitation, evaporation, Evapotranspiration and Infiltration.
- Describe concepts of runoff and hydrograph analysis.
- Analyze flood frequency and design flood and flood routing.
- Analyze the groundwater movement and well hydraulics.

### **Advanced Surveying Using GPS (Elective-I):**

- Explain basic concepts of geodesy.
- Explain basic concepts of Global Positioning systems.
- Describe the GPS Signal structure and GPS orbits.
- Explain GPS errors and accuracy.
- Illustrate GPS applications

### **Groundwater Development and Management (Elective-I):**

- Estimate aquifer parameters and yield of wells.
- Analyse radial flow towards wells in confined and unconfined aquifers.
- Interpret geophysical exploration data for scientific source finding of aquifers.
- Determine the process of artificial recharge for increasing groundwater potential.
- Apply appropriate measures for groundwater management.

### **Waste Water Management (Elective-I):**

- Distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.
- Impart knowledge on selection of treatment methods for industrial wastewater.
- Describe the common methods of treatment in different industries.
- Explain operational problems of common effluent treatment plant.
- Explain the manufacturing process of various industries.

### **Advanced Concrete Technology (Elective-I):**

- Use of new materials in Concretes and understand how they affect the properties of concrete.
- Describe the merits and demerits and manufacturing procedures of various special concretes used for special purposes.
- Appreciate RMC MIX design for special concrete.
- Appreciate need for NDT evaluation of concrete and have knowledge on the working principle of some of the methods.
- Describe durability and high performance of concrete.

### **Traffic Engineering (Elective-I):**

- Describe the traffic volume of vehicles.
- Design On-street or Off- street parking facility for a study area.
- Design the Level of Service of a pavement.
- Design rotary intersection of a pavement.
- Design travel demand models

### **Electronic Instrumentation (Open Elective-I):**

- Select the instrument to be used based on the requirements.
- Understand and analyze different signal generators and analyzers.
- Understand the design of oscilloscopes for different applications
- Design different transducers for measurement of different parameters.

**Database Management Systems (Open Elective-I):**

- Describe ER model and normalization of or database design.
- Create, maintain and manipulate a relational database using SQL
- Design and build database system for a given real world problem
- Examine issues in data storage and query processing and can formulate appropriate solutions.

**Alternative Sources of Energy (Open Elective-I):**

- Distinguish various types of solar thermal collectors.
- Describe the working of a photovoltaic system.
- Analyze the operation of fuel cells and biomass conversion technologies.
- Identify various parts in a wind energy conversion system.
- Elaborate on ocean thermal energy conversion and wave energy conversion

**Heating, Ventilation and Air-Conditioning (Open Elective-I):**

- Understand the role of HVAC systems for human sustainability.
- Study the behavior, properties and affects of moist air.
- Estimate heating and cooling loads to design an optimized duct and ventilating system.
- Evaluate standard requirements of ventilation for human comfort.
- Explain the need for air conditioning system with respect to global warming temperatures.

**Massive Open Online Course (MOOC) (Open Elective-I):**

**Geotechnical Engineering Lab:**

- Determine index properties of soil followed by their classification.
- Determine permeability of soils.
- Determine Compaction strength characteristics.
- Determine Consolidation strength characteristics.
- Determine shear strength characteristics.

**Environmental Engineering Lab:**

- Demonstrate the knowledge on experimental analysis of water and wastewater.
- Analyze water and wastewater by using appropriate techniques.
- Solve water and wastewater problems by considering environmental sustainability.
- Maintain standards in water and wastewater analysis.
- Function effectively as an individual, and as a member or leader in teams to solve the water and wastewater problems.

**Computer Aided Engineering Lab:**

- Draw the conventional signs and symbols.
- Draw the plan and sectional elevation of footing.
- Draw the plan, elevation and section of single storied and multi storied building.
- Draw the plan and cross section of doglegged staircase.
- Draw the cross section of lintel cum sunshade and RCC Beam.



# **ELECTRICAL AND ELECTRONICS ENGINEERING**

## **III Year EEE – Semester-I Course Outcomes:**

### **Power transmission Engineering:**

- Apply parameters of various types of transmission lines during different operating conditions
- Analyze the performance of short and medium transmission lines.
- Investigate travelling waves on transmission lines.
- Summarize various factors related to charged transmission lines and underground cables.

### **Signals and Systems:**

- Able to understand the signals and systems and Concept of orthgonality
- Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform
- Can apply Laplace Transforms to continuous time signals and systems
- Can apply Z Transforms to discrete time signals and systems, applying sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.

