

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)  
Bachelor of Technology**

**Department of Civil Engineering (R20)**

I B. Tech. – I Sem

**(20HS0830)ALGEBRA AND CALCULUS**

**COURSE OUTCOMES (COs)**

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

1. Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
2. Utilize mean value theorems to real life problems.
3. Familiarize with functions of several variables which is useful in optimization.
4. Learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional coordinate systems.
5. Interpret the physical meaning of different operators such as gradient, curl and divergence.
6. Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.

**(20HS0848) ENGINEERING PHYSICS**

**COURSE OUTCOMES (COs)**

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

1. Analyze the differences between interference and diffraction with applications.
2. Apply the Bragg's Law for crystal structure for the determination by X-rays.
3. Explain applications of acoustics and ultrasonicsin various engineering fields.
4. Explain the importance of various mechanical properties of solids.
5. Explain the basic properties and applications of superconductors in various fields.
6. Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterials in various engineering applications

**(20ME0351) BASIC ELECTRICAL &MECHANICAL ENGINEERING**

**COURSE OUTCOMES (COs)**

On successful completion of this course, the students will be able to

1. State various laws in Electrical Engineering and explain the operation of networks
2. Recognize the importance of different network theorems and explicate its applications in two port networks.
3. Interpret the principle operation of DC motors and derive an EMF equation for the transformers.
4. Classify various casting and metal joining processes in the manufacturing processes
5. Distinguish the types of machines in the manufacturing and elucidate the machining operations
6. Categorize the automobile engines and refrigeration& Air-conditioning systems

**(20CS0501) C and DATA STRUCTURES**

**COURSE OUTCOMES (COs)**

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

1. Recognize the programming elements of C Programming language
2. Select the control structure for solving the problem
3. Apply modular approach for solving the problem
4. Solve mathematical problems using C Programming language
5. Develop the applications using stacks and queues
6. Construct the linked lists for various applications and perform sorting techniques

#### (20CE0101)CIVILENGINEERING MATERIALS

##### COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. Classify stones and describe process of stone quarrying
2. Classify bricks and tiles, describe manufacturing process of bricks and tiles and can estimate the quality of bricks and tiles
3. Explain properties of cement and its product and can conduct tests on cement, mortar and concrete
4. Explain characteristics of good, describe seasoning of wood, estimate quality of wood and can conduct tests on wood
5. Describe the properties, tests and applications of various metallic, non-metallic and synthetic materials used for construction
6. Discuss properties, tests related to bitumen and road aggregates

#### (20HS0850)ENGINEERING PHYSICS LAB

##### COURSE OUTCOMES (COs)

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

1. Operate various optical instruments.
2. Estimate wavelength of laser and particles size using laser.
3. Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.
4. Evaluate the acceptance angle of an optical fiber and numerical aperture.
5. Determine energy loss by B-H curve.
6. Evaluate rigidity modulus of a given wire.

#### (20ME0352)BASIC ELECTRICAL AND MECHANICAL ENGINEERING LAB

##### COURSE OUTCOMES (COs)

Students undergoing this course can

1. List few Basics in Electrical Engineering
2. Explain steps in Pattern making, Casting & Moulding
3. Produce a Lap & Butt joint using Arc Welding
4. Carryout Drilling & Tapping operation on a given workpiece
5. Describe Cylindrical & Surface Grinding operation
6. Understand about Shaping & Slotting Operation

## (20CS0502) C and DATA STRUCTURES LAB

### COURSE OUTCOMES (COs)

On Successful completion of this course, the student will be able to

1. Read, understand and trace the execution of programs written in C language
2. Develop C programs for simple applications making use of basic constructs, arrays and strings
3. Develop C programs involving functions, recursion, pointers, and structures
4. Select the data structure appropriate for solving the problem
5. Illustrate the working of stack and queue
6. Implement searching and sorting algorithms

I B. Tech. – II Sem

## (20HS0831) DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS

### COURSE OUTCOMES (COs)

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

1. Classify the differential equations with respect to their order and linearity.
2. Solve the differential equations related to various engineering fields.
3. Identify solution methods for partial differential equations that model physical processes.
4. Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions.
5. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.
6. Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integral formula (relationship between the derivative and the contour integral of a function).

## (20HS0804) ENGINEERING CHEMISTRY

### COURSE OUTCOMES (COs)

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

1. Explain the principles of reverse osmosis and electro dialysis
2. Apply Nernst equation for calculating electrode and cell potentials.
3. Differentiate between thermoplastics and thermosetting plastics.
4. Explain the setting and hardening of cement and concrete phase.
5. Explain the synthesis of colloids with examples.
6. Acquire spotlight to the nano materials and basic engineering materials used in academics, industry and daily life

## (20HS0810) COMMUNICATIVE ENGLISH

### COURSE OUTCOMES (COs)

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

1. To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
2. To ask and answer general questions on familiar topics and introduce oneself/others
3. To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
4. To recognize paragraph structure and be able to match beginnings/endings/headings with

paragraphs

5. To form sentences using proper grammatical structures and correct word forms
6. To use effective sentence structure for their professional activities

#### (20ME0301) ENGINEERING GRAPHICS

##### COURSE OUTCOMES (COs)

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

1. Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.
2. Know the projection of points and implement the same in the construction of projection of lines and planes.
3. Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.
4. Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.
5. Understand the basic principles of isometric and Orthographic Projections.
6. Construct the isometric and orthographic projections of simple objects.

#### (20CE0102) ENGINEERING MECHANICS

##### COURSE OUTCOMES (COs)

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

1. Explain basic principles of statics and can apply them for various force systems
2. Describe the equilibrium conditions and analyze various types of frames
3. Describe the principals associated with centroid, centre of gravity, moment of inertia and apply these principals evaluate them for various two dimensions geometric sections
4. Explain fundamental principles of deformable bodies and compute various types of stress, strain and elastic constants
5. Analyze thin and thick cylinders subjected internal and external forces for stress
6. Describe shear force and bending moment for statically determinate beams for various loading conditions and draw shear force and bending moment diagrams

#### (20HS0805)ENGINEERING CHEMISTRY LAB

##### COURSE OUTCOMES (COs)

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

1. Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.
2. Prepare advanced polymer materials
3. Estimate the Iron in cement
4. Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.
5. Think innovatively and improve the creative skills that are essential for solving engineering problems
6. At the end of the course the students learn the alkalinity, acidity and viscosity of the any solutions

### **(20HS0811) COMMUNICATIVEENGLISHLAB**

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

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

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional Settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
6. Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

### **(20ME0302) WORKSHOP PRACTICE LAB**

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

Upon Completion of the course the students will be able to

1. Describe the different types of wood and carpentry joints
2. Produce Tapered Tray and Conical funnel using sheet metal
3. Understands about Fitting and Electrical Wiring
4. Identify various peripherals of a computer
5. Explain the procedure to install MS Windows & Linux
6. Understand about Productivity tools & Networking

### **(20HS0816) INDIAN CONSTITUTION**

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

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

1. Explain the key concepts of political economy
2. Analyze the significant developments in the political ideologies
3. Describe the salient features of the constitution of India interpret, integrate and critically
4. Analyze the political economy of Indian international relations and gain knowledge in Judiciary system
5. Apply their knowledge and skills acquired to write various competitive examinations
6. Analyze the constitutional rights in relating to practical life

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY::**  
**PUTTUR(AUTONOMOUS)**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

I B.Tech.-I Sem.

**(20HS0830) ALGEBRA AND CALCULUS**

**COURSEOUTCOMES**

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

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- Utilize mean value theorem to solve real life problems.
- Familiarize with functions of several variables which is useful in optimization.
- Learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional coordinate systems.
- Interpret the physical meaning of different operators such as gradient, curl and divergence.
- Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.

**(20HS0802) APPLIED CHEMISTRY**

**COURSEOUTCOMES(COs)**

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

- Apply Nernst equation for calculating electrode and cell potentials
- Illustrate the molecular orbital energy level diagram of different molecular species
- Explain the different types of polymers and their synthesis.
- Synthesis of plastics, elastomers, conducting polymers and their applications in our daily life
- Comprehend the principles and applications of spectroscopies.
- Acquires spotlight to the nanomaterials and basic engineering materials used in academics, industry and daily life.

**(20HS0810) COMMUNICATIVE ENGLISH**

**COURSEOUTCOMES(COs)**

- On successful completion of this course, the student will be able
- To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
- To ask and answer general questions on familiar topics and introduce oneself/others.
- To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
- To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.
- To form sentences using proper grammatical structures and correct word forms.
- To use effective sentence structure for their professional activities.

**(20ME0353) THERMAL AND FLUID ENGINEERING**

**COURSEOUTCOMES**

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

- Describe the different types of powerplants.
- Explain the various properties of thermodynamics system.

- Recognize the importance of Boiler mountings & Boiler accessories for the power generation
- List the different types of fluid flows.
- Understand various types of Pressure and pressure measuring instruments.
- Describe various types in Hydraulic Turbines.

### (20ME0301) ENGINEERING GRAPHICS

#### **COURSE OUTCOMES**

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

- Interpret the engineering drawing fundamental to draw the curves like ellipse, cycloid and Involutes.
- Know the projection of points and implement the same in the construction of projection of lines and planes.
- Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.
- Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.
- Understand the basic principles of Isometric and Orthographic Projections.
- Construct the isometric and orthographic projections of simple objects.

### (20HS0803) APPLIED CHEMISTRY LAB

#### **COURSE OUTCOMES**

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

- Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.
- Prepare advanced polymer materials
- Estimate the Iron incement
- Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.
- Think innovatively and improve the creative skills that are essential for solving engineering problems

### (20HS0811) COMMUNICATIVE ENGLISH LAB

#### **COURSE OUTCOMES**

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

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings.
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
- Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

### (20ME0354) THERMAL AND FLUID ENGINEERING LAB

## **COURSEOUTCOMES**

- Onsuccessful completion ofthecourse thestudentswill be ableto
- ExplaintheneedofBoilersandalso listvariousclassifications ofboiler.
- DescribetheworkingofWatertubeand Firetube boilers.
- StateandverifyBernoulli“stheorem.
- Computedischargeoffluid flowingthroughVenturimeter andOrificemeter.
- Carryoutanexperimenton Turbineflowmeter.
- Findsthefriction factorfor agiven pipeline.

I B.Tech.–IISem.

## (20HS0831)DIFFERENTIALEQUATIONSANDCOMPLEXANALYSIS

### **COURSEOUTCOMES(COs)**

Onsuccessfulcompletionofthiscourse, thestudentwillbeableto

- Classify the differential equations with respect to their order and linearity.Solvethedifferential equationsrelated to various engineeringfields.
- Identify solution methods for partial differential equations that model physicalprocesses.
- Students will become familiar with 3- dimensional coordinate systems andalsolearn theutilizationof special functions.
- Understandthesignificanceofdifferentiabilityforcomplexfunctionsandbefamiliar with the Cauchy-Riemannequations.
- RecognizeandapplytheCauchy“sintegralformulaandthegeneralized
- Cauchy“sintegralformula(relationshipbetweenthedervativeandthecontourintegral afuction).

## (20HS0849)APPLIEDPHYSICS

### **COURSEOUTCOMES(COs)**

Onsuccessfulcompletionofthiscourse, studentwillbeableto

- Analyzethedifferencesbetweeninterferenceanddiffractionwithapplications.
- ExplainconceptsoffreeelectrontheoryandenergybandsinsolidsandassesstheEMwavepropagation in non-conducting medium byusing MaxwellEquations.
- Explainthebasicprinciplesandproperties ofLasers andOpticalFibers.
- Identifytheapplicationsofsemiconductorsinelectronicdevices
- Explainthebasicpropertiesandapplicationsofsuperconductorsinvariousfields.
- Illustrate methods for synthesis and characterization of nanomaterial’s and apply basicprinciplesofnanomaterial’sin various engineeringapplications.

## (20CS0501)C PROGRAMMING AND DATASTRUCTURES

### **COURSEOUTCOMES (COs)**

Onsuccessfulcompletionofthiscourse, thestudentwillbeableto

- Recognizetheprogrammingelements ofClanguage
- Selectthecontrolstructurefor solvingthe problem
- Applymodular approachfor solving the problem
- Solvemathematical problems usingC Programminglanguage
- Developtheapplicationsusingstacksandqueues
- Constructthe linkedlistsforvarious applicationsand performsorting techniques

## (20EE0201)FUNDAMENTALSOFELECTRICALCIRCUITS

## **COURSEOUTCOMES(COs)**

Onsuccessfulcompletionofthiscourse, thestudentwillbeableto

- AnalyzeDCcircuitsusingdifferentmethods.
- AnalyzeAC circuitsand applyappropriate Networktheoremfor solvingelectricCircuits
- Understandseries andparallel resonanceconcepts and analyzecoupled circuits.
- Understandmagneticallycoupledcircuits
- Formulate network matrices using network topology and understand the concept ofduality.
- Understandtheconceptsof KVLandKCL

## (20EC0402)ELECTRONICDEVICESANDCIRCUITS

## **COURSEOUTCOMES(COs)**

Onsuccessfulcompletionof thiscourse, thestudentwillbe ableto

- Demonstrate the characteristics of PN Junction Diode, Rectifiers, Filters, BJT, JFET, MOSFET and special purpose electronic devices.
- Analyze numerical and analytical problems in Rectifiers, Filters, Transistor biasing circuits and Transistor amplifiers.
- Design and develop electronic circuitssuchas Rectifiers with and without filters, Transistor biasing circuits and Transistor amplifiers.
- Solve engineering problems and arrive at solutions relating to electronic devices and circuits.
- Identify a suitable semiconductor device and transistor for any given specification.
- Select suitable technique for transistor modelling.

## (20HS0851)APPLIEDPHYSICSLAB

## **COURSEOUTCOMES(COs)**

Onsuccessful completion of thiscourse, studentwillbeableto

- Operate various optical instruments.
- Estimate wavelength of laser and particles size using laser.
- Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.
- Evaluate the acceptance angle of an optical fiber and numerical aperture.
- Determine energy loss by B-H curve.
- Evaluate rigidity modulus of a given wire.

## (20CS0502)C PROGRAMMING AND DATASTRUCTURESLAB

## **COURSEOUTCOMES(COs):**

OnSuccessful completion of this course, thestudent willbe ableto

- Read, understand and trace the execution of programs written in C language
- Develop C programs for simple applications making use of basic constructs, arrays and strings
- Develop C programs involving functions, recursion, pointers, and structures
- Select the data structure appropriate for solving the problem
- Illustrate the working of stack and queue
- Implement searching and sorting algorithms

## (20ME0302)WORKSHOPPRACTICELAB

## **COURSEOUTCOMES**

Upon Completion of the course the students will be able to

- Describethedifferent typesof woodandcarpentry joints.
- Produce Tapered TrayandConical funnelusingsheetmetal.
- UnderstandsaboutFittingandElectrical Wiring.
- Identifyvariousperipherals ofacomputer.
- Explainthe proceduretoinstallMS Windows&Linux.
- Understandabout Productivitytools&Networking.

#### (20HS0816)INDIANCONSTITUTION

#### **COURSEOUTCOMES(COs)**

Onsuccessfulcompletionofthiscourse, thestudentwillbeableto

- Explainthekeyconceptsof politicaledconomy.
- Analyseshesignificantdevelopmentsinthe politicalideologies.
- Describetheresalient featuresof theconstitution ofIndia interpret,integrateand critically.
- Analysethe politicaledconomyof Indianinternationalrelationsandgainknowledgein Judiciarysystem.
- Applytheir knowledgeand skillsacquired towritevariouscompetitiveexaminations.
- Analyse the constitution alright in relating to Practical life.

### SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS) Bachelor of Technology

#### Department of Mechanical Engineering

#### I B. Tech. – I Semester (M.E)

#### (20HS0830) ALGEBRA AND CALCULUS

#### **COURSE OUTCOMES**

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

1. Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
2. Utilize mean value theorems to real life problems.
3. Familiarize with functions of several variables which is useful in optimization.
4. Learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional coordinate systems
5. Interpret the physical meaning of different operators such as gradient, curl and divergence.
6. Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.

#### (20HS0804) ENGINEERING CHEMESTERY

#### **COURSE OUTCOMES**

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

1. Explain the principles of reverse osmosis and electro dialysis.
2. Apply Nernst equation for calculating electrode and cell potentials.

3. Differentiate between thermoplastics and thermosetting plastics.
4. Explain the setting and hardening of cement and concrete phase.
5. Explain the synthesis of colloids with examples.
6. Acquire spotlight to the nanomaterials and basic engineering materials used in academics, industry and daily life.

#### (20HS0810) COMMUNICATIVE ENGLISH

#### COURSE OUTCOMES

1. To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
2. To ask and answer general questions on familiar topics and introduce oneself/others.
3. To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
4. To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.
5. To form sentences using proper grammatical structures and correct word forms.

#### (20EE0251) BASIC ELECTRICAL& ELECTRONICS ENGINEERING

#### COURSE OUTCOMES

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

1. Determine the equivalent impedance of a given network by using network reduction techniques.
2. Calculate the voltage and current for a given particular network by using KCL&KVL.
3. Analyze the working operation & characteristics of DC generators.
4. Understand the construction of DC motors and transformer.
5. Analyze the operating principles of major electronic devices, its characteristics and application
6. Design and analyze the DC bias circuitry of BJT and FET.

#### (20ME0301) ENGINEERING GRAPHICS

#### COURSE OUTCOMES

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

1. Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.
2. Know the projection of points and implement the same in the construction of projection of lines and planes.
3. Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.
4. Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.
5. Understand the basic principles of isometric and Orthographic Projections.
6. Construct the isometric and orthographic projections of simple objects.

#### (20HS0805) ENGINEERING CHEMESTRY LAB

#### COURSE OUTCOMES

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

1. Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.

2. Prepare advanced polymer materials
  3. Estimate the Iron in cement
  4. Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.
  5. Think innovatively and improve the creative skills that are essential for solving engineering problems
  6. At the end of the course the students learn the alkalinity, acidity and viscosity of the any solutions.
- (20HS0811) COMMUNICATIVE ENGLISH LAB

#### COURSE OUTCOMES

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional Settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
6. Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

(20EE0252) BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

#### COURSE OUTCOMES

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

1. Students will understand all the fundamental components about electrical Engineering and Electronics Engineering.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical and electronic measuring instruments.
4. Understand the basic characteristics of transformers and electrical machines.

(20HS0831) DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS

#### COURSE OUTCOMES

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

1. Classify the differential equations with respect to their order and linearity.
2. Solve the differential equations related to various engineering fields.
3. Identify solution methods for partial differential equations that model physical processes.
4. Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions.
5. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.
6. Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integral formula (relationship between the derivative and the contour integral of a function).

(20HS0848) ENGINEERING PHYSICS

#### COURSE OUTCOMES

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

1. Analyze the differences between interference and diffraction with applications.
2. Apply the Bragg's Law for crystal structure determination by X-rays.
3. Explain applications of acoustics and ultrasonics in various engineering fields.
4. Explain the importance of various mechanical properties of solids.

5. Explain the basic properties and applications of superconductors in various Fields.
6. Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterials in various engineering applications.

### (20CS0501) C Programming and DATA STRUCTURES

#### COURSE OUTCOMES (COs)

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

1. Recognize the programming elements of C language
2. Select the control structure for solving the problem
3. Apply modular approach for solving the problem
4. Solve mathematical problems using C Programming language
5. Develop the applications using stacks and queues
6. Construct the linked lists for various applications and perform sorting techniques

### (20ME0303) BASIC THERMODYNAMICS

#### COURSE OUTCOMES

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

1. State and explain the open and closed systems as well as develop and apply continuity equation for them.
2. Describe the Basic concepts of thermodynamics such as temperature, pressure, system, Properties, process, state, cycles and equilibrium.
3. Explain the Basic laws of thermodynamics and their applications.
4. Interpret the Concepts of enthalpy, entropy and other thermodynamic properties of ideal gas Process.
5. Analyze Thermodynamic cycles and behavior of pure substances, usage of steam tables and Mollier chart in solving steam related problems.
6. Summarize various types of boilers, their construction, working and their applications.

### (20CE0102) ENGINEERING MECHANICS

#### COURSE OUTCOMES

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

1. Explain basic principles of statics and can apply them for various force systems
2. Describe the equilibrium conditions and analyze various types of frames
3. State the laws of friction and apply them to wedges, screw jack, ladder and other fiction dominant mechanical systems to study their behavior
4. Describe the principals associated with centroid, centre of gravity, moment of inertia and apply these principals evaluate them for various two dimensions geometric sections
5. Explain fundamental principles of deformable bodies and compute various types of stress, strain and elastic constants
6. Analyze thin and thick cylinders subjected internal and external forces for stress

### (20HS0850) ENGINEERING PHYSICS LAB

#### COURSE OUTCOMES

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

1. Operate various optical instruments.
2. Estimate wavelength of laser and particles size using laser.
3. Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.
4. Evaluate the acceptance angle of an optical fiber and numerical aperture.
5. Determine energy loss by B-H curve.
6. Evaluate rigidity modulus of a given wire.

(20CS0502) C Programming and DATA STRUCTURES LAB

#### COURSE OUTCOMES

On Successful completion of this course, the student will be able to

1. Read, understand and trace the execution of programs written in C language
2. Develop C programs for simple applications making use of basic constructs, arrays and strings
3. Develop C programs involving functions, recursion, pointers, and structures
4. Select the data structure appropriate for solving the problem
5. Illustrate the working of stack and queue
6. Implement searching and sorting algorithms

(20ME0302) WORKSHOP PRACTICE LAB

#### COURSE OUTCOMES

Upon Completion of the course the students will be able to

1. Describe the different types of wood and carpentry joints.
2. Produce Tapered Tray and Conical funnel using sheet metal.
3. Understands about Fitting and Electrical Wiring.
4. Identify various peripherals of a computer.
5. Explain the procedure to install MS Windows & Linux.
6. Understand about Productivity tools & Networking.

(20HS0816) INDIAN CONSTITUTION

#### COURSE OUTCOMES

1. Explain the key concepts of political economy.
2. Analyze the significant developments in the political ideologies.
3. Describe the salient features of the constitution of India interpret, integrate and critically.
4. Analyze the political economy of Indian international relations and gain knowledge in Judiciary system.
5. Apply their knowledge and skills acquired to write various competitive examinations.
6. Analyse the constitutional rights in relating to Practical life.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Bachelor of Technology

**Department of Electronics and Communication Engineering**

I B. Tech. – I Semester (E.C.E)

(20HS0830) ALGEBRA AND CALCULUS

(Common to All branches)

**Course Outcomes:**

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

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- Utilize mean value theorems to real life problems.
- Familiarize with functions of several variables which is useful in optimization.
- Learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems.
- Interpret the physical meaning of different operators such as gradient, curl and divergence.
- Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.

**(20HS0802) APPLIED CHEMISTRY**

**Course Outcomes:**

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

- Apply Nernst equation for calculating electrode and cell potentials
- Illustrate the molecular orbital energy level diagram of different molecular species
- Explain the different types of polymers and their synthesis.
- Synthesis of plastics, elastomers, conducting polymers and their applications in our daily life
- Comprehend the principles and applications of spectroscopies.
- Acquire spotlight to the nanomaterials and basic engineering materials used in academics, industry and daily life.

**(20HS0810) COMMUNICATIVE ENGLISH**

(Common to EEE, MECH & ECE)

**Course Outcomes:**

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

- Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
- Ask and answer general questions on familiar topics and introduce oneself/others.
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.
- Form sentences using proper grammatical structures and correct word forms.
- Use effective sentence structure for their professional activities.