### **Electrical Measurements:**

- Choose right type of instrument for measurement of voltage and current for ac and dc and measurement of power and energy and also able to calibrate energy meter by suitable method.
- Calibrate ammeter voltmeter and potentiometer and also able to use the ballistic galvanometer and flux meter for magnetic measurements.
- Select suitable bridge for measurement of electrical parameters
- Measure frequency and phase difference between signals using CRO. able to use digital instruments in electrical measurements

### **Management Science:**

- Gives an outline of management and its nature scope and functions and hierarchical levels and organizational structure and managing the culture
- Able to understand the various functions of production and inventory management
- Bring out various concepts of strategic management and project management
- Elucidate the process of matching manager qualifications with position requirements and concept of marketing mix

### **Power Electronics:**

- Explain the static and dynamic characteristics of various power semiconductor devices
- Distinguish the operation of single phase and three phase rectifiers.
- Analyze the operation of different types of DC-DC converters.
- Distinguish the operation of AC-AC Converters

### **Digital Electronics:**

- Understand the conversion between different number systems, Binary Arithmetic and understand the logic gates and Minimization of Logic Functions.
- Realise Logic functions using multiplexers, encoders and decoders.
- Design different types of counters and different sequential circuits using flip flops.
- Realise Different Logic Gates with different logic Families.

### **Power Electronics lab:**

- Explain the characteristics of various power electronic devices and analyze gated rive circuits of IGBT.
- Analyze the performance of single-phase and three-phase full-wave bridge converters with both resistive and inductive loads.
- Describe the operation of single phase AC voltage regulator with resistive and inductive loads.
- Illustrate the working of Buck converter, Boost converter, single-phase square wave inverter and PWM inverter.

### **Control Systems Laboratory:**

- Analyze the performance and working Magnetic amplifier, D.C and A.C. servo motors and Synchro Transmitter and Receiver.
- Determine the transfer function of a DC Motor and Compare P, PI, PD and PID controllers.
- Understand the working of PID controller in temperature control application and position control systems.
- Design lag, lead compensators by using simulation

### **Data Structures through C Lab:**

- Practical knowledge on the application of data structures
- Design and develop programs for linear data structures
- Design and develop programs for non linear data structures
- Develop programs for various sorting techniques

## **III Year EEE – Semester-II Course Outcomes:**

### **Power Electronic Controllers & Drives:**

- Explain the fundamentals of electric drive and different electric braking methods
- Analyze the speed control DC motors through controlled converters (1- $\phi$ ) and choppers.
- Differentiate the stator side control and rotor side control of three phase induction motor using power converters.
- Describe VSI, PWM techniques to control the synchronous motor.

### **Power System Analysis:**

- Compute the per unit values of system and formulate Ybus for a given power system network
- Calculate the load flows in a power systems using various numerical methods.
- Compute Zbus for a given power system network and analyze symmetrical fault calculation
- Solve an un-balanced three phase network by using symmetrical components and analyze a power system under fault conditions.
- Analyze the steady state and transient stabilities

### **Renewable Energy Systems:**

- To be able to analyze solar radiation geometry and thermal systems
- To be able to design solar PV systems
- To be able to understand various electrical machines for renewable energy systems
- To be able to analyze standalone and grid connected wind and PV systems

### **MPMC:**

- To be able to explore the architecture of microprocessors and microcontrollers
- Select a microprocessor or a microcontroller suitable for the given application
- Write assembly language program in 8086 and 8051 for various applications
- Create necessary memory and I/O interfacing with 8086 and 8051

### **Elective – I:**

#### **Electric Vehicles:**

- Explain the concepts and drive train configurations of electric drive vehicles.
- Describe different electric propulsion systems and energy storage devices
- Discuss the technology, design methodologies and control strategy of electric vehicles.
- Explain battery charger topologies for electric vehicles and discuss how the sizing of the drive system is done and energy management strategies used in electric.

### **Optimization Techniques:**

- To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
- To solve single variable and multi variable optimization problems, without and with constraints.
- To apply linear and non-linear programming technique to an optimization problem.
- To explain basic principles of Genetic Algorithms and Particle Swarm Optimization methods

### **Instrumentation:**

- Able to represent various types of signals.
- Acquire proper knowledge to use various types of Transducers
- Able to monitor and measure various parameters such as velocity, temperature, pressure etc.
- Able to measure various parameter like phase and frequency of a signal with the help of CRO

### **Special Electrical Machines:**

- Explain the performance and control of stepper motors, and their applications
- Explain theory of operation and control of switched reluctance motor.
- Describe the operation of BLDC motors.
- Explain the theory of travelling magnetic fields and applications of linear motors.