**(20EE0253) PRINCIPLES OF ELECTRICAL CIRCUITS**

**Course Outcomes:**

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

- Formulate the equations of the electric circuits using basic laws
- Determine the response of DC circuits using basic analysis methods
- Compute the response of DC circuits using network theorems
- Analyze the transient behavior of electric circuits with different types of source
- Describe the elements of AC circuits and the phasor concept
- Solve simple two port networks

**(20ME0301) ENGINEERING GRAPHICS**

(Common to all branches)

**Course Outcomes:**

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

7. Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.
8. Know the projection of points and implement the same in the construction of projection of lines and planes.
9. Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.
10. Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.
11. Understand the basic principles of isometric and Orthographic Projections.
12. Construct the isometric and orthographic projections of simple objects.

**(20HS0803)APPLIED CHEMISTRY LAB**

**Course outcomes:**

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

- Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.
- Prepare advanced polymer materials
- Estimate the Iron in cement
- Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.
- Think innovatively and improve the creative skills that are essential for solving engineering problems
- At the end of the course the students learns the alkalinity, acidity and viscosity of the any solutions.
- 

**(20HS0811) COMMUNICATIVE ENGLISH LAB**

(Common to EEE,MECH& ECE)

**Course outcomes:**

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

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional Settings.
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
- Use effective communicative approaches by preparing job application, report and other
  - kinds of writing correspondences.

#### (20ME0302) WORKSHOP PRACTICE LAB

(Common to all branches)

Course outcomes:

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

- Describe the different types of wood and carpentry joints.
- Produce Tapered Tray and Conical funnel using sheet metal.
- Understands about Fitting and Electrical Wiring.
- Identify various peripherals of a computer.
- Explain the procedure to install MS Windows & Linux.
- Understand about Productivity tools & Networking.

#### (20HS0831) DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS

(Common to: CIVIL,EEE,ME& ECE)

Course Outcomes:

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

- Classify the differential equations with respect to their order and linearity.
- Solve the differential equations related to various engineering fields.
- Identify solution methods for partial differential equations that model physical processes.
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions.
- Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.
- Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integral formula (relationship between the derivative and the contour integral of a function).

I B.Tech- II Sem

## **(20HS0849) APPLIED PHYSICS**

**Course Outcomes:**

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

- Analyze the differences between interference and diffraction with applications.
- Explain concepts of free electron theory and energy bands in solids and asses the EM wave propagation in non-conducting medium by using Maxwell Equations.
- Explain the basic principles and properties of Lasers and Optical Fibers.
- Identify the applications of semiconductors in electronic devices
- Explain the basic properties and applications of superconductors in various fields.
- Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterials in various engineering applications.

## **(20CS0501) C PROGRAMMING AND DATA STRUCTURES**

(Common to EEE, MECH and ECE)

**Course Outcomes:**

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

- Recognize the programming elements of C language
- Select the control structure for solving the problem
- Apply modular approach for solving the problem
- Solve mathematical problems using C Programming language
- Develop the applications using stacks and queues
- Construct the linked lists for various applications and perform sorting techniques

## **(20EC0401) FUNDAMENTALS OF DIGITAL COMPUTING SYSTEMS**

**Course Outcomes:**

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

- Understand the evolution of computers and its applications.
- Understand the need of different computer architectures and role of system architect for it.
- Analyze various system architectures used in the real-world applications.
- Familiarize with various number systems, their representation and conversion techniques.
- Understand various data formats that can be given to the computer for processing.
- Solve the Arithmetic examples based on Binary arithmetic.

## **(20EE0254) ELECTRICAL TECHNOLOGY**

**Course Outcomes:**

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

- To analyse the performance of DC generators and motors
- To analyze the speed control of DC motors.

- To analyze the characteristics of DC machines.
- To analyze the performance of transformers
- To analyze the performance of three phase inductionmotors.
- To analyze the performance of three phase alternators.
- Conduct O.C, S.C tests and predetermine the regulation and efficiency of transformer.

#### (20HS0851) APPLIED PHYSICS LAB

**Course Outcomes:**

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

- Operate various optical instruments.
- Estimate wavelength of laser and particles size using laser.
- Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.
- Evaluate the acceptance angle of an optical fiber and numerical aperture.
- Determine energy loss by B-H curve.
- Evaluate rigidity modulus of a given wire.

#### (20CS0502) C PROGRAMMING AND DATA STRUCTURES LAB

**Course Outcomes:**

On Successful completion of this course, the student will be able to

- Read, understand and trace the execution of programs written in C language
- Develop C programs for simple applications making use of basic constructs, arrays and strings
- Develop C programs involving functions, recursion, pointers, and structures
- Select the data structure appropriate for solving the problem
- Illustrate the working of stack and queue
- Implement searching and sorting algorithms

#### (20EE0255) ELECTRICAL TECHNOLOGY LAB

#### (20HS0816) INDIAN CONSTITUTION

(Common to All Branches)

**Course Outcomes:**

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

- Explain the key concepts of political economy.
- Analyse the significant developments in the political ideologies.
- Describe the salient features of the constitution of India interpret, integrate and critically.
- Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.
- Apply their knowledge and skills acquired to write various competitive examinations.

- Analyse the constitutional rights in relating to Practical life.

### (19HS0834) NUMERICAL METHODS AND TRANSFORMS

#### Course Outcomes:

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

- To develop the mathematical skills of the students in the areas of numerical methods.
- Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.
- Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
- Calculate the Laplace transform of standard functions both from the definition and by using tables.
- Students will be able to comprehend basic systems properties and signals.
- Students will be able to apply Fourier analysis to periodic and aperiodic signals

### (19EE0242) NETWORK THEORY

#### Course Outcomes:

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

- Understand basics electrical circuits with nodal and mesh analysis.
- Solve the given circuit with various theorems and methods.
- Determine the transient response of R-L, R-C, R-L-C circuits for d.c and a.c excitations.
- Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources.
- Learn the various parameters and their interrelationship, able to solve numerical with series, cascade, and parallel connection using two port parameters.
- Design different types of filters.

### (19EC0402) ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE and ECE)

#### Course Outcomes:

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

- Demonstrate the characteristics of PN Junction Diode, Rectifiers, Filters, BJT, JFET, MOSFET and special purpose electronic devices.
- Analyze numerical and analytical problems in Rectifiers, Filters, Transistor biasing circuits and Transistor amplifiers.
- Design and develop electronic circuits such as Rectifiers with and without filters, Transistor biasing circuits and Transistor amplifiers.
- Solve engineering problems and arrive at solutions relating to electronic devices and circuits.
- Identify a suitable semiconductor device and transistor for any given specification.
- Select suitable technique for transistor modelling.

## (19EC0403) SIGNALS, SYSTEMS AND RANDOM PROCESSES

### Course Outcomes:

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

- Analyze different types of signals.
- Represent continuous systems in time and frequency domain using different transforms.
- Investigate the system stability.
- Understand the concept of convolution of signals.
- Understand and Analyze the Laplace Transform and ROC.
  - A student will be able to determine the temporal and spectral characteristics

## (19CE0136) WATER TECHNOLOGY

### (Open Elective-I) Course Outcomes:

### Course Outcomes:

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

- Underline the importance of water and describe the mechanism of hydrological cycle.
- Describe various elements associated with public water supply.
- Describe water quality criteria and standards, and their relation to public health.
- Recognize the cause of water pollution and influence of climatic changes on water resources.
- Summarize various water conservation techniques in practice.
- Explain need for watershed management and implement various Plans for watershed management.

## (19EE0238) GENERATION OF ENERGY THROUGH WASTE

### Course Outcomes:

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

- Analyse agro based, forest residue and industrial waste conversion processes.
- Manufacture of Pyrolytic oils and gases
- Manufacture of charcoal, yields and applications
- Understand various types of gasifiers operation
- Understand inclined and fluidized bed combustors operation
- Understand types of biogas plants and biomass energy programme in India

## (19ME0349) FUNDAMENTALS OF MECHANICAL ENGINEERING

### Course Outcomes:

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

- List the types of Engineering materials and also describe alloying, Heat treatment Processes.
- Recognize the importance of IC Engines in automobiles and the classification of

- air compressors
- Distinguish various types of air conditioning systems for house and Industrial applications
- Explicate the working of various Power plants like nuclear, Hydro & thermal powerplants
- Classify various types modern machining processes and determine the best suitable process to machine a component.
- Apply the working principles of CAD, CAM and CIM in the operation of Robotic manufacturing and quality control systems

### (19CS0549) LINUX PROGRAMMING

(Open Elective – I)

#### Course Outcomes:

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

- Understand the basic set of commands and editors in Linux operating system.
- Implement and execute various shellscripts.
- Work with filters, pipes and user communication, Vi-Editor commands.
- Execute various commands related to regular expressions
- Implement kornshell programming
- Execute commands related to C shell.

### (19HS0813) MANAGEMENT SCIENCE

#### Course Outcomes:

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

- Utilize appropriate theoretical frameworks to real life business and managerial problems.
- Identify appropriate operational risks and develop appropriate responses to them.
- Apply human resource principles to recruit, select and manage employees to achieve organizational goals.
- Enact strategy, including contingent plans for the effective management of the organization.
- Identify, plan, and implement the projects and evaluate the performance of the projects.
- Analyze effective application of latest developments to diagnose and solve organizational problems.

### (19EC0404) SWITCHING THEORY AND LOGIC DESIGN LAB

(Common to EEE and ECE)

#### Course Outcomes:

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

- Verify the operation of Logic gates, combinational and Sequential circuits
- Construct basic combinational circuits and verify their functionalities.
- Apply the design procedures in designing basic sequential circuits.
- Understand the functionality of counters.
- Understand the sequencing of Shift registers.

- Construct various digital circuits and verify their operation.

### (19EC0405) ELECTRONIC DEVICES AND CIRCUITS LAB

(Common to EEE and ECE)

#### Course Outcomes:

On successful completion of this course the students will be able to

- Demonstrate knowledge in different electronic devices and analog circuits.
- Analyze the characteristics of different electronic devices and circuits like Diodes-PN Junction Diode, Zener Diode and Transistors-BJT,FET.
- Design and develop electronic circuits like rectifiers, clippers, clamps, BJT and FET Amplifiers.
- Solve engineering problems with better Electronic circuits.
- Function effectively as an individual and as a member in a group in the area of electronic devices and circuits.
- Develop skills to communicate verbally and in written form in the area of electronic devices and circuits.

### (19EC0406) BASIC SIMULATION LAB

#### Course Outcomes:

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

- Analyze various types of signals and sequences.
- Apply convolution and correlation operations on different signals.
- Determine the response of an LTI system to given signals.
- Plot and analyze the spectrum of a given signal using MATLAB.
- Verify the Sampling theorem.
- Compute various statistical properties of a random noise.

### (19HS0816) INDIAN CONSTITUTION

#### Course Outcomes:

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

- Explain the key concepts of political economy.
- Analyse the significant developments in the political ideologies.
- Describe the salient features of the constitution of India interpret, integrate and critically.
- Analyse the political economy of Indian international relations and gain knowledge in Judiciary
- system.
- Apply their knowledge and skills acquired to write various competitive examinations.
- Analyse the constitutional rights in relating to Practical life.

## (19EC0407) ELECTRONIC CIRCUIT ANALYSIS

### Course Outcomes:

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

- Acquire knowledge of BJT High Frequency Model, Multistage amplifiers, Feedback amplifiers, oscillators, Power amplifiers, Tuned amplifiers and Multivibrators.
- Perform analysis of analog electronic circuits for meeting defined specifications.
- Design and develop analog electronic circuits such as Multistage amplifiers, Feedback amplifiers, Oscillators, Power amplifiers, Tuned amplifiers and Multivibrators with given specifications.
- Solve problems relating to analog electronic circuit design.
- Select an Amplifier circuit suitable for a specific electronic subsystem.
- Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the professional engineering practice using analog electronic circuits.

## (19EC0408) ANALOG COMMUNICATIONS

### Course Outcomes:

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

- Understand different blocks in communication system and distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications.
- Analyze generation and detection of FM signal and comparison between amplitude and angle modulations schemes.
- Study the different types of noises and its effects to analyze the behavior of different Analog modulation schemes in presence of noise & evaluate the performance of analogue communications in the presence of noise.
- Differentiate between different analog pulse modulation and demodulation techniques and signal multiplexing for various applications.
- Identify different radio receiver circuits and role of AGC and understand the concept of information and capacity
- Identify source coding and channel coding schemes for a given communication link.

## (19EC0409) LINEAR & DIGITAL IC APPLICATIONS

### Course Outcomes:

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

- Able to define internal structures of the op amp and basic concepts of filters, timers and converters
- Able to experiment the linear, nonlinear applications of op-amp with specialized ICs and converters.
- Evaluate the applications of op-amp circuits, specialized ICs and converters.
- Able to design the op amp circuits and converters for real time applications.
- Understand CMOS and TTL Logic families and their interfacing.
- Describe various design style of VHDL programming.

- Apply the knowledge of VHDL programming to develop VHDL model for standard combinational and sequential ICstructures.

#### (19EC0410) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

##### Course Outcomes:

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

- Analyse the relation between electric and magnetic fields using vector analysis.
- Evaluate the Maxwell's Equation in Static Electric and Magnetic Field.
- Apply Maxwell's equations in Electromagnetic fields.
- Characterize Maxwell's equation in both static and Time varying fields.
- Understand the propagation of electromagnetic waves in different media.
- Understand the concepts of Transmission lines and Their Applications.
- (19EC0410) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

##### Course Outcomes:

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

- Analyse the relation between electric and magnetic fields using vector analysis.
- Evaluate the Maxwell's Equation in Static Electric and Magnetic Field.
- Apply Maxwell's equations in Electromagnetic fields.
- Characterize Maxwell's equation in both static and Time varying fields.
- Understand the propagation of electromagnetic waves in different media.
- Understand the concepts of Transmission lines and Their Applications.

#### (19CE0143) FUNDAMENTALS OF URBAN PLANNING

(Open Elective –II)

##### Course Outcomes:

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

- Recognize issues related to town planning and discuss the objectives, necessity and stages of town planning
- Summarize importance of zoning, can classify various town planning practices and can conduct surveys for townplanning
- Classify the residential building, list the agencies involved in improving house and review the problems associated with residentialhousing
- Discuss the issues associated with slums and recognize the methods to improve condition of slums
- Interpret norms laid down for public and industrial building and can summarize building bye-laws
- List and discuss various urban roads and the concepts of traffic management in atown

#### (19EE0233) INDUSTRIAL INSTRUMENTATION

**Course Outcomes:**

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

- Identify and explain the types of errors occurring in measurement systems.
- Differentiate among the types of data transmission and modulation techniques.
- Apply digital techniques to measure voltage, frequency and speed.
- Analyse the working principles of different Signal Analyzers and Digital meters.
- Understand the operation of several types of transducers.
- Choose suitable Transducers for the measurement of non-electrical quantities.

**(19ME0350) MECHANICAL MEASUREMENTS & CONTROL SYSTEMS**

**Course Outcomes:**

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

- State the basic principles of measurement systems and explain its performance characteristics
- Distinguish the types of various temperature and pressure measurement instruments and finds the best one for the industrial applications
- Explicate the principle of measurement of Speed, Acceleration and Vibration instruments and describe its working
- Illustrate the operation of Fuel level, measurement of Flow and Humidity Measurement instruments and also state the applications of various control systems
- Identify the appropriate device for the measurement of temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.
- Classify the various types of control systems for the measurement of temperature, speed and position

**(19CS0551) JAVA PROGRAMMING**

**(Open Elective- II)**

**Course Outcomes:**

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

- Implement simple abstract data types and design abstraction functions.
- Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
- Apply object-oriented design patterns for problem solving.
- Implement Exception handling with synchronization.
- Execute programs on Multithreading and String handling concepts.
- Design applications with an event-driven graphical user interface.

**(19HS0814) INTELLECTUAL PROPERTY RIGHTS**

#### **Course Outcomes:**

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

- Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights
- Identify different types of intellectual properties, ownership rights and the scope of the protection
- Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work
- Able to identify, apply, and assess ownership rights, registration processes for IP rights
- To discern the approaches for intellectual property management and intellectual property audits
- Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level

#### **(19EC0411) ELECTRONIC CIRCUIT ANALYSIS LAB**

#### **Course Outcomes:**

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

- Acquire knowledge in different electronic circuits using transistor amplifier.
- Analyze and design of amplifiers, feedback amplifiers, oscillators, Tuned amplifiers and Multivibrators.
- Measure and simulate important parameters of various amplifiers which are used to understand the behavior of analog electronic circuits.
- Identify a suitable analog electronic circuit for various applications with a given specification.
- Function effectively as an individual and as a member in a group in the area of analog electronic circuits.
- Develop skills to communicate in verbal and written form in the area of analog electronic circuits.

#### **(19EC0412) ANALOG COMMUNICATIONS LAB**

#### **Course Outcomes:**

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

- Technically visualize spectra of different analog modulations schemes
- Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.
- Measure characteristics of radio receiver measurements.
- Experience real time behavior of different analog modulations schemes
- Acquire knowledge about pulse modulations systems
- Observe the modulation and demodulation behavior of various modulation techniques

#### **(19EC0413) LINEAR & DIGITAL IC APPLICATIONS LAB**

#### **Course Outcomes:**

On Successful Completion of this, Course the Student will be able to

- Design and analyze the various linear & Non-Linear applications of op-amp.
- Design and analyze filter circuits using op-amp.
- Design and analyze oscillators and multivibrators circuits using op-amp (IC741) or IC555
- Design and draw the internal structure of the various digital integrated circuits.
- Develop VHDL/Verilog HDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.
- Verify the logical operations of the digital IC's (Hardware) in the laboratory.

### (19HS0805) ENVIRONMENTAL SCIENCE

#### Course Outcomes:

On Successful Completion of this Course, the Student will be able to

- Recognize the physical, chemical and biological components of the earth's systems and show how they function.
- Characterize and analyze human impacts on the environment.
- Integrate facts, concepts and methods from multiple disciplines and apply to environmental problems.
- Create informed opinions about how to interact with the environment on both a personal and a social level.
- Perform independent research on human interactions with the environment.
- Recognize the ecological basis for regional and global environmental issues.

### (18EC0428) MICROWAVE THEORY AND TECHNIQUES

#### Course Outcomes:

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

1. Design and simulate waveguide components for various applications
2. Compare between the conventional waveguides & microwave tubes
3. Able to analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices
4. Utilize knowledge about the measurements to be done at microwaves
5. Able to illustrate the various parameters and explain about the characteristics of the various waveguide components
6. Able to define the basic concepts of microwave tubes & Scattering Matrix

### (18EC0429) INFORMATION THEORY AND CODING

#### Course Outcomes:

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

- Explain the concept of information.
- Analyse the concept of entropy and error control coding .
- Determine channel capacity.
- Apply coding techniques to define channel capacities and properties using Shannon's Theorems.
- Construct efficient codes for data on imperfect communication channels.
- Analyse error correction and detection in receiver section.

## (18EC0430) SCIENTIFIC COMPUTING

### Course Outcomes:

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

- Illustrate the significance of computing methods, their strengths and application areas.
- Solve the scientific computing of system of linear equations and Eigen values and singular values in real life situations.
- Apply the scientific computing of system of Non - linear equations and Interpolation for engineering problems.
- Demonstrate the knowledge of scientific methods for solving Numerical Integration and
- Differentiation for engineering problems.
- Solve the ordinary differential equations with initial conditions by using scientific
- techniques with engineering applications.
- Evaluate the partial differential equations by using scientific techniques with engineering applications.

## (18CE0127) ELEMENTS OF ROAD TRAFFIC SAFETY

### Course Outcomes:

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

- Identify the causes for road accidents and can implement measures to prevent road accidents
- Describe traffic regulations and implement parking methods
- Classify different traffic signal and can design traffic signal system
- List and illustrate various traffic signs
- List and discuss various road markings
- Discuss importance of street lighting and classify various street lighting system

## (18EE0234) INDUSTRIAL INSTRUMENTATION

### Course Outcomes:

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

- Identify and explain the types of errors occurring in measurement systems.
- Differentiate among the types of data transmission and modulation techniques.
- Apply digital techniques to measure voltage, frequency and speed.
- Analyse the working principles of different Signal Analyzers and Digital meters.
- Understand the operation of several types of transducers.
- Choose suitable Transducers for the measurement of non-electrical quantities.

## (18ME0307) NON-CONVENTIONAL ENERGY RESOURCES

### Course Outcomes:

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

- State various sources of Energies, its availability and explain the importance of them by observing the global energy scenario.
- Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.

- Summarize the Wind energy systems and elucidate the impact of it in environmental aspects.
- Describe the Biomass conversion process and list out various bioenergy applications.
- Interpret the knowledge of renewable energies such as tidal energy, OTEC, Fuel cell, etc. for effective construction of Hybrid systems.
- Identify numerous applications renewable energy resources and illustrate its harnessing technologies.

### (18CS0517) PYTHON PROGRAMMING

**Course Outcomes:**

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

- Solve the problems using control structures, input and output statements.
- Summarize the features of lists, tuples, dictionaries, strings and files
- Experience the usage of standard libraries, objects, and modules
- Solve the problems using Object Oriented Programming Concepts
- Build the software for real time applications using python
- Install various Python packages

### (18HS0814) INTELLECTUAL PROPERTY RIGHTS

**Course Outcomes:**

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

- Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights
- Identify different types of intellectual properties, ownership rights and the scope of the protection
- Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work
- Able to identify, apply, and assess ownership rights, registration processes for IP rights
- To discern the approaches for intellectual property management and intellectual property audits
- Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level

### (18EC0421) ANTENNAS AND WAVE PROPAGATION LAB (Virtual Lab)

**Course Outcomes:**

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

- Understand parametric equations for the calculation in the far field region.
- Analyze Antenna model for various VHF, UHF.

- Learn pattern multiplication principle for array antennas.
- Understand the relation between various antennas and their parameters .
- Calculate Microwave Antennas parameters.
- Applications of the various practical antenna.

### (18EC0422) MICROCONTROLLER AND APPLICATIONS LAB

#### Course Outcomes:

On successful completion of this course, students will be able to

- Familiar with keil programming environment
- Demonstrate arithmetic, logical and string operations using assembly language programming.
- Develop embedded C language programs for various applications using 8051 microcontroller.
- Explore the provided example code and online resources for extending knowledge about the capabilities of the 8051 microcontrollers
- Test, debug, and deploy the 8051 microcontroller-based systems
- Design and develop own microprocessor/microcontroller-based solutions for the real- world problems

### (18HS0842) APTITUDE PRACTICES

#### Course Outcomes:

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

- Develop the subtle way of approaching in the candidate.
- Acquired the decision making with in no time.
- Implement logical thinking during professional tenure.
- Improve knowledge on problem solving.
- Understand problems on coding and decoding.
- Apply the knowledge on the concept of reasoning in real life.

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY**  
**(AUTONOMOUS)**  
**Bachelor of Technology**  
**Department of Computer Science and Engineering**

I B.Tech – I Sem (CSE)

**(20HS0830) ALGEBRA AND CALCULUS**

**COURSE OUTCOMES (COs)**

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

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- Utilize mean value theorems to real life problems.
- Familiarize with functions of several variables which is useful in optimization.
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems.
- Interpret the physical meaning of different operators such as gradient, curl and divergence.
- Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.

**(20HS0849) APPLIED PHYSICS**

**COURSE OUTCOMES (COs)**

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

- Analyze the differences between interference and diffraction with applications.
- Explain concepts of free electron theory and energy bands in solids and asses the EM wave propagation in non-conducting medium by using Maxwell Equations.
- Explain the basic principles and properties of Lasers and Optical Fibers.
- Identify the applications of semiconductors in electronic devices
- Explain the basic properties and applications of superconductors in various fields.
- Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterials in various engineering applications.

**(20EE0250) PRINCIPLES OF ELECTRICAL ENGINEERING**

**COURSE OUTCOMES (COs)**

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

- Apply concepts of KVL/KCL in solving DC circuits
- Apply the network theorems to simple circuits
- Analyze single phase AC circuits consisting of series and RL-RC-RLC combination
- Illustrate the principles and operation of DC Generators & Motors
- Understand the principles and operation of Transformers & Induction Motor
- Understand the different types of instruments

## (20CS0501) C PROGRAMMING AND DATA STRUCTURES

### COURSE OUTCOMES (COs)

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

- Recognize the programming elements of C language
- Select the control structure for solving the problem
- Apply modular approach for solving the problem
- Solve mathematical problems using C Programming language
- Develop the applications using stacks and queues
- Construct the linked lists for various applications and perform sorting techniques

## (20EC0445) BASIC ELECTRONICS ENGINEERING

### COURSE OUTCOMES (COs)

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

- Demonstrate the characteristics of PN Junction Diode, Rectifiers, Filters, BJT, JFET and MOSFET.
- Analyze numerical and analytical problems in Rectifiers, Filters, and Transistor biasing circuits.
- Design and develop electronic circuits such as Rectifiers with and without filters and Transistor biasing circuits.
- Solve engineering problems and arrive at solutions relating to electronic devices and circuits.
- Identify a suitable semiconductor device and transistor for any given specification.
- Select suitable technique for Device modeling.

## (20HS0851) APPLIED PHYSICS LAB

### COURSE OUTCOMES (COs)

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

- Operate various optical instruments.
- Estimate wavelength of laser and particles size using laser.
- Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.
- Evaluate the acceptance angle of an optical fiber and numerical aperture.
- Determine energy loss by B-H curve.
- Evaluate rigidity modulus of a given wire.

## (20EE0252) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

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

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

- Students will understand all the fundamental components about electrical engineering and electronics engineering.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical and electronic measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.

### **(20CS0502) C PROGRAMMING AND DATA STRUCTURES LAB**

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

On Successful completion of this course, the student will be able to

- Read, understand and trace the execution of programs written in C language
- Develop C programs for simple applications making use of basic constructs, arrays and strings
- Develop C programs involving functions, recursion, pointers, and structures
- Select the data structure appropriate for solving the problem
- Illustrate the working of stack and queue
- Implement searching and sorting algorithms

### **I B.Tech – II Sem (CSE)**

### **(20HS0835) PROBABILITY & STATISTICS**

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

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

- A good understanding of the laws of probability axioms and rules.
- Understanding of moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.
- Calculate and interpret the correlation between two variables.
- Calculate the simple linear regression equation for a set of data.
- Have acquired ability to participate effectively in group discussions.
- Have developed ability in writing in various contexts.
- Have acquired a proper level of competence for employability.

### **(20HS0802) APPLIED CHEMISTRY**

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

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

- Apply Nernst equation for calculating electrode and cell potentials

- Illustrate the molecular orbital energy level diagram of different molecular species
- Explain the different types of polymers and their synthesis.
- Synthesize of plastics, elastomers, conducting polymers and their applications in our daily life
- Comprehend the principles and applications of spectros copies.
- Acquire spotlight to the nano materials and basic engineering materials used in academics, industry and daily life.

### (20HS0810) COMMUNICATIVE ENGLISH

#### COURSE OUTCOMES (COs)

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

- To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
- To ask and answer general questions on familiar topics and introduce oneself/others.
- To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
- To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.
- To form sentences using proper grammatical structures and correct word forms.
- To use effective sentence structure for their professional activities.

### (20ME0301) ENGINEERING GRAPHICS

#### COURSE OUTCOMES

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

- Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.
- Know the projection of points and implement the same in the construction of projection of lines and planes.
- Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.
- Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.
- Understand the basic principles of isometric and Orthographic Projections
- Construct the isometric and orthographic projections of simple objects.

### (20CS0503) DIGITAL LOGIC DESIGN

#### COURSE OUTCOMES (COs)

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

- Compare various Number systems and implement Boolean Algebra operations
- Design and implement Combinational and Sequential logic circuits
- Implement Analog to Digital conversion and Digital to Analog conversion
- Design and develop sequential logic circuits

- Understand the working of logic families and logic gates
- Implement the given logical problem using PLDs

### (20HS0803) APPLIED CHEMISTRY LAB

#### COURSE OUTCOMES(COs)

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

- Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.
- Prepare advanced polymer materials
- Estimate the Iron in cement
- Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.
- Think innovatively and improve the creative skills that are essential for solving engineering problems
- At the end of the course the students learn the alkalinity, acidity and viscosity of the any solutions.

### (20HS0811) COMMUNICATIVE ENGLISH LAB

#### COURSE OUTCOMES(COs)

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

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional Settings.
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
- Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

### (20ME0302) WORKSHOP PRACTICE LAB

#### COURSE OUTCOMES(COs)

Upon Completion of the course the students will be able to

- Describe the different types of wood and carpentry joints.
- Produce Tapered Tray and Conical funnel using sheet metal.
- Understands about Fitting and Electrical Wiring.
- Identify various peripherals of a computer.
- Explain the procedure to install MS Windows & Linux.
- Understand about Productivity tools & Networking.

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY**  
**(AUTONOMOUS)**  
**Bachelor of Technology**  
**DEPARTMENT OF CSIT**

I B.Tech. – I Sem.

**(20EE0250) PRINCIPLES OF ELECTRICAL ENGINEERING**

**COURSE OUTCOMES (COs)**

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

1. Apply concepts of KVL/KCL in solving DC circuits
2. Apply the network theorems to simple circuits
3. Analyze single phase AC circuits consisting of series and RL-RC-RLC combination
4. Illustrate the principles and operation of DC Generators & Motors
5. Understand the principles and operation of Transformers & Induction Motor
6. Understand the different types of instruments

**(20CS0501) C PROGRAMMING AND DATA STRUCTURES**

**COURSE OUTCOMES (COs)**

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

1. Recognize the programming elements of C language
2. Select the control structure for solving the problem
3. Apply modular approach for solving the problem
4. Solve mathematical problems using C Programming language
5. Develop the applications using stacks and queues
6. Construct the linked lists for various applications and perform sorting techniques

**(20EC0445) BASIC ELECTRONICS ENGINEERING**

**COURSE OUTCOMES (COs)**

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

1. Demonstrate the characteristics of PN Junction Diode, Rectifiers, Filters, BJT, JFET and MOSFET.
2. Analyze numerical and analytical problems in Rectifiers, Filters, and Transistor biasing circuits.
3. Design and develop electronic circuits such as Rectifiers with and without filters and Transistor biasing circuits

- . 4. Solve engineering problems and arrive at solutions relating to electronic devices and circuits.
- 5. Identify a suitable semiconductor device and transistor for any given specification.

#### (20HS0851) APPLIED PHYSICS LAB

##### COURSE OUTCOMES (COs)

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

- 1. Operate various optical instruments.
- 2. Estimate wavelength of laser and particles size using laser.
- 3. Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.
- 4. Evaluate the acceptance angle of an optical fiber and numerical aperture.
- 5. Determine energy loss by B-H curve.
- 6. Evaluate rigidity modulus of a given wire.

#### (20EE0252) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

##### COURSE OUTCOMES (COs)

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

- 1. Students will understand all the fundamental components about electrical engineering and electronics engineering.
- 2. Make electrical connections by wires of appropriate ratings.
- 3. Understand the usage of common electrical and electronic measuring instruments.
- 4. Understand the basic characteristics of transformers and electrical machines.

#### (20CS0502) C PROGRAMMING AND DATA STRUCTURES LAB

##### COURSE OUTCOMES (COs):

On Successful completion of this course, the student will be able to

- 1. Read, understand and trace the execution of programs written in C language
- 2. Develop C programs for simple applications making use of basic constructs, arrays and strings
- 3. Develop C programs involving functions, recursion, pointers, and structures
- 4. Select the data structure appropriate for solving the problem
- 5. Illustrate the working of stack and queue
- 6. Implement searching and sorting algorithms

#### (20HS0835) PROBABILITY & STATISTICS

## **COURSE OUTCOMES (COs)**

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

1. A good understanding of the laws of probability axioms and rules.
2. Understanding of moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.
3. Calculate and interpret the correlation between two variables.
4. Calculate the simple linear regression equation for a set of data.
5. Have acquired ability to participate effectively in group discussions.
6. Have developed ability in writing in various contexts.
7. Have acquired a proper level of competence for employability.

I B.Tech – II Sem.

## **(20HS0802) APPLIED CHEMISTRY**

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

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

1. Apply Nernst equation for calculating electrode and cell potentials
2. Illustrate the molecular orbital energy level diagram of different molecular species
3. Explain the different types of polymers and their synthesis.
4. Synthesise of plastics ,elastomers, conducting polymers and their applications in our daily life
5. Comprehend the principles and applications of spectroscopies.
6. Acquire spotlight to the nanomaterials and basic engineering materials used in academics, industry and daily life.

## **(20HS0810) COMMUNICATIVE ENGLISH**

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

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

1. To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
2. To ask and answer general questions on familiar topics and introduce oneself/others.
3. To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.

4. To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.

5. To form sentences using proper grammatical structures and correct word forms.

6. To use effective sentence structure for their professional activities.

#### (20ME0301) ENGINEERING GRAPHICS

##### COURSE OUTCOMES

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

1. Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.

2. Know the projection of points and implement the same in the construction of projection of lines and planes.

3. Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.

4. Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.

5. Understand the basic principles of isometric and Orthographic Projections 6. Construct the isometric and orthographic projections of simple objects.

#### (20CS0503) DIGITAL LOGIC DESIGN

##### COURSE OUTCOMES (COs)

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

1. Compare various Number systems and implement Boolean Algebra operations

2. Design and implement Combinational and Sequential logic circuits

3. Implement Analog to Digital conversion and Digital to Analog conversion

4. Design and develop sequential logic circuits

5. Understand the working of logic families and logic gates

6. Implement the given logical problem using PLDs

#### (20HS0803) APPLIED CHEMISTRY LAB

##### COURSE OUTCOMES(COs)

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

1. Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.

2. Prepare advanced polymer materials
3. Estimate the Iron in cement
4. Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.
5. Think innovatively and improve the creative skills that are essential for solving engineering problems
6. At the end of the course the students learn the alkalinity, acidity and viscosity of the any solutions.

#### (20HS0811) COMMUNICATIVE ENGLISH LAB

##### COURSE OUTCOMES(COs)

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

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional Settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
6. Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

#### (20ME0302) WORKSHOP PRACTICE LAB

##### COURSE OUTCOMES(COs)

Upon Completion of the course the students will be able to

1. Describe the different types of wood and carpentry joints.
2. Produce Tapered Tray and Conical funnel using sheet metal.
3. Understands about Fitting and Electrical Wiring.
4. Identify various peripherals of a computer.
5. Explain the procedure to install MS Windows & Linux.
6. Understand about Productivity tools & Networking.

#### (20HS0816) INDIAN CONSTITUTION

##### COURSE OUTCOMES (COs)

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

- 1.Explain the key concepts of political economy.
2. Analyse the significant developments in the political ideologies.
- 3.Describe the salient features of the constitution of India interpret, integrate and critically.
- 4.Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.
- 5.Apply their knowledge and skills acquired to write various competitive examinations.
6. Analyse the constitutional rights in relating to Practical life.

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)  
Bachelor of Technology  
DEPARTMENT OF AGRICULTURAL ENGINEERING**

**IB.Tech –ISem.**

**(20HS0830)ALGEBRA ANDCALCULUS**

**(CommontoAllbranches)**

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**COURSEOUTCOMES(COs)**

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

1. *Develop the use of matrix algebra techniques that is needed by engineers for practical applications.*
2. *Utilize mean value theorem to real life problems.*
3. *Familiarize with functions of several variables which is useful in optimization.*
4. *Learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional coordinate systems.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.*

**(20HS0848)ENGINEERINGPHYSICS**  
**(CommontoCE& AGE)**

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**COURSEOUTCOMES(COs)**

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

1. Analyze the differences between interference and diffraction with applications.
2. Apply the Bragg's Law for crystal structure for the determination by X-rays.
3. Explain applications of acoustics and ultrasonics in various engineering fields.
4. Explain the importance of various mechanical properties of solids.
5. Explain the basic properties and applications of superconductors in various fields.
6. Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterial's in various engineering applications

## **(20ME0351) BASIC ELECTRICAL & MECHANICAL ENGINEERING**

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(Common to CE & AGE)

### **COURSE OUTCOMES**

*On successful completion of this course, the students will be able to*

1. State various laws in Electrical Engineering and explain the operation of networks
2. Recognize the importance of different network theorems and explicate its applications in two port networks.
3. Interpret the principle operation of DC motors and derive an EMF equation for the transformers.
4. Classify various casting and metal joining processes in the manufacturing processes.
5. Distinguish the types of machines in the manufacturing and elucidate the machining operations.
6. Categorize the automobile engines and refrigeration & Air-conditioning systems.

## **(20CS0501) C PROGRAMMING and DATA STRUCTURES**

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

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

1. Recognize the programming elements of C language
2. Select the control structure for solving the problem
3. Apply modular approach for solving the problem
4. Solve mathematical problems using C Programming language
5. Develop the applications using stacks and queues
6. Construct the linked lists for various applications and perform sorting techniques

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## **(20ME0303) BASIC THERMODYNAMICS**

## COURSEOUTCOMES

*On successful completion of the course, the students will be able to*

1. State and explain the open and closed systems as well as develop and apply continuity equation for them.
2. Describe the basic concepts of thermodynamics such as temperature, pressure, system, Properties, process, state, cycles and equilibrium.
3. Explain the basic laws of thermodynamics and their applications.
4. Interpret the concepts of enthalpy, entropy and other thermodynamic properties of ideal gas Process.
5. Analyze Thermodynamic cycles and behavior of pure substances, usage of steam tables and Mollier chart in solving steam related problems.
6. Summarize various types of boilers, their construction, working and their applications

(20HS0850)ENGINEERINGPHYSICSLAB  
(Common to CE & AGE)

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## COURSEOUTCOMES(COs)

*On successful completion of this course, student will be able to*

1. Operate various optical instruments.
2. Estimate wavelength of laser and particle size using laser.
3. Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.
4. Evaluate the acceptance angle of an optical fiber and numerical aperture.
5. Determine energy loss by B-H curve.
6. Evaluate rigidity modulus of a given wire

(20ME0352)BASIC ELECTRICAL & MECHANICAL ENGINEERING LAB  
(Common to CE & AGE)

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## COURSEOUTCOMES

*Students undergoing this course can*

1. List few Basics in Electrical Engineering.
2. Explain steps in Patternmaking, Casting & Moulding.
3. Produce a Lap & Butt joint using Arc welding.
4. Carry out Drilling & Tapping operation on a given workpiece.
5. Describe Cylindrical & Surface grinding operation.
6. Understand about Shaping & Slotting Operation

(20CS0502)C PROGRAMMING and DATA STRUCTURESLAB  
(Common to CE, CSC, CSM, CIC, CSIT & AGE)

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## **COURSEOUTCOMES(COs):**

OnSuccessfulcompletionofthiscourse,thestudentwillbeableto

1. *Read,understandandtracetheexecutionofprograms written inC language*
2. *DevelopCprogramsforsimpleapplicationsmakinguseofbasicconstructs,arraysand strings*
3. *DevelopCprogramsinvolvingfunctions,recursion,pointers, andstructures*
4. *Selectthedata structure appropriateforsolvingtheproblem*
5. *Illustratethe working ofstackand queue*
6. *Implementsearchingandsortingalgorithms*

IB.Tech –IISem.

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## **(20HS0831)DIFFERENTIALEQUATIONSANDCOMPLEXANALYSIS**

*(Common to CE, EEE, ME, ECE & AGE)*

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## **COURSEOUTCOMES(COs)**

Onsuccessfulcompletionofthiscourse,thestudentwillbeableto

1. *Classifythendifferentialequationswithrespecttotheirorderandlinearity.*
2. *Solvethendifferentialequationsrelatedtovariousengineeringfields.*
3. *Identifysolutionmethodsforpartialdifferentialequationsthatmodelphysicalprocesses.*
4. *Students will become familiar with 3- dimensional coordinate systems and also learntheutilization of special functions.*
5. *Understand the significance of differentiability for complex functions and be familiarwiththe Cauchy-Riemann equations.*
6. *Recognize and apply the Cauchy's integral formula and the generalized Cauchy'sintegral formula (relationship between the derivative and the contour integral of afunction).*

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## **(20HS0804)ENGINEERINGCHEMISTRY**

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## **CourseOutcomes**

At theendofthecoursestudentwillbeableto:

1. *Explaintheprinciplesofreverseosmosisandelectrodialysis.*
2. *ApplyNernstequationforcalculatingelectrodeandcellpotentials.*
3. *Differentiatebetweenthermoplasticsandthermosettingplastics.*

4. Explain the setting and hardening of cement and concrete phase.
5. Explain the synthesis of colloids with examples.
6. Acquires spotlight to the nanomaterials and basic engineering materials used in academics, industry and daily life.

(20HS0810) COMMUNICATIVE  
ENGLISH(CommontoCE,CSE,CSIT,CSM,CIC  
&AGE)

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## COURSEOUTCOMES(COs)

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

1. To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
2. To ask and answer general questions on familiar topics and introduce oneself/others.
3. To employs suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
4. To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.
5. To form sentences using proper grammatical structures and correct word forms.
6. To use effective sentence structure for their professional activities

(20ME0301) ENGINEERING GRAPHICS  
(Commontoallbranches)

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## COURSEOUTCOMES

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

1. Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and involutes.
2. Know the projection of points and implement the same in the construction of projection of lines and planes.
3. Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.
4. Explain the sectional views of Right regular Solids and Apply visualizations skills in developing new products.
5. Understand the basic principles of Isometric and Orthographic Projections
6. Construct the isometric and orthographic projections of simple objects

(20CE0102) ENGINEERING MECHANICS  
(CommontoCE,ME&AGE)

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## COURSEOUTCOMES(COs)

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

1. Explain basic principles of statics, laws of friction and can apply them for various force systems
2. Describe the equilibrium conditions and analyze various types of frames
3. Describe the principals associated with centroid, centre of gravity, moment of inertia and apply these principals evaluate them for various two dimensions geometric sections
4. Explain fundamental principles of deformable bodies and compute various types of stress, strain and elastic constants
5. Analyze thin and thick cylinders subjected internal and external forces for stress
6. Describes shear force and bending moment for statically determinate beams for various loading conditions and draw shear force and bending moment diagrams

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## (20HS0805)ENGINEERING CHEMISTRY LAB

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## COURSEOUTCOMES

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

1. Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.
2. Prepare advanced polymer materials
3. Estimate the Iron incement
4. Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.
5. Think innovatively and improve the creative skills that are essential for solving engineering problems.
6. At the end of the course the students learn the alkalinity, acidity and viscosity of the anhydrides.

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## (20HS0811)Communicative English Lab (Common to CE, CSE, CSIT, CSM, CIC & AGE)

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## COURSEOUTCOMES

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

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken

*English.*

6. Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

### **(20ME0302)WORKSHOPPRACTICELAB**

(Common to all branches)

## **COURSEOUTCOMES**

*Upon Completion of the course the students will be able to*

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understands about Fitting and Electrical Wiring.*
4. *Identify various peripherals of a computer.*
5. *Explain the procedure to install MS Windows & Linux.*
6. *Understand about Productivity tools & Networking.*

### **(20HS0816)Indian Constitution**

(Common to All Branches)

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## **COURSEOUTCOMES(COs)**

On successful completion of this course, the student will be

- able to
1. *Explain the key concepts of political economy.*
  2. *Analyse the significant developments in the political ideologies.*
  3. *Describe the salient features of the constitution of India interpret, integrate and critically.*
  4. *Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.*
  5. *Apply their knowledge and skills acquired to write various competitive examinations.*
  6. *Analyse the constitutional rights in relating to Practical life.*

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)  
Master of Business Administration**

**I MBA – I Semester**

**(20MB9001) MANAGEMENT & ORGANIZATIONAL BEHAVIOUR**

**Course Outcomes:**

After the completion of course Students will be able to:

- Able to describe the basic principles, levels, skills of management and management theories and apply the concepts in real world.
- Analyze the various managerial functions to be performed and decision making in different contexts.
- Recognize, differentiate and assess for an individual, the concept of perception, values, attitudes and personality.
- Comprehend the various theories of motivation, leadership, and explore group dynamics for the benefit of the organizations.
- Apply leadership skills in different organizational contexts and lead the people.
- Improve and develop strategies for organizational change and development, and resolutions for conflict management.

**(20MB9002) ACCOUNTING FOR MANAGERS**

**Course Outcomes:**

After the completion of course Students will be able to:

- Develop and understand the nature and purpose of financial statements in relationship to decision making.
- Determine the useful life and value of the depreciable assets.
- Recognize the relationship between the financing, investing and dividend decisions of the firm during the given point of time.
- Explain how cost volume profit analysis is to be applied by managers to answer various operating decisions, such as what level sales required to break even, how many units of Products are to be sold in order to earn a target level of profit.
- Gain an insight to a broad range of cost accounting concepts and their terminology.

- Identify, measure, and accumulate direct and indirect costs, how to find out variances of material and labour and introduction to job costing systems, budgeting, cost-volume-profit relationships, and relevant costing.

### **(20MB9003) BUSINESS AND CYBER LAWS**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Gain an insight into various laws in the country to regulate business aspects
- Identify the legal principles in making contractual agreements.
- Recognize the importance of business law in economic, political and on social context.
- Analyze the legal issues involved in the formation and winding up of a company.
- Explain to compute Income Tax and various forms of Taxes.
- Get good exposure on different Cyber laws and Cyber Crimes.

### **(20MB9004) BUSINESS STATISTICS FOR MANAGERS**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Implement managerial applications of statistical methods in business problems
- Measure a central value of an observation and variation of an observation with its central value
- Gain better numerical understanding and its key applications to make valid findings and conclusions of data that has collected through different sources.
- Relate all possible kinds of relationships of dependent variables with independent variables
- Formulate hypothesis and test the same with tools of hypothesis testing to draw a proper conclusions about population.
- Comprehend various statistical tools and apply them in business research to make better decisions.

### **(20MB9005) MANAGERIAL ECONOMICS**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Assess the importance of micro economics in business management
- Assess the roles of managers as economists in firms
- Analyze the internal and external decisions to be made by managers
- Analyze the demand and supply conditions and assess the position of a company
- Design competitive strategies, including costing, pricing, product differentiation, according to the natures of products and the structures of the markets.
- Analyze real-world business problems with a systematic theoretical framework.

### **(20MB9006) MANAGEMENT INFORMATION SYSTEMS**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Explain the importance of information system in decision making.
- Determine information system requirements for all management levels by describing the differences between various types of information systems.
- Apply probability theory in decision making situations.

- Apply an ERP system to manage a company.
- Implement and evaluate all aspects management information systems..
- Critically and comparatively evaluate technical descriptions of computer hardware and software

### **(20MB9007) BUSINESS COMMUNICATION**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
- Utilize the skill of writing business letters, memos, general warning, and caution and danger letters in an organization.
- Analyze the verbal and nonverbal communications and lead the people effectively.
- Deliver an effective oral business presentation. Communicate via electronic mail, Internet, and other technologies.
- Select appropriate organizational formats and channels used in developing and presenting business messages.
- Select appropriate organizational formats to prepare resume, selecting a career goal and to market their self.

### **(20HS0858) COMMUNICATIVE ENGLISH LAB FOR MANAGERS**

#### **Course Outcomes:**

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

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional Settings.
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
- Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.