### **Open Elective-I:**

#### **Introduction to Python:**

- Install Python IDE and run basic Python scripts.
- Understand the operators, functions, key Concepts of Object Oriented Programming in python.
- Access Python from various online resources and import packages to the current working environment.
- Develop front end GUI using Visualization Libraries and Multithreading techniques.

#### **Robotics:**

- Identify various robot configuration and components.
- Select appropriate actuators and sensors for a robot based on specific application.
- Carry out kinematic and dynamic analysis for simple serial kinematic chains.
- Perform trajectory planning for a manipulator by avoiding obstacles.

### **Neural Networks & Fuzzy Logic:**

- Know different models of artificial neuron, Use learning methods and different paradigms of ANN.
- Classify between classical and fuzzy sets.
- Use different modules of Fuzzy logic controller.
- Apply Neural Networks and fuzzy logic for real-time applications.

### **Energy Audit and conservation & Management**

- Apply principles of energy auditing and propose energy conservation schemes
- Demonstrate principle and organizing energy management program
- Analyze power factor improvement methods, and Demonstrate the operating principle of energy efficient motors
- To analyse about space heating and ventilation methods and demonstrate the operation of various energy instruments
- Analyze and compute the economic aspects of energy consumption

### **Electrical Measurements Laboratory:**

- Measure the electrical parameters voltage, current, power, energy, displacement, Strain
- Calibrate the Voltmeter, Ammeter, and Energy meter.
- Determine electrical characteristics of resistance, inductance and capacitance.
- Test transformer oil for its effectiveness.

### **MPMC lab:**

- Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do parallel and serial communication using 8051 microcontrollers

### **Professional Ethics & Human Values:**

- Recognize importance of human values, harmony and ethical behavior in real life situations
- Describe the core values that shape the ethical behaviour of an engineer
- Recall basics of professional ethics and human values.
- Listing sustained happiness through identifying the essentials of human values and skills.
- Describe the practical importance of trust, mutually satisfying human behaviour and enriching interaction with nature

# **MECHANICAL ENGINEERING**

## **III Year M.E. Semester-I Course Outcomes:**

### **Dynamics of Machinery:**

- Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
- Compute frictional losses and torque transmission of mechanical systems.
- Understand the dynamic forces acting on the flywheels and governors.
- Apply analytical and graphical methods of calculating balancing of rotary and reciprocating masses.
- Determine the natural frequencies of vibrating system.

### **Manufacturing technology –II:**

- Apply cutting mechanics to metal machining based on cutting force and power consumption
- Operate lathe, milling machines, drill press, grinding machine, etc.
- Select cutting tools and tool geometries for different metals and operations economically.
- Understand the principles of CNC Machines and Processes of Additive Manufacturing.

### **Design of Machine Members – II:**

- Design bearings and various I.C engine parts like Piston, Connecting rod, Crank shaft and Cylinder.
- Apply the concept of curved beam and design power screws like screw Jack, Differential and compound screws.
- Design various power transmission elements such as belts, ropes, chains, pulleys and machine tool elements of levers.
- Analyse the design of spur & helical gear drives along with their applications.

### **Thermal Engineering – II:**

- Explain the working principle of Rankine cycle, actual and ideal, its application in boilers and methods of improving the efficiency by introducing the concept of mean temperature of heat addition.
- List out the advantages, applications and types of steam nozzles and condensers.
- Evaluate the performance of impulse and reaction turbines and to learn about the methods of governing.
- Apply the principle of Newton laws to Jet Propulsion and Gas turbine systems.

### **Metrology:**

- Explain the tolerances and fits for selected product quality, Linear and angular measurements
- Apply appropriate method and instruments for inspection of various gear elements and thread elements.
- Examine surface finish and measure the parts with various comparators.
- Evaluate the machine tool quality with prescribed alignment tests.



**Kinematics & Dynamics Lab:**

- Understand types of motion
- Analyse forces and torques of components in linkages
- Understand static and dynamic balance
- Understand forward and inverse kinematics of open-loop mechanisms

**Thermal Engineering Lab:**

- The student will be able to calculate the various efficiencies, various horse powers and energy balance for several types of Internal Combustions Engines and compressors.

**IPR & Patents (Audit):**

- IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
- Student gets an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

## **III M.E. Semester-II:**

### **Operations Research:**

- Apply linear programming model and assignment model to domain specific situations
- Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results
- Apply the concepts of PERT and CPM for decision making and optimally managing projects
- Analyze the various replacement and sequencing models and apply them for arriving at optimal decisions

### **Open Elective-I:**

#### **Entrepreneurship Development**

- Understanding the Entrepreneurship
- Understanding the Business Environment
- Exposure on Industrial Policies
- The Business plan Preparation
- How to Launching of small business, management.

#### **Data Base Management System**

- Describe ER model and normalization for database design.
- Create, maintain and manipulate a relational database using SQL
- Design and build database system for a given real world problem
- Examine issues in data storage and query processing and can formulate appropriate solutions.

#### **Waste Water Management**

- Distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.
- Impart knowledge on selection of treatment methods for industrial wastewater.
- Describe the common methods of treatment in different industries
- Explain operational problems of common effluent treatment plant.
- Explain the manufacturing process of various industries.

#### **Python Programming**

- Install Python IDE and run basic Python scripts.
- Understand the operators, functions, key Concepts of Object Oriented Programming in python.
- Access Python from various online resources and import packages to the current working environment.
- Develop front end GUI using Visualization Libraries and Multithreading techniques.

**Finite Element Methods:**

- Understand the concepts behind variational methods and weighted residual methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements.
- Apply suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
- Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow.

**Heat Transfer:**

- Apply the basic laws of heat transfer to account for the consequence of heat transfer in thermal analyses of engineering systems to analyze problems involving steady and transient state heat conduction in simple geometries and to design an extended surface for heat transfer enhancement.
- Evaluate heat transfer coefficients for natural convection, forced convection and for a phase change process.
- Design and develop a heat exchanging system for the basic engineering applications by analyzing its performance
- Construct electrical analogy networks through basic principles of radiation to estimate the radiative heat exchange between the bodies.

**Robotics**

- Identify various robot configuration and components.
- Select appropriate actuators and sensors for a robot based on specific application.
- Carry out kinematic and dynamic analysis for simple serial kinematic chains.
- Perform trajectory planning for a manipulator by avoiding obstacles.

# **ELECTRONICS AND COMMUNICATION ENGINEERING**

## **III Year ECE Semester-I Course Outcomes:**

### **Computer Architecture and Organization:**

- Analyze the Performance of a computer using performance equation
- Understand the different instruction types and calculate the effective address of an operand by addressing modes.
- Understanding of how a computer performs micro arithmetic operation.
- Understand how the data transfer takes place using I/O mode, Interrupt, and DMA techniques with interfacing devices and data storage concepts.

### **Linear IC Applications:**

- Understand basic operation and characteristics of op-amp.
- Interpret different linear and non-linear applications of Op-Amp.
- Design & analyze different types of active filters using Op-Amp.
- Compare different types of ADC and DACs

### **Digital IC Applications:**

- Understand the structure of commercially available digital integrated circuit families
- Learn the IEEE Standard 1076 Hardware Description Language (VHDL)
- Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping
- Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL

### **Digital Communications:**

- Understand the various digital modulation techniques.
- Learn about various digital carrier modulation techniques.
- Apply various errors correction and detection codes to digital data.
- Evaluate the error probability calculations for digital modulation techniques available

### **Antennas and Wave Propagation:**

- Explain the process of radiation from an open ended transmission line
- Explain the behaviour of an antenna in terms its parameters and Compute the fields and radiation resistance of a family of antenna.
- Select appropriate antenna for a given applications (TV, radar, wireless)
- Design dipole, Yagi and patch antenna for a given specification

**Professional Ethics & Human Values:**

- Recognize importance of human values, harmony and ethical behavior in real life situations
- Describe the core values that shape the ethical behaviour of an engineer
- Recall basics of professional ethics and human values.
- Listing sustained happiness through identifying the essentials of human values and skills.
- Describe the practical importance of trust, mutually satisfying human behaviour and enriching interaction with nature

## **III ECE Semester-II:**

### **Micro Processors and Micro Controllers:**

- Understand the concepts of architecture, memory organization of Intel 8086 microprocessor and ARM and Intel 8051 microcontrollers.
- Understand the concepts of addressing modes, instruction set of Intel 8086 microprocessor and Intel 8051 and ARM processor
- Write assembly language programs for simple problem statements
- Design an interface between peripheral chips & processors and write programs for data transfer

### **Computer Networks:**

- Understand ISO-OSI and TCP/IP models and various Network topology models
- Analyze MAC layer protocols and LAN technologies
- Understand routing and congestion control algorithms
- Apply the knowledge of Internet protocols to design the applications and Understand how Internet works

### **VLSI design:**

- Describe the fabrication process for MOS,CMOS and BICMOS technologies along with their electrical properties
- Outline the concepts of design rules during the layout design
- Model various scaling Models and factors and their effects on MOSFET parameters.
- Examine various design issues of VLSI Circuits and illustrate FPGA Design