#### **I MBA – II Semester**

### **(20MB9008) HUMAN RESOURCE MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding of the concept of human resource management and its relevance in organizations.
- Explain the current theory and practice of recruitment and selection. This includes but is not limited to the supply of human resource and the advantages and disadvantages of external and internal recruiting.
- Assess the relevant recruitment and selection, and performance appraisal methods to be used in different contexts.
- Develop, implement, and evaluate compensation, employee orientation, training, and development programs.
- Demonstrate the significance of contemporary issues such as diversity management, talent management and so on to both employers and employees

- Analyze core issues, Policies and surrounding employee relation and legal issues

### **(20MB9009) FINANCIAL MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Demonstrate the applicability of the concept of Financial Management; understand its objectives and role of a Financial Manager.
- Analyze and evaluate the investment decisions.
- Manage the working capital requirements of a firm
- Apply the Leverage and EBIT EPS Analysis associated with financial data of the firm
- Demonstrate an understanding of the Cost of capital.
- Analyze the short term solvency (working capital) position of a Firm.

### **(20MB9010) MARKETING MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Demonstrate strong conceptual knowledge in the functional area of marketing management.
- Develop an understanding of various facets of Marketing management
- Demonstrate the ability to take decisions and plan, develop, execute and control marketing strategies
- Ensure various marketing programs for the attainment of organizational marketing goals.
- Demonstrate analytical skills in identification and resolution of problems pertaining to marketing management.
- Apply various marketing activities in an organization to keep in line with the social marketing and marketing audit.

### **(20MB9011) BUSINESS RESEARCH METHODS**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop understanding on various kinds of business research concepts.
- Gain knowledge on Research process and hypothesis development with different research design.
- Demonstrate adequate knowledge on sampling procedure and data collection methods.
- Apply knowledge of measurement & scaling techniques as well as the quantitative data analysis for research problems.
- Assess the importance of Research Report writing in systematic way.
- Apply the knowledge of research methods in business decisions.

### **(20MB9012) OPERATIONS MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness.
- Analyze and evaluate various facility alternatives and their capacity decisions.
- Develop a balanced line of production & scheduling and sequencing techniques in operation environments
- Develop aggregate capacity plans and MPS in operation environments.

- Plan and implement suitable materials handling principles and practices in the operations.
- Plan and implement suitable quality control measures in Quality Circles to TQM.

### **(20MB9013) OPERATIONS RESEARCH**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Recognize the characteristics of different types of decision-making environments
- Apply appropriate decision making approaches and tools to be used in different environments.
- Build and solve Transportation Models and Assignment Models.
- Design new simple models, like: CPM, MSPT to improve decision –making
- Develop critical thinking and objective analysis of decision problems.
- Implement practical cases, by using TORA, WinQSB

### **(20MB9014)ADVANCED STUDIES ON INDIAN ECONOMY & POLICY**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Analyze the characteristics of Indian economy and sectorial contribution towards economy in the historic period and also in the current scenario.
- Familiarize with the various components of business environment and able to assess the dynamics of the environment.
- Recognize the industrial policies that have made significant contribution to the growth of the Indian economy
- Appreciate and assess the impact government policies towards the business.
- Analyze the policies towards international trade, role of export-import bank, and the components balance of payments that cause disequilibrium.
- Gain an understanding of the framework of WTO and its role along with other international organizations that influence global trade.

### **(20MC9146) COMPUTER AND INFORMATION SYSTEMLAB**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Demonstrate ability to create documents and Excel sheets for information storage
- Develop the documentation of using MS-Word.
- Sort the data and apply the mathematical calculation using MS-Excel.
- Develop the business presentation using MS-PowerPoint
- Gain an understanding of techniques of Google search engine.
- Create web pages for simple Business Application.

### **(19HS0815) HUMAN VALUES AND PROFESSIONAL ETHICS FOR MANAGER (AUDIT COURSE)**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the moral issues in a society to live in harmony in the society
- Maintain professional, personal ethics and avoid discriminatory practices.

- Handle ethical dilemmas in various functional disciplines and live in balance with environment
- Realize the significance of mutual trust and abiding by the code of conduct in the organizations and as well in the society.
- Gain an insight into ethics, responsibilities, code of conduct in organizations.
- Develop appropriate technologies and management patterns to create harmony in professional as well as personal life

## **II MBA – I Semester**

### **(20MB9015) BUSINESS ETHICS AND CORPORATE GOVERNANCE**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Apply various ethical principles in business and corporate social responsibility practices
- Recognize how personal ethics can influence behavior and apply in decision making
- Explain the ethical challenges facing the various functional departments
- Identify the organizational and cultural variables that impact ethical judgment
- Analyze various ethical codes in corporate governance
- Identify organizational policies and systems that employ ethical conduct

### **(20MB9016) ENTREPRENEURSHIP DEVELOPMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Discern distinct entrepreneurial traits and identify the successful elements of successful entrepreneurial ventures
- Consider the legal and financial conditions for starting a venture and to assess the opportunities and constraints for new ventures
- Design strategies for the successful implementation of ideas
- Comprehend the evaluation of business opportunity from the prospective of an investor
- Identify the most suitable sources of finance for start-ups
- Write and execute their own business plan

### **(20MB9017) SPIRITUAL MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the values and the importance of value education in a society.
- Gain an understanding towards spirituality, and discern to the challenges of value adoption.
- Appreciate the major religions and the sources of values and understand the divine concept.
- Handle the principles of integrity, character development and live in balance with environment
- Realize the significance of meditation and emotional maturity for the code of conduct in the organizations and as well in the society
- Develop environmental awareness and maintain and assess personal progress to create harmony in professional as well as personal life

### **(20MB9018) BASICS OF BUSINESS PROCESS OUTSOURCING**

**Course Outcomes:**

After the completion of course Students will be able to:

1. Develop an understanding about the basics of business process outsourcing and the challenges of Off shoring.
2. Analyze the opportunities, issues and problems, components that control the business process outsourcing industry.
3. Demonstrate the ability to handle the aspects of health care BPOs and financial services BPOs.
4. Realize the significance of outsourcing and assessing the new trends in the BPO organizations
5. Develop appropriate technologies and management patterns to create careers in BPOs.
6. Realize the new opportunities in various other sectors that can offer BPOs.

**(20MB9019) AGRI-BUSINESS MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Understand the fundamentals of management with reference to agribusiness
- Acquaint with agricultural contribution towards Indian economy
- Realize the significance of environment affecting agribusiness and recognize the various sources of finance towards agri business
- Apply the managerial functions and its applications with reference to agribusiness
- Learn the concepts and process of Agricultural Marketing and Cooperation
- Get knowledge about the recent developments in Agribusiness Management

**(20MB9020) EXPORT AND IMPORT MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the theories of international trade, balance of trade and adjustment mechanisms.
- Get an insight into various instruments that control the international trade and avoid discriminatory practices
- Realize the significance of export marketing, contracts and the role of promotion councils
- Handle the payment methods, risks and various financing strategies in export and import process
- Recognize the different agencies involved in EXIM process and their role in the international trade
- Observe and explore the international environmental factors, international institutions that control the trade.

**(20MB9021) INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about investment management and trading securities
- Examine and value the major investment vehicles and strategies to allocate funds
- Make decisions of allocation and selection of assets based on trade-off between risk and return, risk mitigating tools and investment avenues.
- Define the objectives in constructing and managing a portfolio and learn to create an investment policy statement.

- Develop knowledge of modern portfolio theory and effect of diversification on investment portfolios
- Gain knowledge to measure and evaluate portfolio performance and to manage the risk.

### **(20MB9022) SALES AND DISTRIBUTION MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Gain an understanding about the roles and responsibilities of the Sales Managers
- Manage and enhance the sales force productivity and performance.
- Get an insight towards distribution channels, their organization structures and to make value addition to channels.
- Plan and implement an effective sales strategy for their organizations.
- Design and implement distribution channel strategy.
- Manage the Channels efficiency and effectiveness across countries

### **(20MB9023) PERFORMANCE MANAGEMENT SYSTEMS**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Gain an insight towards performance management and performance appraisal.
- Compare and contrast various organizational performance management programs and best practices and define attributes of effective performance management systems.
- Assess how increased employee involvement can contribute to effective performance and coach employees to identify career paths and resources available to support individual development.
- Practically experience a number of tools which are critical to the new performance management systems.
- Realize the value of and drawbacks of modern performance management systems such as 360, MBO conducted in the organizations.
- Develop an understanding towards the issues involved in effective performance management

### **(20MB9024) ENTERPRISE RESOURCE PLANNING**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Make basic use of Enterprise software, and its role in integrating business functions
- Analyze the strategic options for ERP identification and adoption.
- Develop and design the modules used in ERP systems
- Create reengineered business processes for successful ERP implementation.
- Customize the existing modules of ERP systems.
- Examine the places where formal development approaches of ERP systems can be fruitful and where they may not be so helpful.

### **(20MB9025) RISK MANAGEMENT AND INSURANCE**

**Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the Principles, essential features and objectives of risk management.
- Gain knowledge of the range of financial and financial related risks facing organizations.
- Examine the role of public policy including social insurance in personal financial planning and risk management.
- Determine approach to risk management through risk identification, risk measurement and risk management (or mitigation)
- Identify, understand operational risk and how to manage it.
- Assess significance of insurance policies and calculation of insurance premiums for living and non – living objects.

**(20MB9026) ADVERTISING AND SALES PROMOTION MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about various types of advertising and its forms.
- Realize the significance of advertising agency and the client agency relationship through selection of media
- Handle advertising budget and measure the effectiveness of advertising.
- Comprehend the values and ethics in advertising and apply in practice
- Identify various suitable sales promotion tools and techniques for various groups
- Organize and measure the effectiveness of sales promotion campaigns.

**(20MB9027) KNOWLEDGE MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Explain the key theories and models that inform knowledge management
- Critically apply theory to organisations in order to identify and justify effective knowledge management strategies and activities
- Access and evaluate essentials relating to knowledge management
- Communicate clearly and implement effectively varying formats and technologies
- Design problem solutions based upon research findings and critical assessment of current theory and practice
- Develop an insight towards the future of knowledge management from industry perspective

**(20MB9028) DATA WAREHOUSING AND MINING****Course Outcomes:**

After the completion of course Students will be able to:

- Gain an understanding towards Data Warehouse fundamentals, Data Mining Principles
- Design data warehouse with dimensional modeling and apply OLAP operations.
- Identify appropriate data mining algorithms to solve real world problems
- Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining

- Describe complex data types with respect to spatial and web mining.
- Apply and select suitable methods for data analysis.

### **(20MB9029) FINANCIAL MARKETS AND SERVICES**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Demonstrate an awareness of the current structure and regulation of the Indian financial services sector.
- Apply concepts relevant to financial markets and financial institutions, such as the flow of funds, levels of interest rates and interest rate differentials
- Identify the functions of financial markets and institutions and examine their impact on the level of interest rates and interest differentials.
- Describe the instruments, participants and operation of the money market and role of intermediaries in the primary market
- Explore the integration of international financial markets and analyze the implications for financial managers.
- Evaluate and create strategies to promote financial products and services

### **(20MB9030) CONSUMER BEHAVIOUR**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Demonstrate how knowledge of consumer behaviour can be applied to marketing.
- Identify and explain factors which influence consumer behaviour.
- Relate internal dynamics such as personality, perception, learning motivation and attitude to the choices consumers make.
- Realize the principal factors that influence consumers as individuals and decision makers with an application to the buying decision process.
- Develop marketing strategies that are consumer based and create and enhance customer
- Discern the concept of Consumerism and legislative responses to consumerism, and marketer responses to consumer issues

### **(20MB9031) TRAINING AND DEVELOPMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Explain the role of training and development in human resources management.
- Describe the psychology of the learning process on which training is based.
- Analyze the training needs of an organization.
- Assess, design, access and implement various methods, techniques and sources of training.
- Evaluate the value of the training once completed from the individual employee and the organization's viewpoint.
- Develop an appropriate training strategy for today's organization

### **(20MB9032) SUPPLY CHAIN MANAGEMENT**

**Course Outcomes:**

After the completion of course Students will be able to:

- Appreciate the evolution and identify the role of supply chain management in the economy
- Identify and evaluate the drivers of supply chain management
- Analyze the importance of make or buy decisions and identify appropriate suppliers
- Appraise the importance of supply chain networks
- Assess the risk associated with supply chain practices and take better decisions
- Familiarize with and apply various computer based supply chain optimization tools

**(20MB9033) COST AND MANAGEMENT ACCOUNTING****Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the role of cost accounting in the business management of manufacturing and non-manufacturing companies.
- Apply accounting methods of cost calculation and interpret cost accounting statements.
- Analyze and evaluate information for cost ascertainment, planning, control and decision making
- To know the various stock valuation methods adopted by various business organisations.
- Gain an understanding between the relationship between cost accounting, financial accounting and management accounting role in decision making.
- Prepare a budget and use budgets for performance evaluation after flexing the budget.

**(20MB9034) PRODUCT AND BRAND MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Gain an insight into the fundamental concepts of product and brand development
- Use the brand positioning framework to develop a brand, keep it relevant, expand a brand internationally, and reposition a brand
- Use tools and metrics to measure branding and interpret brand performance
- Recognize the importance of using branding strategies in an organization.
- Develop an understanding about the differences in branding to various sectors
- Assess and apply branding strategies to various products across different sectors.

**(20MB9035) HUMAN RESOURCE PLANNING****Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about how to plan for human resources and implement techniques of man power forecasting and inventorying
- Analyze the role of recruitment and selection in relation to the organization's business
- Competency to recruit, select and appraise the performance of the employees
- Handle employee issues such as employee separation and evaluate new trends in managing the staff in organizations

- Appraise succession plans and critical staffing objectives and evaluate the complexities of downsizing issues and the role of HR planning in the process of downsizing
- Develop appropriate technologies and management patterns to improve business

### **(20MB9036) E – BUSINESS**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the E- Markets and E- business infrastructure and trends
- Identify various procurement methods, their benefits and risks and assess different options for integration of organizations“ information systems with e-procurement suppliers.
- Analyze different types of portal technologies and deployment methodologies commonly used in the industry for security and reliability of E- business.
- Analyze the effectiveness of network computing and cloud computing policies in a multi-location organization.
- Analyze real business cases regarding their e-business strategies and transformation processes and choices.
- Integrate theoretical frameworks with business strategies.

### **(20MB9037) INDUSTRY ANALYSIS AND REPORT PRESENTATION**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Gain an understanding of the dynamics of a specific industry.
- Compare various issues particular to an industry.
- Develop cross-functional perspective of the functioning of a business enterprise and an industry.
- Develop awareness about the future prospective problems based on secondary source of data.
- Learn and examine the trends of growth or decline in industry.
- Analyze the issues of an industry and an enterprise with respect to set basic parameters

### **(20MB9038) BUSINESS SIMULATION LAB**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the EXCEL lessons
- Get familiarize with basic to intermediate skills for using Excel in the classroom vis-à-vis Business Applications
- Hands on experience on MS Excel Utilities
- Create solutions for Data Management and Reporting
- Gain an understanding about the SPSS and experts in handling data files and carry out basic statistical analysis
- Test basic hypothesis using t tests, Chi Square tests and ANOVA.

### **IIMBA – II Semester**

### **(20MB9039) STRATEGIC MANAGEMENT**

**Course Outcomes:**

After the completion of course Students will be able to:

- Describe major theoretical concepts, background work and research output in the field of strategic management.
- Develop an understanding of the strategic management process and the functional strategies
- Conduct analysis using various tools and frameworks to make strategic decisions
- Explain the basic concepts, principles and practices associated with strategy formulation and implementation
- Analyze various strategies and explore appropriate strategic implementation at business and corporate levels
- Analyze and evaluate critically real life company situations and develop creative solutions, using a strategic management perspective

**(20MB9040) GREEN BUSINESS MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Demonstrate an understanding of comprehensive systemic analysis across both physical and behavioural dimensions involving society, the environment, and the economy.
- Analyze the role of environmental sustainability in the promotion of comprehensive justice and equity.
- Gain an insight towards the basic sustainability concepts of evolutionary processes, inter-generational debt, socio-political adaptation, climate change, ecosystem services, and environmental justice
- Articulate a comprehensive world view that integrates diverse approaches to sustainability.
- Realize the significance of environmental reporting and green product management
- Identify how globalized processes impact socio ecological systems. Develop appropriate technologies and management patterns to create harmony with the environment

**(20MB9041) WORLD TRADE ORGANIZATION & INTELLECTUAL PROPERTY RIGHTS****Course Outcomes:**

After the completion of course Students will be able to:

- Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP
- Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development
- Identify activities and constitute IP infringements and the remedies available to the IP owner
- Describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.
- Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.
- Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.

**(20MB9042) CROSS CULTURAL MANAGEMENT****Course Outcomes:**

After the completion of course Students will be able to:

- Appreciate the critical role of culture in international business and the importance of managing cultural differences
- Analyze the interacting spheres of culture including organizational culture, professional culture, national culture, and industry culture.
- Discern the influence of culture on different functions of management including communication, negotiation, marketing, leadership, motivation, human resource management and teams.
- Display an understanding of cultural difference in interactions with different nationalities and an awareness of and sensitivity to cross-cultural issues.
- Understand and explain issues of cultural awareness when conducting international business
- Build mind-set and skill-set of a competent leader who appreciates and leverages diversity in talents and organizations s/he works with

#### **(20MB9043) INNOVATIVE TECHNOLOGY MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Account for the importance of technological development and innovation for economic growth and increased competitiveness on a firm level
- Critically discuss a firm's need to have a strategic and integrated approach to be able to successfully manage innovation and technical development,
- Analyse complex innovation processes in firms both internally and externally.
- Explore and better manage the effects of new technology on people and work systems
- Demonstrate that the effective management of technological innovation requires the integration of people, processes and technology
- Recognize opportunities for the commercialization of innovation

#### **(20MB9044) ORGANIZATIONAL CULTURE & TEAMWORK**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the concepts in the field of management and develop skills to apply the concepts for business problems
- Describe strategies used by managers to create and maintain a consistent organizational culture
- Recognize the role of management in communicating and teaching organizational culture to employees and subordinates across boarders
- Understanding and manipulating organisational/corporate culture to engender greater organisational flexibility and productivity
- Demonstrate an understanding of how to uphold international negotiations
- Demonstrate self-awareness, sensitivity, and openness to diverse people and cultures

#### **(20MB9045) FINANCIAL DERIVATIVES**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the various financial derivative securities (Futures, Forwards and Options).
- Describe standard derivative contracts, their properties and functionality.

- Analyze the role and relationship between forward and futures prices.
- Apply scientific methods for valuation of options and other derivatives, in continuous and discrete time.
- Interpret and apply risk measures that are commonly used in risk management.
- Describe how swaps can reduce market risks and use a simulation to assess a risk hedging strategy based on interest rate swaps

## **(20MB9046) SERVICES MARKETING**

### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding understand the characteristics of services, understand consumer behavior in services, align service design and standards, delivering service, managing services promises
- To segment markets for services and create value in the market for new services
- Implement pricing and promotion strategies for services
- Focus on the role of marketing communication and set communication strategies for service marketing
- Plan and execute the delivery of services based on the requirement.
- Develop appropriate strategies for marketing of the services

## **(20MB9047) ORGANIZATIONAL CHANGE AND DEVELOPMENT**

### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding and appreciation of the various concepts of organizational development
- Learn how to apply some of the key concepts and tools organizational development and change leadership and management.
- Discuss and analyze diagnostic tools used to assess organizational effectiveness.
- Identify major types of organizational development interventions.
- Demonstrate how to evaluate organizational development interventions
- Apply human resource intervention techniques in different management scenarios.

## **(20MB9048) DATA COMMUNICATION AND NETWORK ANALYSIS**

### **Course Outcomes:**

After the completion of course Students will be able to:

- Explain the concept of Data communication and networks, layered architecture and their applications
- Evaluate data communication link considering elementary concepts of data link layer protocols for error detection and correction.
- Analyse and Set up protocol designing issues for Communication networks.
- Apply various network layer techniques for designing subnets and supernets and analyse packet flow on basis of routing protocols.

- Estimate the congestion control mechanism to improve quality of service of networking application
- Understand and design application layer protocols and internet applications such as network security

## **(20MB9049) INTERNATIONAL FINANCIAL MANAGEMENT COURSE OUTCOMES**

### **Course Outcomes:**

After the completion of course Students will be able to:

- Analyse, apply and evaluate information within the global financial environment of foreign exchange to solve problems and make informed decisions.
- Review the problems of dealing in foreign currency and the advantages and disadvantages of overseas funding
- Demonstrate the use of foreign exchange derivatives and other methods to manage foreign exchange exposure and risk
- Describe the issues pertaining to cross-border investment decisions and financing MNCs
- Analyse the complexities associated with management of cost of funds in the capital Structure in MNCs
- Analyse, evaluate and synthesize both quantitative and qualitative financial information to influence problem solving and decision making

## **(20MB9050) INTERNATIONAL MARKETING**

### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the major issues related to international marketing
- To assess an organization's ability to enter and analyse various strategies to enter and compete in international markets
- Identify and analyse opportunities within international marketing environments
- Handle new product development and branding in international markets
- Realize the factors that affect the distribution channels and structures in international markets and take appropriate decisions
- Develop an understanding towards the procedures and documentation in the export and import process in the country and apply in practice

## **(20MB9051) INTERNATIONAL HUMAN RESOURCE MANAGEMENT**

### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about importance of Human resource at international level and also identify the differences between domestic and international human resource management
- To understand and assess the various cultural and human variables that influence in the workplace.
- Understand the nature, sources and different methods for recruiting people at international level and apply them along with compensation of human resources based on their skills.

- Perform the functional roles of HRM in International context especially in recruitment and selection, performance management, training, learning and development and repatriation.
- Apply different appraisal methods and trainings that are available for International staffing.
- Assess about the industrial relations in other nations and also to manage people in different locations.

### **(20MB9052) CORPORATE INFORMATION MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Define an information system from both a technical and business perspective and distinguish between computer literacy and information systems literacy
- Identify the major management challenges to building and using information systems in organizations
- Identify managerial risks related to information system organization processing and utilizing
- Explain how enterprise systems and industrial networks create new efficiencies for businesses
- Apply outsourcing of business activities and manage the risk and relationship with outsourcing agencies
- Highlight the role of projects in modern day business organizations and sensitize the complexities of project management.

### **(20MB9053) SEMINAR ON CONTEMPORARY ISSUES OF MANAGEMENT**

#### **Course Outcomes:**

After the completion of course Students will be able to:

- Develop an understanding about the issues in the business enterprises across various industrial sectors
- Practice and maintain communication, logical and analytical skills learnt in the MBA program
- Construct new ability to practice new problem solving skills and use these skills in personal life.
- Demonstrate necessary skills to handle day-to-day managerial responsibilities, such as making speeches, giving effective presentations and maintaining one's poise in private and public
- Develop proactive thinking to perform effectively in the dynamic socio economic business systems
- Learn the etiquette essentials to perform in various communication roles as business managers

### **(20MB9054) PROJECT WORK & VIVA VOCE**

#### **Course Outcomes:**

- Plan, and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic relevant to environment and society
- Systematically identify relevant theory and concepts, relate these to appropriate methodologies and evidence, apply appropriate techniques and draw appropriate conclusions
- Engage in systematic discovery and critical review of appropriate and relevant information sources
- Appropriately apply qualitative and/or quantitative evaluation processes to original data
- Understand and apply ethical standards of conduct in the collection and evaluation of data and other resources

- Communicate research concepts and contexts clearly and effectively both in writing and orally

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)  
Master of Computer Applications**

**I MCA – I Semester**

**(20HS0836)DISCRETE MATHEMATICS**

**CourseOutcomes:**

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

1. Write an argument using logical notation and determine if the argument is or is not valid.
2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
3. Understand the basic principles of sets and operations in sets.
4. Demonstrate an understanding of relations and functions and be able to determine their properties.
5. Determine when a function is 1-1 and "onto".
6. Demonstrate different traversal methods for trees and graphs.
7. Model problems in Computer Science using graphs and trees.