### **Digital Signal Processing:**

- Design, simulate and realize different digital filters.
- Estimate the spectra of signals that are to be processed by discrete time system and to verify the performance of various spectrum estimation techniques
- Design multi rate digital signal processing system.
- Understand the architecture of DSP processor

### **OPEN ELECTIVE-1:**

#### **a) Data Base Management systems:**

- Describe ER model and normalization for database design.
- Create, maintain and manipulate a relational database using SQL
- Design and build database system for a given real world problem
- Examine issues in data storage and query processing and can formulate appropriate solutions.

### **b) Python programming:**

- Install Python IDE and run basic Python scripts.
- Understand the operators, functions, key Concepts of Object Oriented Programming in python.
- Access Python from various online resources and import packages to the current working environment.
- Develop front end GUI using Visualization Libraries and Multithreading techniques.

### **c) Soft Computing Techniques:**

- Learn about soft computing techniques and their applications
- Analyze various neural network architectures
- Understand perceptrons and counter propagation networks.
- Analyze the genetic algorithms and their applications.

### **d) Bio medical Instrumentation:**

- Man instrument system and types of electrodes and transducers to extract bio potential signals
- Anatomy of heart, lungs, eye and ears. Devices to do tests on heart, lungs, eye and ears.
- Diagnose & Monitor the health of patient in intensive care unit
- Monitors, recorders and electrical accident prevention methods

### **e) JAVA Programming:**

- Identify the concepts and features of object oriented programming in Java.
- Describe and implement the programs with command line arguments and Scanner Class.
- Analyze and implement the concepts of Inheritances and Multithreading with real world scenario.
- Develop GUI programs using Applets and Event Handling.



# COMPUTER SCIENCE AND ENGINEERING

## **III Year CSE Semester-I Course Outcomes:**

### **Compiler Design:**

- Acquire knowledge in different phases and passes of Compiler
- Understand Parser and its types i.e. Top-down and Bottom-up parsers.
- Construct LL, SLR, CLR and LALR parse table.
- Syntax directed translation, synthesized and inherited attributes and analyze techniques for code optimization

### **Python Programming:**

- Install Python IDE and run basic Python scripts.
- Understand the operators, functions, key Concepts of Object Oriented Programming in python.
- Access Python from various online resources and import packages to the current working environment.
- Develop front end GUI using Visualization Libraries and Multithreading techniques.

### **Data Mining Techniques:**

- Understand why there is a need for data warehouse in addition to traditional operational database systems And Understand why there is a need for data mining and in what ways it is different from traditional statistical techniques.
- Identify components in typical data warehouse architectures.
- Design a data warehouse and understand the process required to construct one.
- Understand the details of different algorithms made available by popular commercial data mining software and Solve real data mining problems by using the right tools to find interesting patterns.

### **Design and Analysis of Algorithms:**

- Able to analyze the performance of an algorithm in terms of time and space.
- Give an intuition on how to find a solution to large problems by dividing them into smaller sub problems.
- Identifying which designing technique can be used to solve a particular problem.
- Knowing how to explore the solution space by using Branch and Bound technique.

### **UNIX and Shell Programming:**

- Explain the architecture and features of UNIX Operating System and differentiate it from other Operating Systems
- Demonstrate UNIX commands for file handling and process control
- Build Regular expressions for pattern matching and apply them to various filters for a specific task
- Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem

### **Data Mining with R Lab:**

- Able to installation of R studio and understand working with R
- Exercise the data mining techniques with varied input values for different parameter.
- Understand the data sets and data pre-processing and implement various graphs using R software
- Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression

### **Python Programming Lab:**

- Understand how to write, test, and debug simple Python programs.
- Determine the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python and Develop Python programs step-wise by defining functions and calling them.
- Explain how to design GUI Applications in Python and evaluate different database operations and Express different Decision Making statements and Functions
- Summarize different File handling operations

### **Operating Systems and Compiler Design Lab:**

- Understand operating systems concepts like deadlocks, multi programming
- Implement various concepts like page replacement algorithms, CPU scheduling algorithms
- Implementation of Lexical analyzer
- Implementation of various parsers

### **Professional Ethics & Human Values:**

- Recognize importance of human values, harmony and ethical behavior in real life situations
- Describe the core values that shape the ethical behaviour of an engineer
- Recall basics of professional ethics and human values.
- Listing sustained happiness through identifying the essentials of human values and skills.
- Describe the practical importance of trust, mutually satisfying human behaviour and enriching interaction with nature