**(20MC9101)COMPUTER ORGANIZATION**

**CourseOutcomes:**

1. Able to design digital circuits by simplifying the Boolean functions
2. Able to understand the organization and working principle of computer hardware components
3. Able to understand mapping between virtual and physical memory
4. Acquire knowledge about multiprocessor organization and parallel processing
5. Able to understand the importance of the hardware-software interface.
6. Able to trace the execution sequence of an instruction through the processor.

**(20MC9102)DATASTRUCTURES**

**CourseOutcomes:**

1. Learn how to use data structure concepts for realistic problems.
2. Ability to identify appropriate data structure for solving computing problems in C language.
3. Ability to solve problems independently and think critically.
4. Able to search and sort the elements in graphs and trees.
5. Ability to solve linked list problems.
6. Ability to solve queues and hash tables.

**(20MC9103)OPERATINGSYSTEMS****CourseOutcomes:**

1. Able to understand the operating system components and its services
2. Implement the algorithms in process management and solving the issues of IPC
3. Able to demonstrate the mapping between the physical memory and virtual memory
4. Able to understand file handling concepts in OS perspective
5. Able to understand the protection of system.
6. Able to understand the operating system components and services with the recent OS

**(20MC9104)OBJECTORIENTEDPROGRAMMINGTHROUGHC++****CourseOutcomes:**

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.
3. Debugging and running the program
4. Have the ability to write a computer program to solve specified problems.
5. Able to do the I/O Operations
6. Able to do the C++ Inheritance & Exception Handling concepts.

**(20MC9105)DATASTRUCTURESUSINGC LAB****CourseOutcomes:**

1. Learn how to use data structure concepts for realistic problems.
2. Ability to identify appropriate data structure for solving computing problems in C language.
3. Ability to solve problems independently and think critically.
4. Able to search and sort the elements in graphs and trees.
5. Ability to solve linked list problems.
6. Ability to solve queues and hash tables.

**(20MC9106)OBJECTORIENTEDPROGRAMMINGTHROUGHC++LAB****CourseOutcomes:**

1. Understand fundamentals of programming such as variables, conditional and

- iterative execution, methods, etc.
- 2. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.
- 3. Debugging and running the program
- 4. Have the ability to write a computer program to solve specified problems.
- 5. Able to do the I/O Operations
- 6. Able to do the C++ Inheritance & Exception Handling concepts

### **(20MC9107)P.C.SOFTWARE LAB**

#### **CourseOutcomes:**

- 1. Able to disassemble and assemble the PC back to working condition.
- 2. Able to know installation of softwares.
- 3. Able to understand mapping between virtual and physical memory.
- 4. Able to know Software troubleshooting and Hardware Troubleshooting.
- 5. Able to work on MSOffice tools.

### **(20MC9108)COMPUTERNETWORKS**

#### **CourseOutcomes:**

- 1. Able to trace the flow of information from one node to another node in the network
- 2. Able to Identify the components required to build different types of networks
- 3. Able to understand the functionalities needed for data communication into layers
- 4. Able to choose the required functionality at each layer for given application
- 5. Able to understand the working principles of various application protocols
- 6. Acquire knowledge about security issues and services available

### **(20MC9109)JAVaproGRAMMING**

#### **CourseOutcomes:**

- 1. Students who have completed this course able to:
- 2. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- 3. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- 4. Have the ability to write a computer program to solve specified problems.
- 5. Able to do the java collection framework programs
- 6. Able to develop Applet programs.
- 7. Work with GUI, Event handling mechanism.

### **(20MC9110)COMPUTERGRAPHICS**

#### **CourseOutcomes:**

- 1. Gain proficiency in 3D computer graphics API programming
- 2. Able to draw line, circle and ellipse using algorithms
- 3. Enhance the perspective of modern computer system with modeling, analysis and interpretation of 2D and 3D visual information.
- 4. Able to transform the 2D and 3D objects
- 5. Able to apply methods for detecting visual surface.
- 6. Able to design Animation for the objects.

## **(20MC9111)DATABASE MANAGEMENTSYSTEM**

### **CourseOutcomes:**

1. Understand the basic concepts of the database and data models.
2. Design a database using ER diagrams and map ER into Relations and normalize the relations.
3. Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
4. Ability to execute various SQL Commands.
5. Develop a simple database applications using normalization.
6. Acquire the knowledge about different special purpose databases and to critique how they differ from traditional databasesystems.

## **(20MC9112)SOFTWAREENGINEERING**

### **CourseOutcomes:**

1. Get an insight into the processes of software development
2. Able to understand the problem domain for developing SRS and various models of software engineering
3. Able to Model software projects into high level design using DFD diagrams
4. Able to Measure the product and process performance using various metrics
5. Able to Evaluate the system with various testing techniques and strategies
6. Able to apply metrics to evaluate the software

## **(20MC9113)JAVAPROGRAMMINGLAB**

### **CourseOutcomes:**

1. After completion of this course, the students would be able to
2. Understand programming language concepts, particularly Java and object-oriented concepts, data types.
3. Effectively create and use objects from predefined class libraries
4. Apply decision and iteration control structures to implement algorithms
5. Implement interfaces, inheritance, and polymorphism as programming techniques.
6. Able to write recursive algorithms.
7. Implement Java collection frame work as programming techniques.

## **(20MC9114)COMPUTERGRAPHICS LAB**

### **CourseOutcomes:**

1. Gain proficiency in 3D computer graphics API programming
2. Able to draw line, circle and ellipse using algorithms
3. Enhance the perspective of modern computer system with modeling, analysis and interpretation of 2D and 3D visual information.
4. Able to transform the 2D and 3D objects
5. Able to apply methods for detecting visual surface.
6. Able to design Animation for the objects.

## **(20MC9115)DATABASE MANAGEMENTSYSTEMLAB**

### **.CourseOutcomes:**

1. Able to master the basic concepts and understand the applications of database systems.
2. Able to construct an Entity-Relationship (E-R) model and Relational Algebra.
3. Understand and apply database normalization principles.
4. Able to construct SQL queries to perform CRUD operations on database. (Create, Retrieve, Update, Delete).
5. Understand the usage of triggers.
6. Able to execute sql programs.

### **(20HS0863) PROFESSIONAL COMMUNICATION SKILLS**

#### **CourseOutcomes:**

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

1. Flair in Writing and felicity in written expression
2. Enhancing job required skills for getting success in their professions
3. Improving Effective Speaking Abilities for their business or professional correspondence
4. prepare effective Interview techniques to get job in the present scenario
5. Using the appropriate skills in all kinds of professional activities
6. Use effective communicative approaches by preparing job application, report and other kinds of spoken and written correspondences.

### **(20MC9116)WEB TECHNOLOGIES**

#### **CourseOutcomes:**

Student is able to:

1. Design and work with HTML5 and CSS applications.
2. Usage of javascript functions and objects.
3. Do the server side programming, maintain sessions.
4. Establish the DB connections and access the data.
5. Ability to work on Java Server Page
6. Design pages using PHP and AJAX.

### **(20MC9117)MOBILE APPLICATION DEVELOPMENT**

#### **CourseOutcomes:**

1. Students understood the aspects of mobile programming that make it unique from programming for other platforms.
2. Students can design and develop sophisticated mobile interfaces.
3. Students program mobile applications for the Android operating system by use basic features.
4. Able to work on advanced phone features.
5. Students understood sending and receiving messages.
6. Ability to deploy applications to the Android marketplace for distribution.

### **(20MC9118)DATA WAREHOUSING AND DATA MINING**

#### **CourseOutcomes:**

Upon Completion of the course, the students will be able to

1. Preprocess the data for mining applications
2. Apply the association rules for mining the data
3. Cluster the high dimensional data for better organization of the data
4. Able to apply the data mining for text and multimedia.
5. Evolve Multidimensional Intelligent model from typical system
6. Evaluate various mining techniques on complex data objects

**(20MC9119) SOFTWARE TESTING  
(PROGRAMME ELECTIVE – I)**

**CourseOutcomes:**

1. Test the software by applying testing techniques to deliver a product free from bugs
2. Evaluate the web applications using bug tracking tools.
3. Investigate the scenario and the able to select the proper testing technique
4. Explore the test automation concepts and tools
5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma
6. Evaluate the estimation of cost, schedule based on standard metrics

**(20MC9120) ARTIFICIAL INTELLIGENCE  
(PROGRAMME ELECTIVE – I)**

**CourseOutcomes:**

At the end of this course:

1. Student should have a knowledge and understanding of the basic concepts of AI including Search.
2. Student can able to solve optimization problems.
3. Student can solve the Game Playing problems.
4. Student can able to use planning and learning techniques
5. Student should be able to use this knowledge and understanding of appropriate principles and guidelines to synthesise solutions to tasks in AI and to critically evaluate alternatives.
6. Student can have ability to use the expert system

**(20MC9121) DISTRIBUTED SYSTEMS  
(PROGRAMME ELECTIVE – I)**

**CourseOutcomes:**

After completion of this course, the student is:

1. Able to explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are;
2. Able to solve inter process communication problems.
3. Able to list the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions;
4. Able to recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems;
5. Able to design a distributed system that fulfills requirements with regards to key distributed systems properties (such as scalability, transparency, etc.), be able to

- recognize when this is not possible, and explain why
6. Able to build distributed software and higher – level middleware and languages.

**(20MC9122)LINUX PROGRAMMING  
(PROGRAMME ELECTIVE– I)**

**CourseOutcomes:**

1. Work confidently in Linux environment.
2. Work with different text processing commands
3. Work with files and directories in linux.
4. Work with shell script to automate different tasks as Linux administration.
5. Able to communicate with processes and memory.
6. Work confidently with the socket.

**(20MC9123)NETWORKSECURITY  
(PROGRAMME ELECTIVE– I)**

**CourseOutcomes:**

1. Understand the most common type of cryptographic algorithm
2. Understand the Public-Key Infrastructure
3. Understand network security in transport layer.
4. Understand security protocols for protecting data on networks
5. Understand vulnerability assessments and the weakness of using passwords for authentication
6. Be able to configure simple firewall architectures

**(20MC9124)HUMAN COMPUTERINTERACTION  
(PROGRAMME ELECTIVE– II)**

**CourseOutcomes:**

1. Find innovative ways of interacting with computers
2. Help the disabled by designing non-traditional ways of interacting
3. Able to use system menus and windows.
4. Use cognitive psychology in the design of devices for interaction
5. Able to apply models from cognitive psychology.
6. Able to perform effectively on menus and windows

**(20MC9125)ADVANCEDPROGRAMMING(PYTHON&RLANGUAGES)  
(PROGRAMME ELECTIVE– II)**

**CourseOutcomes:**

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

1. Making Software easily right out of the box.
2. Experience with an interpreted Language.
3. Prior Introduction to testing software
4. Ability to Work on a real life Project, implementing R Analytics to create Business Insights.
5. Ability to analyze the data and results using R, a flexible and completely Cross -

platform.

6. Ability to use a wide range of analytical methods and produce presentation quality graphics.

### **(20MC9126) INTERNET OF THINGS (PROGRAMME ELECTIVE – II)**

#### **CourseOutcomes:**

1. Ability to combine sensors, servos, robotics, Arduino chips, and more with various or the Internet,
2. Ability to create interactive, cutting-edge devices.
3. Better idea of the overview of necessary steps to take the idea of IOT concept through production
4. Ability to apply techniques for writing Embedded Code
5. Ability to manage memory and performance of battery life
6. Ability to design printed circuit boards.

### **(20MC9127) E-COMMERCE**

#### **CourseOutcomes:**

1. Recognize the impact of Information and Communication technologies, especially of the Internet in business operations
2. Recognize the fundamental principles of e-Business and e-Commerce
3. Distinguish the role of Management in the context of e-Business and e-Commerce
4. Able to manage electronic payments
5. They can know the added value, risks and barriers in the adoption of e-Business and e-Commerce
6. Examine applications of e-Commerce in relation to the applied strategic.

### **(20MC9128) BLOCKCHAIN TECHNOLOGY (PROGRAMME ELECTIVE – II)**

#### **CourseOutcomes:**

1. Explain design principles of Bitcoin and Ethereum.
2. Explain the Simplified Payment Verification protocol.
3. List and describe differences between proof-of-work and proof-of-stake consensus.
4. Interact with a blockchain system by sending and reading transactions.
5. Design, build, and deploy a distributed application.
6. Evaluate security, privacy, and efficiency of a given blockchain system.

### **(20MC9129) WEB TECHNOLOGIES LAB**

#### **CourseOutcomes:**

1. Student is able to:
2. Design and work with HTML5 and CSS applications.
3. Usage of javascript functions and objects.
4. Do the server side programming, maintain sessions.

5. Establish the DB connections and access the data.
6. Ability to work on Java Server Page
7. Design pages using PHP and AJAX

### **(20MC9130)MOBILE APPLICATION DEVELOPMENT LAB**

#### **CourseOutcomes:**

1. Students understood the aspects of mobile programming that make it unique from programming for other platforms.
2. Students can design and develop sophisticated mobile interfaces.
3. Students program mobile applications for the Android operating system by use basic features.
4. Able to work on advanced phone features.
5. Students understood sending and receiving messages.
6. Ability to deploy applications to the Android marketplace for distribution.

### **(20MC9131)DATA WAREHOUSING AND DATA MINING LAB**

#### **CourseOutcomes:**

After undergoing the course students will be able to

1. Synthesize the data mining fundamental concepts and techniques from multiple perspectives.
2. Develop skills and apply data mining tools for solving practical problems
3. Advance relevant programming skills.
4. Gain experience and develop research skills by reading the data mining literature.

### **(20HS0842)APTITUDE PRACTICES**

#### **CourseOutcomes:**

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

1. Develop the subtle way of approaching in the candidate.
2. Acquired the decision making with in no time.
3. Implement logical thinking during professional tenure.
4. Improve knowledge on problem solving.
5. Understand problems on coding and decoding.
6. Apply the knowledge on the concept of reasoning in real life.

### **(20MC9132)CLOUD COMPUTING**

#### **CourseOutcomes:**

1. Compare the strengths and limitations of cloud computing
2. Identify the architecture, infrastructure and delivery models of cloud computing
3. Choose the appropriate cloud player, Programming Models and approach.
4. Able to work on various cloud services.
5. Address the core issues of cloud computing such as security, privacy and Interoperability
6. Design Cloud Services and Set a private cloud

**(20MC9133) CYBER SECURITY  
(PROGRAMME ELECTIVE-III)**

**CourseOutcomes:**

After learning the course the students should be able to:

1. Understand cyber-attack and System Vulnerability Scanning.
2. Understand the tools in network defense.
3. Knowledge on cyber laws.
4. Able to protect themself and ultimately society from cyber-attacks.
5. Knowledge on Web application tools.
6. Understand Cyber Crimes and types.

**(20MC9134) MACHINE LEARNING  
(PROGRAMME ELECTIVE-III)**

**CourseOutcomes:**

The student will be able to:

1. Identify the machine learning algorithms which are more appropriate for various types of learning tasks in various domains
2. Implement machine learning algorithms on real datasets
3. Implement decision tree learning.
4. Demonstrate knowledge on Bayesian Learning.
5. Able to apply models of hidden markov.
6. Demonstrate linear models for Regression

**(20MC9135) SOFTWARE PROJECT MANAGEMENT  
(PROGRAMME ELECTIVE- III)**

**CourseOutcomes:**

1. Understand the activities during the project scheduling of any software application.
2. Learn the risk management activities and the resource allocation for the projects.
3. Can apply the software estimation and recent quality standards for evaluation of the software projects.
4. Understand the flow and interactive process.
5. Acquire knowledge and skills needed for the construction of highly reliable software project.
6. Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing

**(20MC9136) .NET TECHNOLOGIES  
(PROGRAMME ELECTIVE- III)**

**CourseOutcomes:**

1. Aware of .net framework components.

2. Creating simple data binding applications in VB using ADO.Net connectivity.
3. Able to create a web form application using c#.
4. Performing Database operations for windows form.
5. Able to create a web applications.
6. Creating user interactive webpages.

**(20MC9137) BIO – INFORMATICS  
(PROGRAMME ELECTIVE-III)**

**CourseOutcomes:**

The students will be able to:

1. Describe the contents and properties of the most important bioinformatics databases, perform text- and sequence-based searches.
2. Analyze and discuss the results in light of molecular biological knowledge
3. Explain the major steps in pairwise and multiple sequence alignment.
4. Explain the principle for, and execute pairwise sequence alignment by dynamic programming
5. Able to apply methods of photo genetics.
6. Predict the secondary and tertiary structures of protein sequences.

**(20MC9138) NEURAL NETWORKS & FUZZY LOGIC  
(PROGRAMME ELECTIVE-IV)**

**CourseOutcomes:**

1. To Expose the students to the concepts of feed forward neural networks
2. To provide adequate knowledge about feedback networks.
3. To teach about the concept of fuzziness involved in various systems. To provide adequate knowledge about fuzzy set theory.
4. To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
5. To provide adequate knowledge of application of fuzzy logic control to real time systems.

**(20MC9139) IMAGE PROCESSING  
(PROGRAMME ELECTIVE-IV)**

**CourseOutcomes:**

1. Able to enhance images using enhancement techniques.
2. Able to restore images using restoration techniques and methods used in digital image processing
3. Able to transform the image in digital image processing.
4. Able to image enhancement techniques used in digital image processing.
5. Able to compress images using compression techniques used in digital image processing
6. Able to segmentation of images using digital image processing.

**(20MC9140) DESIGN PATTERNS**

## **(PROGRAMME ELECTIVE-IV)**

### **CourseOutcomes:**

1. Students demonstrate a thorough understanding of patterns and their underlying principles
2. Students know what design pattern to apply to a specific problem
3. Students demonstrate what tradeoffs need to be made when implementing a design pattern
4. Able to draw UML diagrams for different patterns.
5. Students can able draw class diagrams for different patterns.
6. Students will be able to use design patterns when developing software

## **(20MC9141) BIG DATA ANALYTICS (PROGRAMME ELECTIVE-IV)**

### **CourseOutcomes:**

The students will be able to:

1. Work with big data platform and analyze the big data analytic techniques for useful business applications.
2. Design efficient algorithms for mining the data from large volumes.
3. Analyze the HADOOP technologies associated with big data analytics
4. Analyze the Map Reduce technologies associated with big data analytics
5. Explore on Big Data applications Using Pig and Hive
6. Understand the fundamentals of various big data analysis techniques

## **(20MC9142) ENTERPRISE RESOURCE PLANNING (PROGRAMME ELECTIVE-IV)**

### **CourseOutcomes:**

After completing this course, student will be able to

1. Classify different processes of the organization and relationship among all processes.
2. Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components;
3. To describe the Generic Model of ERP and General ERP Implementation Methodology.
4. To apply the concept of ERP.
5. To apply the concepts of CRM and ERP
6. To demonstrate knowledge of SAP and Oracle Apps.

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)  
Masters of Technology**

**Department of Civil Engineering (R20)  
STRUCTURAL ENGINEERING**

**I M.Tech - I Semester**

**( 20HS0823) RESEARCH METHODOLOGY AND IPR**

**COURSE OUTCOMES (COs)**

On successful completion of this course, the student shall able to

1. Explain the key concepts and issues in research and basic framework of research process.
2. Formulate appropriate research problem and implement suitable research design for the research problem.
3. Identify various sources of information for literature review and data collection.
4. Develop an understanding of ethics in conducting applied research and make use of components of scholarly writing in report preparation.
5. Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
6. Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.

**(20CE1001) ADVANCED STRUCTURAL ANALYSIS**

**COURSE OUTCOMES (COs)**

On Successful completion of this course, the student shall be able to

1. Ascertain the indeterminacy of frames, trusses by idealization
2. Analyse continuous beam by Stiffness & flexibility matrix methods
3. Analyse Rigid Jointed frames by Stiffness & flexibility matrix methods
4. Analyse Pin Jointed trusses by Stiffness & Flexibility matrix methods
5. Formulate global & element stiffness matrix, by direct stiffness method
6. Realize Equation solution Techniques

**(20CE1002) ADVANCED SOLID MECHANICS**

**COURSE OUTCOMES (COs)**

On successful completion of this course, the student able to

1. Understand Two dimensional analysis of stress and strain
2. Understand Three dimensional analysis of stress and strain
3. Comprehend the concept of pure bending, gravity loading etc
4. Inculcate the habit of researching and practicing in the field of elasticity
5. Enhance the competency level
6. Develop compatibility conditions, equilibrium through homogeneity

**(20CE1008) THEORY OF THIN PLATES AND SHELLS**

**COURSE OUTCOMES (COs)**

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

1. Explain the behavior of plates for UDL, hydrostatic, concentrated load cases
2. Perform the pure bending of rectangular , circular plates and Derive Its deflection theories
3. Analyze the behavior of simply supported rectangular plates under different load conditions
4. Analyze the plates using Navier's method for concentrated load
5. Define the solution of shells by Using various analytical methods
6. Apply the numerical techniques to Perform the behavior of Cylindrical shells

### **(20CE1009) THEORY AND APPLICATIONS OF CEMENT COMPOSITES**

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

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

1. Formulate constitutive behaviour of composite materials - Ferro cement, SIFCON and Fibre Reinforced Concrete - by understanding their strain- stress behaviour
2. Classify the materials as per orthotropic and anisotropic behaviour.
3. Understand the mechanical properties of materials and able to suggest according to need in the field.
4. Estimate strain constants using theories applicable to composite materials.
5. Analyse and design structural elements made of cement composites.
6. the use of various sources to design cement-based materials with tailor-made properties

### **(20CE1010) THEORY OF STRUCTURAL STABILITY**

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

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

1. Analyze elastic and inelastic buckling of bars
2. Understand the various numerical methods for treatment of stability problems and buckling of rectangular cross-sectional beams and plates
3. Mathematical treatment of stability problems.
4. To acquaint with basic principles relating to stability of structures.
5. To acquaint students with the Elastic and in-elastic Buckling behavior of structures.
6. An appreciation of the fundamental basis of design rules concerned with structural instability.

### **(20HS0837) ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING**

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

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

1. Have acquired ability to participate effectively in group discussions
2. Have developed ability in writing in various contexts
3. Have acquired a proper level of competence for employability
4. Have acquired computational skills to solve real world problems in engineering
5. Create programming code and present numerical results in an informative way
6. Apply numerical methods to obtain approximate solutions to mathematical problems

## **(20CE1011) STRUCTURAL HEALTH MONITORING**

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

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

1. Identify the probable reasons for the deterioration of various structural members.
2. Diagnose the distress in the structure understanding the causes and factors.
3. Assess the health of structure using static field methods.
4. Assess the health of structure using dynamic field tests.
5. Use an appropriate health monitoring technique and demolition technique.
6. Assess the structural health monitoring using electrical resistance and electromagnetic techniques

## **(20CE1012) STRUCTURAL OPTIMIZATION**

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

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

1. Use the optimization tools for the design of structures effectively
2. Solve problems of linear and non-linear optimization methods
3. Solve problems of geometric and dynamic optimization methods
4. Use approximate concepts and stochastic optimization methods
5. Understand the concept of optimality criteria methods
6. To be familiar with genetic algorithm and simulated annealing

## **(20CE1003) TECHNICAL SEMINAR**

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

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

1. Can collect relevant material on the chosen topic from various sources
2. Can comprehend the subject material collected and can prepare a technical write up
3. Can develop writing and presentation skills.
4. Will be able to interact with people and can participate in healthy debates.
5. Will be helpful in more understanding and subject learning.

## **(20CE1004) ADVANCED CONCRETE LAB**

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

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

1. Design high grade concrete and study the parameters affecting its performance.
2. Conduct Non Destructive Tests on existing concrete structures.
3. Apply engineering principles to understand behavior of structural/elements.
4. Understand and apply the proper testing requirements for cement.
5. Be able to test the behavior of special concretes
6. Can understand the effect of various admixtures on the properties of fresh and hardened concrete

## **(20HS0818) ENGLISH FOR RESEARCH PAPER WRITING**

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

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

1. Familiarize students with the key concepts of linguistics and develop awareness of the latest trends in language study.
2. Lead to a greater understanding of the human communicative action through an objective study of language.
3. Know and appreciate the location of literature within humanities.
4. Gain knowledge of research methods in literary studies and advanced knowledge of literature in the English language and literary theory.
5. Carry out an independent, limited research project under supervision, in accordance with applicable norms, ideals and conditions for literary research.
6. Improve common and basic scholarly requirements of logical and empirical rigor.

## **I M.Tech - II Semester**

### **(20CE1005) FEM IN STRUCTURAL ENGINEERING**

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

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

1. Obtain an understanding of the fundamental theory of the FEA method
2. Develop the ability to generate the governing FE equations for systems governed by partial differential equations
3. Develop shape functions for bar and beam elements
4. Understand global, local and natural coordinates
5. Understand the formulation of 1-dimensional & 2-dimensional elements
6. Compute the stiffness matrix for Iso-parametric elements.
7. Analyze plane stress and plane strain problems

### **(20CE1006) STRUCTURAL DYNAMICS**

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

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

1. Identify different types of vibrations under SDOF system.
2. Evaluate impact of degree of freedom on vibration of structures
3. Find response of free and forced vibration (harmonic and periodic) of SDOF system
4. Find natural frequency and mode shapes of MDOF system
5. Find natural frequency and mode shapes of simple beams with different end conditions
6. Determine natural frequency and mode shapes by using Stodola method & Holzer method

### **(20CE1013) ADVANCED STEEL DESIGN**

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

On successful completion of this course, the student shall be able to

1. Analyze and design simple bolted and welded connections.
2. Analyze the strength and design beam-column connections
3. Design steel framing system and connections of an industrial building.

4. Design roof systems, purlins and bracings subjected to lateral wind loads.
5. Design and analyse steel girder and truss bridges as per IS 800:2007.
6. They also know the plastic analysis.

## **(20CE1014) DESIGN OFFORMWORK**

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

Onsuccessful completion of this course, the student shall be able to

1. Understand the necessity and types of form work for various structures of civil Engineering and select proper type of form work, accessories and materials required.
2. Design the form work for various structural elements like beam, slab, column, wall and foundation.
3. Design the form work for special structures like shells, retaining walls, bridges, Silos, bunkers & watertank.
4. Understand the working of flying form work like tunnel forms, slip forms and table forms.
5. The students will be able to Judge the form work failures and assess the form work issues in multi – storey building construction through casestudies.
6. Judge the form work failures from case studies.

## **(20CE1015) DESIGN OF HIGH RISESTRUCTURES**

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

Onsuccessful completion of this course, the student shall be able to

1. Analyze design and detail Transmission/ TV tower, Mast and Trestles with different loading conditions.
2. Analyses design and detail the RC and SteelChimney.
3. Analyses design and detail the tall buildings subjected to different loading conditions using relevant codes.
4. Analysis and design of dynamic approach OF STRUCTURAL DESIGN USING is Code provisions
5. Analysis and design of the various horizontal load transfer systems.
6. Know the structural systems for future generation buildings.

## **(20CE1016) DESIGN OF MASONRYSTRUCTURES**

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

Onsuccessfulcompletion of this course, the student shall be able to

1. Understand the masonry design approaches.
2. Analyses Reinforced Masonry Members.
3. Determine interactions between members.
4. Determine shear strength and ductility of Reinforced Masonry members
5. Check the stability of wall
6. Perform elastic and inelastic analysis of masonry walls.

## **(20CE1017) DESIGN OF ADVANCED CONCRETE STRUCTURES**

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

On successful completion of this course, the student shall be able to

1. Estimation of crack width and Redistribution of moments in Reinforced concrete beam.
2. Design of deep beams, ribbed (voided) slabs.
3. Design of Grid floors, flat slabs.
4. Design of plain concrete walls.
5. Design of shearwalls.
6. Design of R.C. beams and slabs to satisfy the limit state of serviceability by determining the short term and long term deflection.

## **(20CE1018) ADVANCED DESIGN OF FOUNDATIONS**

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

On successful completion of this course, the student shall be able to

1. Decide the suitability of soil strata for different projects.
2. Design shallow foundations deciding the bearing capacity of soil.
3. Analyze and design the pile foundation.
4. Understand analysis methods for well foundation
5. Design deep foundation satisfying bearing capacity and settlement requirements.
6. Design and analysis of retaining walls and sheet piles under static loads.

## **(20CE1019) SOIL-STRUCTURE INTERACTION**

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

On successful completion of this course, the student shall be able to

1. Understand soil structure interaction concept and complexities involved.
2. Evaluate soil structure interaction for different types of structures under various conditions of loading and subsoil characteristics.
3. Prepare comprehensive design oriented computer programs for interaction problems based on theory of sub grade reaction such as beams, footings, rafts etc.
4. Analyze different types of frame structures founded on stratified natural deposits with linear and non-linear stress-strain characteristics.
5. Evaluate action of groups of piles considering stress-strain characteristics of real soils.
6. Idealize soil response in order to analyze and design foundation elements subjected to different loadings.

## **(20CE1020) DESIGN OF INDUSTRIAL STRUCTURES**

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

On successful completion of this course, the student shall be able to

1. Explain various types of industrial structures and its design methodologies
2. Design bunkers,silo.
3. Design chimney andtowers.
4. Design various industrialfloors.
5. Design rectangular water tank.
6. Design of staging.

### **(20CE1007) STRUCTURAL DESIGN LAB**

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

On successful completion of this course, the student shall be able to

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

1. Design and Detail all the Structural Components of Frame Buildings.
2. Design and Detail complete Multi-Storey Frame Buildings

### **(20HS0838)NUMERICAL ANALYSIS LAB**

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

On successful completion of this course, the student shall be able to

1. Find roots of non-linear equations by Bisection method and Newton's method.
2. Do curve fitting by least square approximations
3. Solve the system of linear equations using gauss - elimination/ gauss-seidal iteration/
4. Gauss- Jordan method
5. Integrate numerically using trapezoidal and Simpson's rules
6. Find numerical solution of ordinary differential equations by Euler's method, Runge-Kutta method.
7. Use numerical methods to solve engineering problems.

### **(20HS0829) CONSTITUTION OF INDIA**

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

On successful completion of this course, the student shall be able to

1. Explain the key concepts of political economy.
2. Analyse the significant developments in the political ideologies.
3. Describe the salient features of the constitution of India.
4. Interpret, integrate andcritically.
5. Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.
6. Apply their knowledge and skills acquired to write civil service examinations

## **(20CE1021) DESIGN OF PRESTRESSED CONCRETE STRUCTURES**

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

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

1. Discuss about the historical development and its principles of prestressed concrete
2. Analyze the methods of prestressing and its losses
3. Predict the deflection and its importance in Prestressed concrete
4. Define flexural, shear & torsional resistance in prestressed concrete
5. Discuss and analyze composite members in prestressed concrete
6. Analysis and design of statically indeterminate beams

## **(20CE1022) ANALYSIS OF LAMINATED COMPOSITE PLATES**

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

On successful completion of this course, the student shall be able to

1. Analyze the rectangular composite plates using the analytical solutions
2. Analyze the composite plates using advanced finite element method
3. Precisely the various numerical methods for the stress analysis
4. Analyze the discretion of classical plates theory by using spatial approximations
5. Develop the finite element method by stiffness matrix & Numerical integration
6. Analyze the computation of stresses by using rectangular laminated plates

## **(20CE1023) FRACTURE MECHANICS OF CONCRETE STRUCTURES**

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

On successful completion of this course, the student shall be able to

1. Describe the Basics Concepts of Fracture Mechanics & its Mechanism
2. Identify and classify cracking of concrete structures based on fracture mechanics.
3. Perform Stresses at Crack Tip and different Criteria involved
4. Explain the fatigue and fatigue crack grow rate
5. Describe the basic concepts of CTOD and COD
6. Explain the fracture resistance of material

## **(20CE1024) DESIGN OF PLATES AND SHELL**

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

On successful completion of this course, the student shall be able to

1. Analyze and design thin plates with deflection
2. Analyze and design of laterally loaded, uniformly loaded circular plates

3. Analyze and design thin shells using approximate solutions
4. Analyze different types of plates (rectangular and circular) under different boundary connections by various classical methods and approximate methods
5. Analyze and design of prismatic folded plate system
6. Analyze and design of doubly curved shells

### **(20HS0824) BUSINESS ANALYTICS**

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

On successful completion of this course, the student shall be able to

1. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization
2. Design alternatives to solve business problems utilizing quantitative analysis, critical thinking and sound ethical decision making
3. Summarize, process and transform data for obtaining meaningful conclusions
4. Interpret data using latest data analytics tools to address organizational problems
5. Organize and critically apply the concepts and methods of business analytics
6. Assess decision problems and build models for creating solutions using business analytical tools

### **(20ME3026) INDUSTRIAL SAFETY**

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

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

1. Explain the Points of factories act 1948 for health and safety.
2. Define the term Cost & its relation with replacement economy.
3. Recognize the Concept of Wear, Corrosion and its Prevention methods.
4. Understand the Concept of sequence of fault finding activities and the importance of decision tree.
5. Elaborate the importance of scheduled preventive maintenance of mechanical and electrical equipment.
6. Distinguish between Periodic and Preventive maintenance of equipments.

### **(20ME3027) ADVANCES IN OPERATIONS RESEARCH**

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

On successful completion of this course, the student shall be able to

1. On completion of this course, the student shall be able to
2. Create mathematical models of the real time situations.
3. Implement Transportation and Assignment problems to solve in real time industry
4. Choose the best strategy of Game and capable of identifying the suitable queuing theory
5. Enumerate fundamental techniques and apply it to solve various optimization areas
6. Investigate, study, Apply knowledge in Replacement models and
7. Understand the Inventory control Models

### **(20ME3028) COMPOSITE MATERIALS**

## **COURSE OUTCOMES (COs)**

On successful Completion of this course the student will be able to

1. Explain the Fundamental concept of composite materials.
2. Classify different types of composite materials.
3. Describe the Fabrication and processing of composite materials.
4. Illustrate the Methods of preparation of Metal matrix Composites and polymer matrix composites.
5. Discuss about the Mechanical behavior of composite materials.
6. Explain the application of composite materials.

## **(20EE2128) WASTE TO ENERGY**

## **COURSE OUTCOMES (COs)**

On successful lcompletion of this course, the student will be able to

- 1.Analyse agro based, forest residue and industrial waste conversion processes.
- 2.Manufacture of Pyrolytic oils and gases
- 3.Manufacture of charcoal, yields and applications
- 4.Understand various types of gasifiers operation
- 5.Understand inclined and fluidized bed combustors operation
- 6.Understand types of biogas plants and biomass energy programme in India

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY**  
**(AUTONOMOUS)**  
**Control Systems (M.Tech)**  
**Department of Electrical and Electronics Engineering (EEE)**

**IM.Tech -ISem.(CS)**

**(20HS0823) RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS**

**COURSE OUTCOMES**

1. Recognize appropriate research problem, errors in selecting a research problem, Scope and objectives of research problem.
2. Critically assess research methods pertinent to technology innovation research.
3. Identify, explain, compare, and prepare the key elements of a research proposal/report.
4. Skill to understand the need of intellectual property rights, IPR protection to inventors.
5. Develops procedural knowledge to Legal System and solving the problem relating to intellectual property rights for further research work and investment in R&D.

**(20EE2001) MATHEMATICAL METHODS IN CONTROL SYSTEMS**

**COURSE OUTCOMES**

Students will be able to

1. Apply matrix properties and functions to a given problem
2. Use eigenvalues and eigenvectors
3. Analyse responses of linear systems to any given input signal
4. Understand Probability and Random variables
5. Determine response of linear systems for stochastic inputs
6. Apply mathematical methods to control systems

**(20EE2002) NON-LINEAR SYSTEMS**

**COURSE OUTCOMES**

Students will be able to

1. Understand the properties of nonlinear systems
2. Explore tools for stability analysis
3. Evaluate control problems with significant nonlinearities
4. Identify the design problem
5. Able to distinguish between the control strategies
6. Correlate between design parameters and the system performance

**(20EE2003) ROBOTICS AND AUTOMATION**

**COURSE OUTCOMES**

Students will be able to

1. Understand basic concepts of Robotics
2. Obtain forward, reverse kinematics and dynamics model of the industrial robot arm
3. Propose control law for a given application
4. Synthesize control law for a given application
5. Classify robots
6. decides specifications depending on the applications

## (20EE2004) DIGITAL CONTROL SYSTEMS

### COURSE OUTCOMES

Students will be able to

1. Understand the advantages of digital systems over analog systems
2. Model digital filters and systems
3. Analyse digital systems in time domain
4. Analyse digital systems in frequency domain
5. Model and analyse digital systems in state space representation
6. Design controllers for digital systems in state space representation

## (20EE2005) NON-LINEAR CONTROL SYSTEMS

### COURSE OUTCOMES

Students will be able to

1. Distinguish linear and non-linear control systems.
2. Distinguish absolute stability and relative stability
3. Understand the Lyapunov stability.
4. Application of deeper ideas from mathematics and specifically from geometry to engineering problems
5. Analyze nonlinear controllers with the aid of software tools
6. Design nonlinear controllers with the aid of software tools

## (20EE2006) SYSTEMS BIOLOGY

### COURSE OUTCOMES

Students will be able to

1. Understand and apply mathematical models to design a particular system
2. Apply feed-forward loops to design a biological control system

## (20EE2122) SCADA SYSTEM AND APPLICATIONS

### COURSE OUTCOMES

1. Can able to work with PLC
2. Can able to work with SCADA
3. Know different components in PLC and SCADA
4. Can understand how PLC and SCADA help in power system automation
5. Able to understand the functioning of different hardware component in SCADA
6. Can able to understand the applications of SCADA in different industries

## **(20EE2007)DESIGN ASPECTS IN CONTROL SYSTEMS**

### **COURSE OUTCOMES**

Students will be able to

1. Understand the system modelling.
2. Implement tuning procedures on controllers
3. Design compensators
4. Implement pole placement design
5. Model a control system given its parameters
6. Decide gains of the controllers like PI, PID in a given control system

## **(20HS0818)ENGLISH FOR RESEARCH PAPER WRITING**

### **COURSE OUTCOMES**

1. To recognize and demonstrate the style and conventions of research writing.
2. To improve the clarity and coherence of their written proposal.
3. Able to use a variety of sentence patterns.
4. To enhance their revision and proofreading skills.
5. To use effective strategies and techniques to construct their academic projects.

### **IM.Tech –II Sem.(CS)**

## **(20EE2010)OPTIMAL CONTROL THEORY**

### **COURSE OUTCOMES**

Students will be able to

1. Understand optimal design of controllers
2. Understand the application of calculus of variation to optimal design
3. Combine the mathematical methods used in optimal control to derive the solution to variations of the problems studied in the course
4. Understand constraints specification in control problem
5. Use the standard algorithms for numerical solution of optimal control problems and use Matlab to solve fairly simple but realistic problems
6. Integrate the tools learnt during the course and apply them to more complex problems

## **(20EE2011)INDUSTRIAL AUTOMATION**

### **COURSE OUTCOMES**

Students will be able

1. Identify potential areas for automation and justify need for automation
2. Select suitable major control components required to automate a process or an activity
3. Translate and simulate a real time activity using modern tools
4. Able to discuss the benefits of automation.
5. Identify suitable automation hardware for the given application.
6. Recommend appropriate modeling and simulation tool for the given manufacturing application.

## **(20EE2012)ADVANCED CONTROL SYSTEMS**

### **COURSEOUTCOMES**

Students will be able to

1. Apply the concepts of linear algebra and their applications to control system
2. Analyze the system dynamics
3. Understand Lyapunov stability theory
4. Design linear quadratic controller
5. Implement Pole placement design.
6. Able to design compensators

## **(20EE2013)ADVANCED ROBOTICS**

### **COURSEOUTCOMES**

Students will be able to

1. Understand mathematical methods for modeling and control of Robotic manipulator
2. Understand spatial descriptions and transformation
3. Able to design a robotic control
4. Able to apply non-linear techniques to any control problem
5. Able to model mobile robot
6. Understand robot programming and language systems

## **(20EE2014)ADAPTIVE LEARNING CONTROL SYSTEMS**

### **COURSEOUTCOMES**

1. Students will be able to
2. Understand detailed knowledge of classical system identification and the development
3. Understand properties of various methods in system identification
4. Understand detailed knowledge of on-line parameter estimation
5. Understand knowledge of adaptive control systems and their development and properties
6. Understand the development and properties of adaptive control systems.
7. Understand knowledge of methods and tools for stability analysis of adaptive systems

## **(20EE2015)MODEL REDUCTION IN CONTROL SYSTEMS**

### **COURSEOUTCOMES**

Students will be able to

1. Apply model reduction techniques for a given control design problem
2. Design control loops for all techniques
3. Know modern methods
4. Apply SMC for model reduction
5. Understand higher order sliding mode control
6. Understand MOR for nonlinear systems

## **(20EE2116)ADVANCED DIGITAL SIGNAL PROCESSING**

### **COURSEOUTCOMES**

Students will be able to

- Gain knowledge about the time domain and frequency domain representations as well as analysis of discrete time signals and systems
- Study the design techniques for IIR and FIR filters and their realization structures.
- Acquire knowledge about the finite word length effects in implementation of digital filters.
- Acquire knowledge about the various linear signal models and estimation of power spectrum of stationary random signals
- Design of optimum FIR and IIR filters
- Analyse of finite word length effects

### **(20HS0829) CONSTITUTION OF INDIA**

#### **COURSE OUTCOMES**

1. Explain the key concepts of political economy
2. Analyse the significant developments in the political ideologies
3. Describe the salient features of the constitution of India interpret, integrate and critically
4. Analyse the political economy of Indian international relations and gain knowledge in Judiciary system
5. Apply their knowledge and skills acquired to write various competitive examinations
- 6.

#### **M.Tech, II Year 1<sup>st</sup> Semester (CS)**

### **(20EE2021) MACHINE LEARNING TECHNIQUES**

#### **Course Outcomes**

Students will be able to

1. Distinguish between supervised, unsupervised and semi-supervised learning
2. Apply the appropriate machine learning strategy for any given problem
3. Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
4. Design systems that use the appropriate graph models of machine learning
5. Modify existing machine learning algorithms to improve classification efficiency

### **(20EE2022) STOCHASTIC CONTROL**

#### **Course Outcomes**

Students will be able to

1. Apply design Schotastic models for a given system
2. Design Stochastic Stability problems
3. Design linear and non-linear filtering systems

### **(20EE2023) COMPUTATIONAL METHODS**

#### **Course Outcomes**

Students will be able to

1. Know the concept and steps of problem solving - mathematical modelling, solution and implementation
2. Knowledge and understanding of, and the ability to use, mathematical techniques
3. Understand and apply mathematical reasoning

## **(20HS0824)BUSINESSANALYTICS**

### **CourseOutcomes:**

Students will be able to:

1. Design, device, and query relational databases for operational data.
2. Design, implement, populate and query data warehouses for informational data.
3. To integrate very large datasets to make business decisions.
4. Evaluate the use of data from acquisition through cleansing, warehousing, analytics, and visualization to the ultimate business decision.
5. Evaluate the key concepts of business analytics.
6. Determine when to implement relational versus document oriented database structures.

## **(20ME3026)INDUSTRIALSAFETY**

### **COURSEOUTCOMES:**

Students undergoing this course are able to

1. Understand the points of factories act 1948 for health and safety.
2. Understand the cost & its relation with replacement economy.
3. Understand the concepts of Wear and Corrosion Prevention
4. Understand the concept of sequence of fault finding activities
5. Understand the Program and schedule of preventive maintenance of mechanical and electrical equipment.
6. Understand the Periodic Maintenance of Equipments

## **(20ME3027)ADVANCESINOPERATIONSRESEARCH**

### **COURSEOUTCOMES**

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

- Create mathematical models of the real time situations.
- Implement Transportation and Assignment problems to solve in real time industry
- choose the best strategy of Game and capable of identifying the suitable queuing theory
- Enumerate fundamental techniques and apply it to solve various optimization areas
- Investigate, study, Apply knowledge in Replacement models and
- Understand the Inventory control Models

## **(20CE1028)COSTMANAGEMENTOFENGINEERINGPROJECTS**

### **CourseOutcomes:**

Student can access the present value and future value for money

- Student can apply the principles of Benefit & Cost Analysis and
- Break-Even comparison
- Student can calculate the depreciation cost for construction equipment and can estimate the cost for construction equipment
- Can prepare profit and loss, balance sheet etc

## **(20ME3028)COMPOSITEMATERIALS**

### **COURSEOUTCOMES**

Upon completion of this course, the students will have an overview of

1. Fundamental concept of composite materials.
2. Different types of composite materials.
3. Fabrication and processing of composite materials.
4. MMC & CMC
5. Mechanical behavior of composite materials.
6. Application of composite materials.

## **(20EE2128)WASTETOENERGY**

### **COURSEOUTCOMES(COs)**

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

1. Analyse agro based, forest residue and industrial waste conversion processes.
2. Manufacture of Pyrolytic oils and gases
3. Manufacture of charcoal, yields and applications
4. Understand various types of gasifiers operation
5. Understand inclined and fluidized bed combustors operation
6. Understand types of biogas plants and biomass energy programme in India

## **SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)**

### **Power Electronics (M.Tech)**

### **Department of Electrical and Electronics Engineering (EEE)**

### **IM.Tech-ISem.**

## **(20HS0823)RESEARCH METHODOLOGY AND IPR**

### **Course outcomes:**

After the completion of the course, student would be able to:

- Explain the key concepts and issues in research and basic framework of research process.
- Formulate appropriate research problem and implement suitable research design for the research problem.
- Identify various sources of information for literature review and data collection.
- Develop an understanding of ethics in conducting applied research and make use of components of scholarly writing in report preparation.
- Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
- Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.

## **(20EE2101)ELECTRIC DRIVE SYSTEMS**

## **COURSEOUTCOMES:**

Students will be able to:

1. Knowledge about the dynamic behavior of rotating machines.
2. Able to understand equivalent circuit of synchronous machines.
3. To understand various practical issues of different machines.
4. To learn about the basic concepts of AC/DC machine modeling.
5. To analyze various methodologies in small signal machine modeling.
6. To learn the performance and dynamic modeling of synchronous machines

## **(20EE2103) ADVANCED POWER ELECTRONIC CIRCUITS**

## **COURSEOUTCOMES:**

Students will be able to:

1. Knowledge about analysis and design of Load Commutated CSI and PWM CSI Learn analysis and design of series Inverters.
2. Acquire knowledge about analysis and design of Switched Mode Rectifiers, APFC,
3. Knowledge about DC-DC converters & resonant converters design
4. Select appropriate phase shifting converter for multi-pulse converter and operation
5. Select appropriate phase shifting converter for multi-pulse converter
6. Select appropriate phase shifting converter for multi-pulse converter

## **(20EE2104) OPTIMAL AND ADAPTIVE CONTROL**

## **COURSEOUTCOMES:**

Students will be able to:

1. Knowledge in the mathematical area of calculus of variations as to apply the same for solving optimal control problems.
2. Problem formulation, performance measure and mathematical treatment of optimal Control problems.
3. Acquire knowledge on solving optimal control design problems by taking into
4. Consideration the physical constraints on practical control systems.
5. To obtain optimal solutions to controller design problems taking into consideration the Limitation on control energy in the real practical world.
6. Apply constrained optimization to various physical systems.
- 7.