## **III Year CSE Semester-II Course Outcomes:**

### **Computer Networks:**

- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP models
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation and understand routing and congestion control algorithms
- Analyze MAC layer protocols and LAN technologies

### **Web Technologies:**

- Understand HTML tags to design static web pages
- Describe the basic concepts of Java Scripts to design dynamic web pages
- Familiarize the concepts of PHP and AJAX
- Analyze a given problem and apply requisite appropriate tools for designing dynamic and interactive web applications

### **Object Oriented Analysis and Design using UML:**

- Build solutions to the complex problems using object oriented approach
- Identify classes and responsibilities of the problem domain
- Apply UML tools for various case studies
- Represent classes, objects, responsibilities and states using UML notations.

### **Artificial Intelligence:**

- Identify Methods in AI that may be suited to solving a given problem and Game Playing
- Analyze the basic issues of different types of knowledge representation techniques to build intelligent system
- Build Expert systems for real time applications
- Determination of uncertainty of data using different probability approaches for real time applications

### **OPEN ELECTIVE-1**

#### **Digital image Processing:**

- Analyze various types of images mathematically
- Compare image enhancement methods in spatial and frequency domains
- Demonstrate various segmentation algorithms for given image
- Justify different techniques for image compression

#### **Embedded Systems:**

- Categorize embedded systems and Summarize 8051 microcontroller architecture
- Identify the unique characteristics of real-time systems
- Apply synchronization tools in various real time scenarios
- Define the unique design problems and challenges of real-time systems

**Microprocessor:**

- Understand the concepts of architecture, memory organization of Intel 8086 microprocessor and Intel 8051 microcontrollers.
- Understand the concepts of addressing modes, instruction set of Intel 8086 microprocessor and Intel 8051 microcontrollers.
- Write assembly language programs for simple problem statements
- Design an interface between peripheral chips & processors and write programs for data transfer

**Robotics:**

- Identify various robot configuration and components.
- Select appropriate actuators and sensors for a robot based on specific application.
- Carry out kinematic and dynamic analysis for simple serial kinematic chains.
- Perform trajectory planning for a manipulator by avoiding obstacles.

**OPEN ELECTIVE-2 (CBCS)(MOOCS)**

**( Note: Online certification course from NPTEL or SWAYAM on recent trends technologies with minimum 12 weeks)**

**Computer Networks Lab:**

- Explain how to Communicate between two desktop computers.
- Implement the different protocols
- Implement and compare the various routing algorithms
- Demonstrate Program using sockets

**Unified Modelling Lab:**

- Understand the various Case studies
- Model Static View of a System using Use case diagram
- Model Dynamic View of a System using UML diagrams
- Represent user and programmatic interactions using UML

**Web Technologies Lab:**

- Create a static web pages using HTML and CSS and Develop JavaScript code for data validation
- Demonstrate how *XML* provides a standard method to access information
- Demonstrate database connectivity for developing web applications
- Summarize object oriented programming concepts

**IPR & Patents (Audit course):**

The students once they complete their academic projects, they get awareness of acquiring the patent and copyright for their innovative works. They also get the knowledge of plagiarism in their innovations which can be questioned legally.

# **INFORMATION TECHNOLOGY**

## **III Year IT Semester-I Course Outcomes:**

### **Human Computer Interaction:**

- Understand the basics of human and computational abilities and limitations
- Understand the fundamental aspects of designing and evaluating interfaces.
- Apply new theories, tools and techniques in HCI.
- To analyze and design software systems, components to meet desired needs.

### **Advanced Java Programming:**

- Develop advanced HTML pages with the help of tags and scripting language.
- Understand scope, life cycles, request and response headers.
- Construct a Web Application using Servlets
- Construct a Web application using Java Server Pages

### **Database Management Systems:**

- Describe ER model and normalization for database design.
- Create, maintain and manipulate a relational database using SQL
- Design and build database system for a given real world problem.
- Examine issues in data storage and query processing and can formulate appropriate solutions.

### **UNIX Programming:**

- Explain the architecture and features of UNIX Operating System and differentiate it from other Operating Systems
- Demonstrate UNIX commands for file handling and process control
- Build Regular expressions for pattern matching and apply them to various filters for a specific task
- Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem

### **Operating Systems:**

- Summarize various concepts of Operating Systems.
- Implement and Apply Process Scheduling Algorithms.
- Illustrate concepts of Paging, Segmentation and Apply Concurrency, Deadlock Mechanisms in real world.
- Analyze the concepts of file systems in operating systems.