## **(20EE2105) POWER QUALITY**

## **COURSEOUTCOMES:**

Students will be able to:

1. Acquire knowledge about the harmonics, harmonic introducing devices and effect of harmonics on system equipment and loads
2. Develop analytical modeling skills needed for modeling and analysis of harmonics in network and components
3. Introduce the student to active power factor correction based on static VAR compensators and its control techniques
4. Introduce the student to series and shunt active power filtering techniques
5. The students will be able to

- identify the power quality problems, causes and suggests suitable mitigating techniques.
6. Ability to study about the various Active Passive power filters.

### **(20EE2107) STATIC VAR CONTROLLER AND HARMONIC FILTERING**

#### **COURSE OUTCOMES**

Students will be able to:

1. Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation
2. Obtain schemes at Transmission and Distribution level in Power Systems.
3. To introduce the student to various single phase and three-phase Static VAR Compensation schemes and their controls
4. To develop analytical modelling skills needed for modelling and analysis of such Static VAR
5. To compare Controlling methods of DVR
6. To design suitable converter for topology for applications.

### **(19EE2108) PWM CONVERTERS AND APPLICATIONS**

#### **COURSE OUTCOMES:**

Students will be able to:

1. Knowledge concepts and basic operation of PWM converters, including basic circuit operation and design
2. Learn the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality.
3. Able to recognize and use the following concepts and ideas: Steady-State and transient modelling and analysis of power converters with various PWM techniques.
4. Model the PWM Converters and Induction motor drives
5. Apply various compensation techniques for the converters
6. Ability to simulate the PWM technique on converter topologies
- 7.

### **(20EE2109) ENERGY AUDITING, CONSERVATION & MANAGEMENT**

#### **Course Outcomes:**

After completion of the course the student should be able to:

1. Conduct energy auditing and evaluate energy audit results
2. Carry out motor energy audit
3. Students should be able to understand the good lighting system design and practice
4. Analyse demands side management concepts through case study
5. Students should be able to calculate depreciation and payback calculation
6. To predict management of energy systems

### **(20HS0818) ENGLISH FOR RESEARCH PAPER WRITING**

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

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

1. Familiarize students with the key concepts of linguistics and develop awareness of the latest trends in

- language study.
2. Lead to a greater understanding of the human communicative action through an objective study of language.
  3. Know and appreciate the location of literature within humanities.
  4. Gain knowledge of research methods in literary studies and advanced knowledge of literature in the English language and literary theory.
  5. Carry out an independent, limited research project under supervision, in accordance with applicable norms, ideals and conditions for literary research.
  6. Improve common and basic scholarly requirements of logical and empirical rigor.

#### **IM.Tech –IISem.**

#### **(20EE2112) POWER ELECTRONIC CONVERTERS**

##### **COURSE OUTCOMES:**

Students will be able to:

1. To understand the various power semiconductor devices.
2. Obtain the knowledge on various conversion techniques of power semiconductor devices.
3. Design controllers for dc-dc converters for DC-DC applications.
4. To simulate the behavior of single phase and three phase Inverters.
5. To solve the problems on inverter control techniques.
6. Apply the mathematical modelling skills on the converter topologies.

#### **(20EE2113) DIGITAL CONTROL OF POWER ELECTRONICS AND DRIVE SYSTEMS**

##### **COURSE OUTCOMES:**

Students will be able to:

1. Design static Scherbius and Kramer drives to implement slip power recovery schemes.
2. Implement synchronous motor drives with fixed frequency and variable frequency sources.
3. Obtain Knowledge on speed control schemes for Brushless D.C. motors and Permanent Magnet Synchronous motors.
4. To understand the concept Control of Wound-field Synchronous motor and SRM drives.
5. Apply the mathematical skills to solve the vector control of PMSM.
6. To know the control and operation of PM BDCM drive scheme.

#### **(20EE2114) SWITCHED MODE AND RESONANT CONVERTERS**

##### **COURSE OUTCOMES:**

1. Acquire knowledge about the principles of operation of non-isolated and isolated hard-switched DC-DC converters.
2. Acquire knowledge on various loss components in a switched mode converter and choice of switching frequency with a view towards design of such converters.
3. Analyse the harmonics of line commutated rectifiers.
4. Understand and analyse the concept of resonant converter.
5. To develop the mathematical transfer function of SMPS.
6. Analyse the dynamics of switching converter.

#### **(20EE2115) INDUSTRIAL LOAD MODELLING AND CONTROL**

**COURSEOUTCOMES:**

Students will be ableto:

1. Knowledgeaboutloadcontroltechniquesinindustriesanditsapplication.
2. DifferenttypesofindustrialprocessesandoptimizetheprocessusingtoolslikeLINDOand LINGO.
3. Applyloadmanagementto reducedemandofelectricityduringpeaktime.
4. Applydifferentenergysavingopportunitiesinindustries
5. Thestudentsshouldgainaworkableknowledgeinanalyzing ElectricDrive Systems
6. AbletoForecasttheIntegratedLoad managementofindustry.

**(20EE2116)ADVANCEDDIGITALSIGNALPROCESSING****COURSEOUTCOMES :**

Students will be ableto:

1. PortraythefundamentalsofDigitalSignalProcessing.
2. Depicttheconceptsandapplicationsof Motorcontrolsignalprocessors
3. Knowledgeaboutthetimedomainandfrequencydomainrepresentationsaswellanalysisof discretetimesignals andsystems.
4. StudythedesigntechniquesforIIRandFIRfiltersandtheirrealizationstructures.
5. Acquireknowledgeaboutthefinitewordlengtheffectsinimplementationofdigitalfilters.
6. Comparethevariouslinearsignalmodelsanditsalgorithms

**(20EE2117)ADVANCEDMICRO-CONTROLLERBASEDSYSTEMS****COURSEOUTCOMES**

Studentswill be ableto:

1. Learn how to program a processor in assembly language and develop an advancedprocessorbasedsystem.
2. Learnconfiguringand usingdifferentperipherals in a digitsystem.
3. CompileanddebugaMicroprocessorProgram.
4. Generatane executable file anduseit.
5. Obtainknowledgeonthe embeddedboards
6. Obtaina skillto identifythesuitable controller forthe application.

**(20EE2118)DISTRIBUTEDGENERATION****COURSEOUTCOMES**

Students will be ableto:

1. Tounderstandtheplanningandoperationalissues relatedtoDistributedGeneration.
2. AcquireKnowledgeaboutDistributedGenerationLearnMicro-Grids.
3. Relatetheconventionalpowergenerationanddistributedgeneration
4. Analyzetheconceptof distributedgenerationandinstallation
5. Explicatetheconcept ofAC/DCmicrogrids
6. Analyzepower quality issues andcontrol operation of micro grid

**(20EE2119)SMARTGRIDS****COURSEOUTCOMES:**

Students will be ableto:

1. Understand the difference between smartgrid & conventional grid.
2. Apply knowledge on smart metering concepts to industrial and commercial installations.
3. Formulatesolutionsintheareasofsmartsubstations,distributedgenerationandwideareameasurements.
4. Explicate the need of smart grid technology.
5. Analyse the power quality issues in smart grid
6. Describe the concept of smartgrid communication technologies

### **(20HS0829)CONSTITUTION OF INDIA**

#### **COURSEOUTCOMES**

1. Explain the key concepts of political economy
2. Analyze the significant developments in the political ideologies
3. Describe the salient features of the constitution of India interpret, integrate and critically
4. Analyze the political economy of Indian international relations and gain knowledge in Judiciary system
5. Apply their knowledge acquired to write various competitive examinations
6. Apply knowledge on society on their rights

#### **IIM.Tech –ISem**

### **(20EE2123)SCADASYSTEMANDAPPLICATIONS**

#### **CourseOutcomes**

Students will be able to:

1. Describe the basic tasks of Supervisory Control Systems (SCADA) as well as their typical applications.
2. Acquire knowledge about SCADA architecture, various advantages and disadvantages of each system.
3. Knowledge about single unified standard architecture IEC 61850.
4. To learn about SCADA system components: remote terminal units, PLCs, intelligent electronic devices, HMI systems, SCADA server.
5. Learn and understand about SCADA applications in transmission and distribution sector, industries etc.
6. knowledge about various system components and communication protocols of SCADA system and its applications.

### **(20EE2124)FACTSANDCUSTOMPOWERDEVICES**

#### **CourseOutcomes:**

Students will be able to:

1. Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission and Distribution level in Power Systems.
2. Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled.
3. To compare the Reactive Power Compensation techniques
4. Develop analytical modeling skills needed for modeling and analysis of such Static VAR Systems
5. Demonstrate the use of SVC to mitigate power system problems
6. Suggest suitable techniques for coordinating various FACTS devices

## **(20EE2125)HVDCTRANSMISSIONSYSTEMS**

### **CourseOutcomes:**

Students will be able to:

1. Choose intelligently AC and DC transmission systems for the dedicated application(s).
2. Identify the suitable two-level/multilevel configuration for high power converters.
3. Select the suitable protection method for various converter faults.
4. Demonstrate the modern trends in planning of HVDC system
5. Design AC and DC filters to eliminate Harmonics
6. Model HVDC systems for Digital Dynamic Simulation and demonstrate the grounding of HVDC systems.

## **(20HS0824)BUSINESSANALYTICS**

### **CourseOutcomes:**

After the completion of the course, student would be able to:

1. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
2. Design alternatives to solve business problems utilizing quantitative analysis, critical thinking and sound ethical decision making.
3. Summarize, process and transform data for obtaining meaningful conclusions
4. Interpret data using latest data analytic tools to address organisational problems
5. Organize and critically apply the concepts and methods of business analytics
6. Assess decision problems and build models for creating solutions using business analytical tools.

## **(20ME3026)INDUSTRIALSAFETY**

### **COURSEOUTCOMES:**

Students undergoing this course are able to

1. Understand the points of Factories Act 1948 for health and safety.
2. Understand the cost & its relation with replacement economy.
3. Understand the concept of Wear and Corrosion Prevention
4. Understand the concept of sequence of fault finding activities
5. Understand the Program and schedule of preventive maintenance of mechanical and electrical equipment.
6. Understand the Periodic Maintenance of Equipments

## **(20ME3027)ADVANCESINOPERATIONSRESEARCH**

### **COURSEOUTCOMES**

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

1. Create mathematical models of the real time situations.
2. Implement Transportation and Assignment problems to solve in real time industry
- 3 Choose the best strategy of Game and capable of identifying the suitable queuing theory
4. Enumerate fundamental techniques and apply it to solve various optimization areas
5. Investigate, study, Apply knowledge in Replacement models and
6. Understand the Inventory control Models

#### **(20CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS**

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

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

1. Summarise the concept of strategic cost management, strategic cost analysis – target costing, lifecycle costing and Kaizen costing and the cost drive concept.
2. Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
3. Summarise the meaning and different types of project management and project execution, detailed engineering activities.
4. Understand the project contracts,
5. Describe the cost behaviour and profit planning types and contents, Bar charts and Network diagram.
6. Analyse by using quantitative techniques for cost management like PERT/CPM.

#### **(20ME3028) COMPOSITE MATERIALS**

##### **COURSE OUTCOMES**

Upon completion of this course, the students will have an overview of

1. Fundamental concept of composite materials.
2. Different types of composite materials.
3. To understand the Fabrication and processing of composite materials.
4. Comparison of MMC & CMC
5. Apply knowledge on Mechanical behaviour of composite materials.
6. Application of composite materials.

#### **(20EE2128) WASTE TO ENERGY**

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

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

1. Analyse agro based, forest residue and industrial waste conversion processes.
2. Manufacture of Pyrolytic oils and gases
3. Manufacture of charcoal, yields and applications
4. Understand various types of gasifiers operation
5. Understand inclined and fluidized bed combustors operation
6. Understand types of biogas plants and biomass energy programme in India

## **M.Tech (Thermal Engineering)**

### **Department of Mechanical Engineering**

#### **M. Tech. – I Semester (T.E)**

#### **(20HS0823) RESEARCH METHODOLOGY AND IPR**

##### **COURSE OUTCOMES**

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

1. Explain the key concepts and issues in research and basic framework of research process.
2. Formulate appropriate research problem and implement suitable research design for the research problem.
3. Identify various sources of information for literature review and data collection.
4. Develop an understanding of ethics in conducting applied research and make use of components of scholarly writing in report preparation.
5. Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
6. Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.

#### **(20ME3101) THERMODYNAMICS AND COMBUSTION**

##### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the concepts of transient flow analysis and real gas mixture
2. Describe the concepts of Chemical composition
3. Have a broad knowledge on chemical equilibrium
4. Have a broad knowledge on the concepts of Nerst heat theorem
5. Identify the applications of the fuel cells and magneto hydro dynamic generators.
6. Describe the concepts of PVC

#### **(20ME3102)ADVANCED FLUID DYNAMICS**

##### **COURSE OUTCOMES**

Students undergoing this course can will able to

1. Derive the Governing equations in Fluid dynamics using integral and differential approaches.
2. Describe Potential flows and the characteristics of Internal flows
3. Explain about laminar boundary layers and find solution methodology for boundary layer equations.
4. Summarize turbulent flow and derive governing equations of turbulent flow.
5. Conduct fluid flow experiments and identify the sources of errors in that
6. Analyse the data received in experiments

#### **(20ME3112) NUCLEAR ENGINEERING**

##### **COURSE OUTCOMES**

Upon completion of the course the student will be able to

1. State the Power production from fission process and list out the fertile materials used for the process
2. Derive diffusion equation for neutron transportation and explain the importance of slow neutrons in power production
3. Deduce solution for multi group diffusion equations in one region and multi region reactors
4. Distinguish the type of reactors and identify the best suitable site for the construction of reactor
5. Explicate the Neutron life cycle in thermal reactor and derive an equation for point kinematics in hours

6. Evaluate the temperature distribution in boiling regime using heat transfer equation explain the importance of Radioactive Waste Disposal.

### **(20ME3113) ENERGY CONSERVATION AND MANAGEMENT**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the Importance of Initiation, Organizing and Managing, Energy Management Programs
2. Critical assessment of energy usage and Importance of energy management
3. Analyze the Concepts of Energy auditing of the Investment projects
4. Understand the Relevant international standards and laws for establishing a power plant
5. Explain the Need of Energy Consultant in Planning and future strategies in power sector
6. Identify the Significance of various alternate energy resources and its energy storage and Control systems

### **(20ME3114) ENERGY MANAGEMENT IN THERMAL SYSTEMS**

#### **COURSE OUTCOMES**

On completion of the course the Students will be able to

1. Explain an overview of energy, its importance and conservation
2. Perform audit the power plants by considering various important parameters
3. Understands the usage of energy in various thermal utilities
4. Identify the method of energy transmission and its protection
5. Know about financial analysis techniques for attaining payback periods
6. Recognize the importance of numerous Energy Efficiency factors for achieving breakeven point in energy sectors

### **(20ME3115) AIR-CONDITIONING SYSTEM DESIGN**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the Parameters influencing the Effective Temperature for comfort Air conditioning
2. Classify the Air – conditioning systems like summer, winter and year round A/C Systems
3. Explain the Terms used in Air-Conditioning and the importance of bypass factor in the design of A/C system
4. Describe the working of Humidification and dehumidification equipment used for attaining required Conditions
5. Illustrate the function of grills, diffusers, fans and blowers for proper air distribution
6. Design the Air conditioning duct design for effective air distribution with less noise

### **(20ME3116) JET PROPULSION AND ROCKETRY**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Analyze the Gas turbine cycle and the influence of various design parameters on the Performance of the turbine
2. Explain the fundamentals of jet propulsion and importance of nozzles in improving the Performance
3. Describe the concept of thermo chemistry of combustion products
4. Identify the Importance of solid propulsion systems with various solid propellants
5. Formulate the heat transfer analysis in the liquid propellant rocket engines
6. Understand the concepts of thermodynamic flow analysis of Jet Propulsion

### **(20ME3117) FUELS AND COMBUSTION**

#### **COURSE OUTCOMES**

On successful Completion of this course, the student will be able to

1. State the characteristics of fuels and explain the importance of the fuel constituents by observing the fuel analysis.
2. Describe different types of solid & liquid fuels used in combustion by analyzing the properties of fuels
3. Implement the knowledge of different gaseous fuels in combustion process for deriving an equation for the chemical kinematics of the combustion
4. Interpret the combustion principles in explaining the flame propagation and flame stability.
5. Distinguish the types of combustion equipment used in coal burning and also explicate the importance of air pollution control.
6. Discuss about burning velocities of fuels and compute the velocities at various factors affecting the burning

#### **(20ME3103) THERMAL ENGINEERING LAB**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Demonstrate the Performance of Heat Exchangers & Flame propagation analysis of Gaseous fuel.
2. Explain the Heat Balance sheet and emissions of an Engine
3. Have a broad knowledge on VCR engine
4. Differentiate between the performance analysis of Heat Pipe and Air Conditioning unit
5. Identify the importance of air compressor in industries
6. Calibrate the Temperature measurement apparatus

#### **(20ME3104) COMPUTER AIDED ANALYSIS LAB**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the Analysis of a truss member under loading.
2. Explain the concepts of Tapered plate under transverse load.
3. Describe concepts of the flow of incompressible gas through an S-bend for laminar flow.
4. Design the air flow over a simple geometry (aero foil) in a wind.
5. Apply the basic principle of analysis to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
6. Explain the applications of CFD

#### **(20HS0818) ENGLISH FOR RESEARCH PAPER WRITING**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Familiarize students with the key concepts of linguistics and develop awareness of the latest trends in language study
2. Understanding of the human communicative action through an objective study of language
3. Know and appreciate the location of literature within humanities
4. Knowledge of research methods in literary studies and advanced knowledge of literature in the English language and literary theory
5. Formulate an independent, limited research project under supervision, in accordance with applicable norms, ideals and conditions for literary research.
6. Improve common and basic scholarly requirements of logical and empirical rigor.

#### **(20ME3105) ADVANCED HEAT TRANSFER**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Describe the various modes of heat transfer.
2. Differentiate between different flow process of forced and free convection
3. Have a broad knowledge on Pool Boiling and Nusselt's theory

4. Distinguish between LMTD and NTU Methods
5. Explain the Radiant heat exchange in grey, non-grey bodies
6. Understand the Steady State Heat Flow

### **(20ME3106) STEAM ENGINEERING**

#### **COURSE OUTCOMES**

Upon completion of the course the student will be able to

1. Describe the combustion process in boilers and interpret the importance of adiabatic flame temperature in combustion.
2. Derive an equation for economic thickness of Insulation for maximum heat savings in the steam lining design
3. Distinguish the types of refractory materials and determine the best refractory for reducing waste minimization
4. Assess the steam distribution and leakages in steam piping and list out the steam based equipment used
5. Explain the performance evaluation methods of boilers and the factors affecting on it
6. Illustrate the phenomenon of the control and monitoring of devices used for boiler waste minimization

### **(20ME3118) REFRIGERATION AND CRYOGENICS**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the Working principle of multistage compression systems for producing lower temperatures
2. Design, selection of evaporators, condensers, control systems
3. Different types of refrigerants to phase out CFCs .
4. Explain the Concept of insulation in the cryogenic systems
5. Describe Liquefaction process of various gases
6. Identify Effect of lower temperatures on the properties of the metals

### **(20ME3119 ) DESIGN OF HEAT EXCHANGERS**

#### **COURSE OUTCOMES**

On completion of the course the Students will be able to

1. Explain Heat exchangers and its classification.
2. Carryout heat exchanger analysis and describe fouling.
3. Design and Analyze double pipe heat exchangers.
4. Construct and analyze the Compact heat exchangers.
5. Understands about Mechanical design, simulation & optimization of heat exchangers.
6. Describe about different types of Design methodologies

### **(20ME3120) CRYOGENIC ENGINEERING**

#### **COURSE OUTCOMES**

Upon completion of this course, the student will be able to

1. List out the material properties of cryogenic materials and explain the applications of them in cryogenic Industry
2. State the basic principles of liquefaction of cryogenic fluid systems and implement this knowledge in the production of lower temperatures.
3. Distinguish various methods of separation of cryogenic gases and apply the same in the purification of cryogenic gases
4. Analyze the numerous types of refrigeration principles and differentiate the cryogenic refrigerators
5. Interpret several cryogenic fluid storage systems and identify the best methods of handling cryogenic fluids with insulations and instrumentation

6. Evaluate the design aspects of Cryogenic Storage systems and compare the heat transfer at various Insulation levels.

### **(20ME3121) COMPUTATIONAL FLUID DYNAMICS**

#### **COURSE OUTCOMES**

Students undergoing this course will be able to

1. Analyze the Experimental and hyperbolic equations of CFD
2. Explain the Concept of FDM, FVM Methodology for solving the problems
3. Describe the Flow domains, mesh and their importance.
4. Derive Diffusion Equation, Convection Equation.
5. Differentiate Staggered & Non Staggered Grid Systems.
6. Formulate Partial Differential Equations for CFD

### **(20ME3122) MODELLING OF I.C ENGINES**

#### **COURSE OUTCOMES**

Students undergoing this course will be able to

1. Learn the Approaches of modeling, model building and integration methods
2. Formulate the Thermodynamic models of CI engines.
3. Explain the Concept of fuel spray behavior, turbulent interactions.
4. Illustrate the Mathematical models of SI Engines
5. Design the Modeling of charging systems.
6. Describe Wall Heat transfer Correlations

### **(20ME3123) INSTRUMENTATION FOR THERMAL ENGINEERING**

#### **COURSE OUTCOMES**

Students undergoing this course will be able to

1. Get the knowledge on characteristics of instruments and measuring Instruments
2. Acquire knowledge on microprocessor and element of micro computer
3. Knowledge on Measurement of Physical Quantities instruments
4. Measure the advance technique instruments
5. Acquire knowledge on Measurement analyzers
6. Describe about different types of Measurement Analyzers

### **(20ME3107) COMPUTATIONAL FLUID DYNAMICS LAB**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Explain the Experimental and hyperbolic equations.
2. Describe the Geometry modeling and Grid Generation.
3. Describe the Methodology of computational fluid dynamics.
4. Illustrate both flow physics and mathematical properties of governing N-S Equations and define proper boundary conditions for solution.
5. Usage of CFD software to model relevant engineering flow problems and analyze the CFD results.
6. Formulate the Simulation in Fin by Natural Convection process

### **(20ME3108) THERMAL ENGINEERING LAB (VIRTUAL LAB)**

#### **COURSE OUTCOMES**

On completion of the course the students will be able to

1. Gains brief knowledge on rise of Taylor bubble and gas-liquid two phase flow through vertical conduit..
2. Attain the familiarized with evaporation loss from cryogenic vessel and characteristics of air lift pump.
3. Learns about conductivity probes and signals &Natural circulation loop in two phase flow.
4. Knows about bubble formation and condensation.