### **Advanced Java Programming Lab:**

- After successful completion of course, students will be able appreciate and apply the advanced concepts of Java including JDBC, Servlets, JSP, Java Beans, etc.

### **UNIX and Operating Systems Lab:**

- To use Unix utilities and perform basic shell control of the utilities
- To use the UNIX file system and file access control.
- To use of an operating system to develop software
- Work confidently in Unix/Linux environment
- Write shell scripts to automate various tasks
- Master the basics of Linux administration

### **Database Management System Lab:**

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

### **Professional Ethics & Human Values:**

- Recognize importance of human values, harmony and ethical behavior in real life situations
- Describe the core values that shape the ethical behaviour of an engineer
- Recall basics of professional ethics and human values.
- Listing sustained happiness through identifying the essentials of human values and skills.
- Describe the practical importance of trust, mutually satisfying human behaviour and enriching interaction with nature



## **III Year IT Semester-II Course Outcomes:**

### **Computer Networks:**

- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP models
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation and understand routing and congestion control algorithms
- Analyze MAC layer protocols and LAN technologies

### **Web Technologies:**

- Understand HTML tags to design static web pages
- Describe the basic concepts of Java Scripts to design dynamic web pages
- Familiarize the concepts of PHP and AJAX
- Analyze a given problem and apply requisite appropriate tools for designing dynamic and interactive web applications

### **Software Testing Methodologies:**

- Understanding the purpose of Software Testing.
- Understand the Transaction Flow Testing and Dataflow testing
- Test the software using domain testing and Logic Based Testing
- Apply the software testing tools for real world applications

### **Program Elective – I:**

#### **Social Networks and Semantic Web:**

- Understand semantic web basics, architecture and technologies.
- Understand the semantic relationships among these data elements using Resource Description Framework (RDF).
- Design and implement a web services application that “discovers” the Data and/or other web services via the semantic web.
- Discover the capabilities and limitations of semantic web technology for social networks.

#### **Biometric Systems:**

- Identify the various Biometric technologies.
- Understand the need of biometric in the society
- Design of biometric recognition for the organization.
- Develop simple applications for privacy.

**Neural Networks:**

- Understanding of the technical potential of the learning and self organizing systems of today.
- Describe the assumptions behind, and the derivations of the ANN algorithms
- Learn Analysis of linear auto associative FF Networks
- Apply applications of Artificial Neural Networks to real world applications

**Operation Research:**

- Understand the methodology of Operations Research.
- Understand the Linear programming methods, duality, and sensitivity analysis.
- Apply Multi-criteria decision techniques.
- Create decision making under uncertainty and risk.

**Open Elective:**

**Artificial Intelligence:**

- Identify Methods in AI that may be suited to solving a given problem and Game Playing
- Analyze the basic issues of different types of knowledge representation techniques to build intelligent system
- Build Expert systems for real time applications
- Determination of uncertainty of data using different probability approaches for real time applications

**Digital Signal Processing:**

- Design, simulate and realize different digital filters.
- Estimate the spectra of signals that are to be processed by discrete time system and to verify the performance of various spectrum estimation techniques.
- Design multi rate digital signal processing system.
- Understand the architecture of DSP processor.

**Embedded Systems:**

- Categorize embedded systems and Summarize 8051 microcontroller architecture
- Identify the unique characteristics of real-time systems
- Apply synchronization tools in various real time scenarios
- Define the unique design problems and challenges of real-time systems

**Robotics:**

- Identify various robot configuration and components.
- Select appropriate actuators and sensors for a robot based on specific application.
- Carry out kinematic and dynamic analysis for simple serial kinematic chains.
- Perform trajectory planning for a manipulator by avoiding obstacles.

### **Data Mining Lab using WEKA:**

- The data mining process and important issues around data cleaning, pre-processing and integration
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.

### **Web Technologies Lab:**

- Students will be able to develop static web sites using XHTML and Java Scripts
- To implement XML and XSLT for web applications
- Develop Dynamic web content using Java Servlets and JSP
- To develop JDBC connections and implement a complete Dynamic web Application

### **Software Testing Lab:**

- Find practical solutions to the problems
- Solve specific problems alone or in teams
- Manage a project from beginning to end
- Work independently as well as in teams
- Define, formulate and analyze a problem

### **IPR & Patents:**

- IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
- Student gets an insight on Copyrights, Patents and Software patents which are instrumental for further advancements

**ELECTRONICS AND COMPUTER  
ENGINEERING**

## **III Year ECM Semester-I Course Outcomes:**

### **Linear IC Applications:**

- Understand basic operation and characteristics of op-amp.
- Interpret different linear and non-linear applications of Op-Amp.
- Design & analyze different types of active filters using Op-Amp.
- Compare different types of ADC and DACs.

### **Digital IC Applications:**

- Understand the various digital modulation techniques.
- Learn about various digital carrier modulation techniques.
- Apply various errors correction and detection codes to digital data.
- Evaluate the error probability calculations for digital modulation techniques available

### **Micro Processors & Micro Controllers:**

- Understand the concepts of architecture, memory organization of Intel 8086 microprocessor and Intel 8051 and PIC 16C6X/7X microcontrollers.
- Understand the concepts of addressing modes, instruction set of Intel 8086 microprocessor and Intel 8051 and ARM processor.
- Write assembly language programs for simple problem statements.
- Design an interface between peripheral chips & processors and write programs for data transfer.

### **Data Base Management Systems:**

- To develop an understanding of essential DBMS concepts involved in implementation of Database systems.
- Compare relational model with the structured query language (SQL).
- Design and build database system for a given real world problem.
- Examine issues in data storage and query processing and can formulate appropriate solutions.

### **Python Programming:**

- Install Python IDE and run basic Python scripts.
- Understand the operators, functions, key Concepts of Object Oriented Programming in python.
- Access Python from various online resources and import packages to the current working environment.
- Develop front end GUI using Visualization Libraries and Multithreading techniques.

### **Python Programming Lab:**

- Understand how to write, test, and debug simple Python programs.
- Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python Develop Python programs step-wise by defining functions and calling them..
- Express different Decision Making statements and Functions
- Understand and summarize different File handling operations
- Explain how to design GUI Applications in Python and evaluate different database operations.

### **Data Base Management Systems Lab:**

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Populate and query a database using SQL DML/DDDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.

### **IPR & Patents:**

- IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
- Student gets an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

## **III Year ECM Semester-II Course Outcomes:**

### **VLSI Design:**

- Describe the fabrication process for MOS,CMOS and BICMOS technologies along with their electrical properties.
- Outline the concepts of design rules during the layout design.
- Model various scaling Models and factors and their effects on MOSFET parameters.
- Examine various design issues of VLSI Circuits and illustrate FPGA Design

### **Design and Analysis of Algorithms:**

- Able to analyze the performance of an algorithm in terms of time and space.
- Give an intuition on how to find a solution to large problems by dividing them into smaller sub problems.
- Identifying which designing technique can be used to solve a particular problem.
- Knowing how to explore the solution space by using Branch and Bound technique.

### **Digital Signal Processing:**

- Design, simulate and realize different digital filters.
- Estimate the spectra of signals that are to be processed by discrete time system and to verify the performance of various spectrum estimation techniques.
- Design multi rate digital signal processing system.
- Understand the architecture of DSP processor.

### **Web Design:**

- Understand HTML tags to design static web pages.
- Describe the basic concepts of Java Scripts to design dynamic web pages.
- Familiarize the concepts of PHP and AJAX.
- Analyze a given problem and apply requisite appropriate tools for designing dynamic and interactive web applications.

### **Open Elective-I:**

#### **Software Project Management:**

- To match organizational needs to the most effective software development model. To understand the basic concepts and issues of software project management
- To effectively planning the software projects. To implement the project plans through managing people, communications and change.
- To select and employ mechanisms for tracking the software projects To conduct activities necessary to successfully complete and close the Software projects.
- To develop the skills for tracking and controlling software deliverables. To create project plans that address real-world management challenges.

### **Robotics:**

- Identify various robot configuration and components.
- Select appropriate actuators and sensors for a robot based on specific application.
- Carry out kinematic and dynamic analysis for simple serial kinematic chains.
- Perform trajectory planning for a manipulator by avoiding obstacles.

### **Bio-Medical Engineering:**

- Man instrument system and types of electrodes and transducers to extract biopotential signals
- Anatomy of heart, lungs, eye and ears. Devices to do tests on heart, lungs, eye and ears.
- Diagnose & Monitor the health of patient in intensive care unit.
- Monitors, recorders and electrical accident prevention methods

### **UNIX Programming:**

- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
- Testing will demonstrate both black and glass box testing strategies.
- Project work will involve group participation.

### **Open Elective –II (CBCS)(MOOCS)**

(Note: Courses may be varied depending upon the availability at that time)

### **Web Design Lab:**

- Analyze a web page and identify its elements and attributes.
- Build static and dynamic web pages using HTML and CSS.
- Develop client side manipulations in web pages using Java Script.
- Understanding various applications to implement in JDBC.