5. Understands about various performance parameters of I.C Engine.

6. Understand about Steam Condensation

#### **(20HS0825) CONSTITUTION OF INDIA**

#### **COURSE OUTCOMES**

On successful completion of the course the students will be able to

1. Explain the key concepts of political economy
2. Analyse the significant developments in the political ideologies
3. Describe the salient features of the constitution of India interpret, integrate and critically
4. Analyse the political economy of Indian international relations and gain knowledge in Judiciary system
5. Apply their knowledge and skills acquired to write various competitive

Examinations

6. Explain the functions of Election commission

#### **(20ME3124) DESIGN OF SOLAR AND WIND SYSTEMS**

#### **COURSE OUTCOMES**

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

1. Explain the Solar radiation estimation and measurement, solar energy collectors
2. Describe the Concept of Nuclear reactor, nuclear waste disposal
3. Classify the Methods of wind energy conversion systems and Geothermal Energy
4. Express the Production, storage methods of Hydrogen
5. Describe the Direct energy conversion methods.
6. Importance of Nuclear Waste Disposal from power plants

#### **(20ME3125) FINITE ELEMENT METHODS IN THERMAL ENGINEERING**

#### **COURSE OUTCOMES**

On successful completion of the course the Students will be able to

1. Formulate the experimental and basic equations.
2. Describe the problems on bar, analysis of beams and frames.
3. Discuss the boundary layer condition and Numerical integration.
4. Explain the Generalist heat conduction equation.
5. Illustrate the processes mesh generation, boundary conditions.
6. Analyze the Analysis of Frames & Beams

#### **(20ME3126) THERMAL MEASUREMENTS AND PROCESS CONTROLS**

#### **COURSE OUTCOMES**

Upon completion of the course the Students will be able to

1. Understand the basic Instruments and general concepts.
2. Describe the working of different Pressure Measurement Instruments.
3. Illustrate different working of Flow measurement
4. Discuss about the Generalist Temperature Measurement Instruments.
5. Differentiate the difference of Velocity and density Measurement.
6. Describe the working of water level measuring Instruments

#### **(20HS0824) BUSINESS ANALYTICS**

#### **COURSE OUTCOMES**

On successful completion of course student will be able to

1. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
2. Design alternatives to solve business problems utilizing quantitative analysis, critical thinking and sound ethical decision making.
3. Summarize, process and transform data for obtaining meaningful conclusions
4. Interpret data using latest data analytics tools to address organizational problems
5. Organize and critically apply the concepts and methods of business analytics
6. Assess decision problems and build models for creating solutions using business analytical tools.

### **(20CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS**

#### **COURSE OUTCOMES**

At the end of the course, the students are able to

1. Summarize the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.
2. Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
3. Summarize the meaning and different types of project management and project

Execution, detailed engineering activities.

4. Understand the project contracts
5. Describe the cost behavior and profit planning types and contents, Bar charts and Network diagram.
6. Analyze by using quantitative techniques for cost management like PERT/CPM

### **(20EE2128) WASTE TO ENERGY**

#### **COURSE OUTCOMES**

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

1. Analyse agro based, forest residue and industrial waste conversion processes.
2. Describe the Manufacture of Pyrolytic oils and gases
3. Discuss about the methods of Manufacture of charcoal and its applications
4. Understand various types of gasifiers operation
5. Understand inclined and fluidized bed combustors operation
6. Understand types of biogas plants and biomass energy programme in India

### **(20ME3026) INDUSTRIAL SAFETY**

#### **COURSE OUTCOMES**

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

1. Explain the Points of factories act 1948 for health and safety.
2. Define the term Cost & its relation with replacement economy.
3. Recognize the Concept of Wear, Corrosion and its Prevention methods
4. Understand the Concept of sequence of fault finding activities and the importance of decision tree
5. Elaborate the importance of scheduled preventive maintenance of mechanical and electrical equipment.
6. Distinguish between Periodic and Preventive maintenance of equipments

### **(20ME3027) ADVANCES IN OPERATIONS RESEARCH**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Create mathematical models of the real time situations.
2. Implement Transportation and Assignment problems to solve in real time industry
3. Choose the best strategy of Game and capable of identifying the suitable queuing Theory
4. Enumerate fundamental techniques and apply it to solve various optimization

areas

5. Investigate, study, Apply knowledge in Replacement models and Inventory Control Models
6. Understand the Inventory control Models

### **(20ME3028) COMPOSITE MATERIALS**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Explain the Fundamental concept of composite materials.
2. Classify different types of composite materials.
3. Describe the Fabrication and processing of composite materials.
4. Illustrate the Methods of preparation of Metal matrix Composites and polymer matrix composites
5. Discuss about the Mechanical behavior of composite materials.
6. Explain the application of composite materials.

### **SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)**

#### **Computer Aided Design and Manufacturing**

#### **M. Tech. – I Semester (CAD&CAM)**

### **(20HS0823) RESEARCH METHODOLOGY AND IPR**

#### **COURSE OUTCOMES**

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

1. Explain the key concepts and issues in research and basic framework of research process.
2. Formulate appropriate research problem and implement suitable research design for the research problem.
3. Identify various sources of information for literature review and data collection.
4. Develop an understanding of ethics in conducting applied research and make use of components of scholarly writing in report preparation.
5. Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
6. Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.

### **(20HS0840) COMPUTATIONAL METHODS**

#### **COURSE OUTCOMES**

On successful Completion of this course, students will be able to

1. Acquire ability to participate effectively in group discussions.
2. Develop ability in writing in various contexts.

3. Acquire a proper level of competence for employability.
4. Improve computational skills to solve real world problems in engineering.
5. Introduce the fundamentals of numerical and asymptotic computational methods, Including optimization, and apply these methods to engineering problems.
6. Apply advanced mathematics through multivariate calculus and differential equations.

### **(20ME3001) COMPUTER INTEGRATED MANUFACTURING**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Define manufacturing Systems, automation and need of interdisciplinary fields of CAD/CAM.
2. Describe the NC part programming and develop the manual part programming.
3. Operate different types of CNC /DNC machine and sort the manufactured parts using Group Technology.
4. Formulate and solve the problems in FMS and integrate the systems with CIM.
5. Interrelate the different systems like CAPP, MRP with CIM.
6. Design as suitable products that can be manufactured using CIM technology.

### **(20ME3011) GEOMETRIC MODELING**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the need for and different applications of geometric modeling techniques.
2. Know some of the technical solutions.
3. Able to apply the range of solutions to problems involving 3D objects.
4. Implement the knowledge being learned and shortens the overall Learning curve which is necessary to solve CAE problems that arise in engineering.
5. Familiarized with the computer graphics application in Design.
6. Know about Cubic splines and its applications in Automotive and Aviation Industries.

### **(20ME3012) CNC TECHNOLOGY & PROGRAMMING**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand fundamentals of NC/CNC.
2. Distinguish the product specification methods.
3. Learn Tooling for NC/CNC.
4. Maintain and Troubleshoot CNC Machine Tools.
5. Recall the need of design and manufacturing integration.
6. Explain about construction Features of CNC Machines.

### **(20ME3013) ADDITIVE MANUFACTURING AND TOOLING**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand history, concepts and terminology of additive manufacturing.
2. Apply the reverse engineering concepts for design development.
3. Explain the various types of additive manufacturing techniques.
4. Design and develop newer tooling models.
5. Analyse the cases relevant to mass customization and some of the important research challenges associated with AM and its data processing tools.
6. Understand about Solid Ground curing and its applications

### **(20ME3014) QUALITY ENGINEERING AND MANUFACTURING**

#### **COURSE OUTCOMES**

At the end of this course the students

1. Know about quality engineering, its value and its economic impact on enforcement.
2. Understand importance of tolerance and its allocation in design of a component.
3. Aware of strategies adopted while parameter and tolerance designing.
4. Know steps involved in DOE and analysis of occurrence of variance.
5. Easily interpolate experimental results, analyze and get the conclusions.
6. Can understand about Quality Levels in various Industries.

#### **(20ME3015) COMPUTER AIDED PROCESS PLANNING**

##### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Distinguish the concepts of process planning applicable to manufacturing in consideration with production planning, concurrent engineering
2. Execute part design representations for process planning using different coding systems
3. Generate the structure of automated process planning system and uses the principle of generative and retrieval CAPP systems for automation
4. Implement logical design concepts for computer aided process planning systems
5. Design process planning systems using different software's
6. Create awareness about the implementation techniques for CAPP

#### **(20ME3016) MECHANICAL BEHAVIOR OF MATERIALS**

##### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Define and discuss the mechanical behavior of materials and analysis of fracture mechanism maps.
2. Describe the Material behavior under dynamic loads and design approaches.
3. Have a broad knowledge on different types of Material properties and its selection.
4. Use of modern metallic materials for engineering structure.
5. Elucidate the manufacturing methods of nonmetallic materials like polymers and other materials for Industrial and other applications.
6. Explain about Modern Metallic Materials and its applications.

#### **(20ME3002) COMPUTER AIDED DESIGN LAB**

##### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Be familiarize with computer aided drafting.
2. Draw the various components using CAD modeling software.
3. Sketch the plans of Automobile parts using software.
4. Develop sections and elevations for machine elements.
5. Illustrate the assembly of flange coupling.
6. Discuss about the concepts of geometric Modeling.

#### **(20ME3003) COMPUTER MODELING LAB**

##### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Demonstrate the different tools used in solid works software.
2. Have a broad knowledge on different types of -Riveted joint for Plates.
3. Differentiate between different types of Bolt & Nut and Piston.
4. Identify the applications of different types of Screw Jack and Connecting rod.
5. Have a broad knowledge on different types of Flange Coupling .
6. Describe about Propeller shaft

#### **(20HS0818) ENGLISH FOR RESEARCH PAPER WRITING**

##### **COURSE OUTCOMES**

On completion of the course the students will be able to

1. Familiarize students with the key concepts of linguistics and develop awareness of the latest trends in language study.
2. Lead to a greater understanding of the human communicative action through an objective study of language.
3. Know and appreciate the location of literature within humanities.
4. Gain knowledge of research methods in literary studies and advanced knowledge of literature in the English language and literary theory.
5. Carry out an independent, limited research project under supervision, in accordance with applicable norms, ideals and conditions for literary research, to a degree of academic excellence that satisfies common and basic scholarly requirements of logical and empirical rigor.
6. Use effective strategies and techniques to construct their academic projects.

#### **(20ME3004) FINITE ELEMENT METHODS**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the concepts behind formulation methods in FEM.
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
3. Develop element characteristic equation and generation of global equation.
4. Apply suitable boundary conditions to a global equation for bars, trusses, beams etc.
5. Understand the concepts of Nodes and elements.
6. Solving the problems related to Heat Transfer.

#### **(20ME3005) RAPID PROTOTYPING**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Apply solid modeling concepts and techniques in RP.
2. Analyze and implement the different algorithms associated with STL file errors.
3. Calculate the layer thickness in different layering techniques.
4. Carry out design manipulations for the generation of support structure.
5. Identify, characterize and select the ideal materials for a given Rapid Prototyping system.
6. Understand the working principles of stereo lithography system.

#### **(20ME3017) ADVANCES IN MANUFACTURING TECHNOLOGY**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Define and describe the fundamentals and principals of advanced manufacturing Technology.
2. Apply relevant theories to solve manufacturing problems.
3. Explain manufacturing processes via experimental and theoretical analyses.
4. Relate manufacturing theory to practice through laboratory experiments.
5. Improve a manufacturing process either working in a team or individually.
6. Describe about Surface processing Operations.

#### **(20ME3018) ADVANCED OPTIMIZATION TECHNIQUES**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Explain the fundamental knowledge of Linear Programming and Dynamic

- Programming problems.
2. Use classical optimization techniques and numerical methods of optimization.
  3. Describe the basics of different evolutionary algorithms.
  4. Enumerate fundamentals of Integer programming technique and apply different Techniques to solve various optimization problems arising from engineering areas.
  5. Investigate, study, develop, organize and promote innovative solutions for various applications.
  6. Solve the Assignment Problems.

### **(20ME3019) PRODUCT LIFE CYCLE MANAGEMENT**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand history, concepts and terminology of PLM.
2. Apply the functions and features of PLM.
3. Analyse the case studies.
4. Understand PLM/PDM implementation approaches.
5. Integrate PLM/PDM with other applications.
6. Understand the PDM Infrastructure

### **(20ME3020) COMPUTER GRAPHICS**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Demonstrate the different computer hardware.
2. Describe the various properties of different algorithms.
3. Have a broad knowledge on different types of clipping algorithms & transformations.
4. Differentiate between different types of Rendering used in Industrial Application.
5. Identify the applications of different types of Shading Algorithms.
6. Explain about Raster Scan Graphics

### **(20ME3021) ROBOTICS**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Demonstrate knowledge of the relationship between mechanical structures of industrial robots and their operational workspace characteristics.
2. Apply spatial transformation to obtain forward kinematics equation of robot manipulators.
3. Solve inverse kinematics of simple robot manipulators.
4. Obtain the Jacobian matrix and use it to identify singularities.
5. Generate joint trajectory for motion planning.
6. Explain about Robot Kinematics.

### **(20ME3022) NON DESTRUCTIVE TESTING**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Provide better understanding of the principles of various Non-destructive testing methods.
2. Able to select appropriate NDT method for testing of defects.
3. Understand the concept of liquid penetrant and magnetic particle testing.
4. Acquire knowledge of ultrasonic inspection techniques.
5. Acquire knowledge of recent techniques of NDT.
6. Describe about various non-destructive testing methods like Ultrasonic Testing.

## **(20ME3006) MANUFACTURING ENGINEERING LAB ( VIRTUAL LAB)**

### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Understand the Concept of digital fabrication.
2. Design and fabrication of different types of circuit boards.
3. Distinguish between 3D scanning and 3D machining processes
4. Discuss about various methods and tools used in micro machining process.
5. Elaborate the Mechanism from Lazarenko's model.
6. Create molding and Casting of Polyurethane parts.

## **(20ME3007) COMPUTER AIDED ANALYSIS LAB**

### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Analyze the Analysis of a truss member under loading.
2. Discuss the Concepts of Analysis of Tapered plate under transverse load.
3. Explain the Flow of incompressible gas through an S-bend for laminar flow.
4. Formulate the Analysis of conductive heat transfer of different geometry 2D components.
5. Usage of MATLAB software for training and testing.
6. Understand the Heat Transfer Analysis in Different Geometry 2D Components.

## **(20HS0825) CONSTITUTION OF INDIA**

### **COURSE OUTCOMES**

On completion of the course the students will able to

1. Explain the key concepts of political economy.
2. Analyse the significant developments in the political ideologies.
3. Describe the salient features of the constitution of India interpret, integrate and

Critically.

4. Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.
5. Apply their knowledge and skills acquired to write various competitive Examinations.
6. Acquire through knowledge on the constitution of India.

## **(20ME3023) MECHATRONICS**

### **COURSE OUTCOMES**

On successful completion of the course the students will be able to

1. Illustrate the usage of Mechatronics systems and Artificial intelligence for manufacturing sectors.
2. Explain the working principles and classification of sensors and transducers.
3. Describe the basic structure and operation of Microcontroller and Microprocessor
4. Interpret the basic structure and categorize the components used in Programmable logic controller.
  
5. Explain the Concept of Data Base Management System and its usage in CAD/CAM.
6. Elucidate about Transducers and its applications in real life.

## **(20ME3024) MECHANICS OF COMPOSITES**

### **COURSE OUTCOMES**

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

1. Elucidate the mechanical characteristics of composite materials.
2. Evaluate and estimate the micromechanical behavior of the materials.
3. Define the coordinate transformation of composite materials
4. Design the elastic behaviour on unidirectional composite materials.
5. Formulate of laminate composite materials and its behaviors.

6. Develop new methods of manufacturing composites.

### **(20ME3025) INDUSTRIAL ROBOTICS AND EXPERT SYSTEMS**

#### **COURSE OUTCOMES**

On successful Completion of this course the student will be able to:

1. Understand fundamentals of Robotics.
2. Provide better understanding of the principles of controlling the Robot motion.
3. Design robots and robotic work cells.
4. Acquire knowledge of write program for controlling the robots.
5. Apply artificial intelligence and expert systems in robotics.
6. Understand about Robot Kinematics.

### **(20HS0824) BUSINESS ANALYTICS**

#### **COURSE OUTCOMES**

On successful completion of course student will be able to:

1. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
2. Design alternatives to solve business problems utilizing quantitative analysis, critical thinking and sound ethical decision making.
3. Summarize, process and transform data for obtaining meaningful conclusions
4. Interpret data using latest data analytics tools to address organizational problems
5. Organize and critically apply the concepts and methods of business analytics
6. Assess decision problems and build models for creating solutions using business analytical tools.

### **(20CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS**

#### **COURSE OUTCOMES**

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

1. Summarize the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.
2. Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
3. Summarize the meaning and different types of project management and project execution, detailed engineering activities.
4. Understand the project contracts.
5. Describe the cost behavior and profit planning types and contents, Bar charts and Network diagram.
6. Analyze by using quantitative techniques for cost management like PERT/CPM.

### **(20EE2128) WASTE TO ENERGY**

#### **COURSE OUTCOMES**

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

1. Analyse agro based, forest residue and industrial waste conversion processes.
2. Manufacture of Pyrolytic oils and gases.
3. Manufacture of charcoal, yields and applications.
4. Understand various types of gasifiers operation.
5. Understand inclined and fluidized bed combustors operation.
6. Understand types of biogas plants and biomass energy programme in India.

### **(20ME3026) INDUSTRIAL SAFETY**

## **COURSE OUTCOMES**

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

1. Explain the Points of factories act 1948 for health and safety.
2. Define the term Cost & its relation with replacement economy.
3. Recognize the Concept of Wear, Corrosion and its Prevention methods.
4. Understand the Concept of sequence of fault finding activities and the importance of decision tree.
5. Elaborate the importance of scheduled preventive maintenance of mechanical and electrical equipment.
6. Distinguish between Periodic and Preventive maintenance of equipments.

## **(20ME3027) ADVANCES IN OPERATIONS RESEARCH**

## **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Create mathematical models of the real time situations.
2. Implement Transportation and Assignment problems to solve in real time industry.
3. Choose the best strategy of Game and capable of identifying the suitable queuing Theory.
4. Enumerate fundamental techniques and apply it to solve various optimization

areas.

5. Investigate, study, Apply knowledge in Replacement models and Inventory Control Models.
6. Understand the Inventory control Models.

## **(20ME3028) COMPOSITE MATERIALS**

## **COURSE OUTCOMES**

On successful Completion of this course the student will be able to

1. Explain the Fundamental concept of composite materials.
2. Classify different types of composite materials.
3. Describe the Fabrication and processing of composite materials.
4. Illustrate the Methods of preparation of Metal matrix Composites and polymer matrix composites.
5. Discuss about the Mechanical behavior of composite materials.
6. Explain the application of composite materials.

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
**(AUTONOMOUS)**

**M.Tech. (Electronics and Communication Engineering)**

**Specialization: Digital Electronics & Communication Systems**

**Regulation-R20**

**I M.Tech. – I Semester**

### **(20HS0823) RESEARCH METHODOLOGY AND IPR**

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

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

1. *Recognize appropriate research problem, errors in selecting a research problem, Scope and objectives of research*
2. *Critically assess research methods pertinent to technology innovation research*
3. *Identify, explain, compare, and prepare the key elements of a research proposal/report*
4. *Skill to understand the need of intellectual property rights, IPR protection to inventors*
5. *Develop procedural knowledge to Legal System and solving the problem relating to intellectual property rights for further research work and investment in R & D*

### **(20EC4001) ADVANCED DIGITAL SYSTEM DESIGN**

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

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

1. *Knowledge of digital integrated circuit hardware design.*
2. *Analyze and design combinational and sequential digital circuits.*
3. *Identify the requirements and specifications of the system required for a given application.*
4. *Able to learn the benefits and drawbacks of various design methods.*
5. *Test the performance of combinational and sequential digital circuits.*

### **(20EC4002) ADVANCED DIGITAL SIGNAL PROCESSING**

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

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

1. *Know the analysis of discrete time signals.*
2. *To study the modern digital signal processing algorithms and applications.*
3. *Have an in-depth knowledge of use of digital systems in real time applications.*
4. *Apply the algorithms for wide area of recent applications in digital signal processing.*
5. *To study the modern filter design and implementation.*

### **(20EC4003) ANTENNA and RADIATING SYSTEMS (Programme Elective –I)**

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

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

1. *Understanding the Basic Principles and Radiation of Antennas.*
2. *Recognizing Fundamental Parameters of Antennas.*
3. *Explain Dipole Antennas, Establish Mathematical Equations for Various Parameters of thin Linear Antenna.*

4. Understanding the Various Types of Antenna Arrays.
5. Design Wire Antennas, Loop Antennas, Reflector Antennas, Lens Antennas, Horn Antennas and Micro Strip Antennas.

**(20EC4004) DIGITAL COMMUNICATION TECHNIQUES**  
**(Programme Elective –I)**

**COURSE OUTCOMES (COs)**

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

1. Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
2. Perform the time and frequency domain analysis of the signals in a digital communication system.
3. Select the blocks in a design of digital communication system.
4. Analyze Performance of spread spectrum communication system.
5. Analyze Performance of OFDM communication system.

**(20EC4005) DSP PROCESSORS & ARCHITECTURES**  
**(Programme Elective –I)**

**COURSE OUTCOMES (COs)**

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

1. Understand the basics of Digital Signal Processing and transforms.
2. Able to distinguish between the architectural features of General purpose processors and DSP processors.
3. Understand the architectures of TMS320C54xx devices.
4. Able to write simple assembly language programs using instruction set of TMS320C54xx knowledge.
5. Can Interface various devices to DSP Processors.

**(20EC4006) HIGH SPEED NETWORKS**  
**(Programme Elective –II)**

**COURSE OUTCOMES (COs)**

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

1. Gets an in-depth knowledge of High-Speed Networks and TCP/IP protocols.
2. Knows about the security and network management.
3. Analyze the cause of congestion, traffic slow down and related factors for Quality of Service.
4. Understand about ATM and Frame relay.
5. Explain the major techniques involved, and networks & systems issues for the design and implementation of High-Speednetworks.

**(20EC4007) VOICE and DATA NETWORKS**  
**(Programme Elective – II)**

**COURSE OUTCOMES (COs)**

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

1. *Design a voice and data network.*
2. *Understand network terminology and network switching.*
3. *Understand about multiple access protocols.*
4. *Design a network with ip addresses and make subnets of the networks.*
5. *Understand quality of service in packet networks.*

**(20EC4008) WIRELESS SENSOR NETWORKS**  
**(Programme Elective – II)**

**COURSE OUTCOMES (COs)**

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

1. *Able to understand the basic WSN technology and supporting protocols, with emphasis.*
2. *Able to understand the sensor network hardware and operating systems.*
3. *Able to understand the sensor network protocols and addresses physical layer issues.*
4. *Able to understand and differentiate database management systems, data storage and Query processing.*
5. *Able to design and deploy the sensor networks.*

**(20EC4009) ADVANCED DIGITAL SIGNAL PROCESSING LAB (Virtual Lab)**

**COURSE OUTCOMES (COs)**

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

1. *Understand the handling of discrete/digital signals using MATLAB.*
2. *Understand the basic operations of Signal processing.*
3. *Analyze the spectral parameter of window functions.*
4. *Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters.*
5. *Design the signal processing algorithm using MATLAB & VLAB.*

**(20EC4010) ADVANCED DIGITAL SYSTEM DESIGN LAB**

**COURSE OUTCOMES (COs)**

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

1. *Achieve Knowledge and Awareness of various components to design stable analog circuits.*
2. *Represent numbers and perform arithmetic operations.*
3. *Minimize the Boolean expression using Boolean algebra and design it using logic gates*
4. *Analyze and design combinational circuit.*
5. *Design and develop sequential circuits.*
6. *Translate real world problems into digital logic formulations using VHDL.*

**(20HS0818) ENGLISH FOR RESEARCH PAPER WRITING**

**COURSE OUTCOMES (COs)**

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

1. *To recognize and demonstrate the style and conventions of research writing.*
2. *To improve the clarity and coherence of their written proposal.*
3. *Able to use a variety of sentence patterns.*
4. *To enhance their revision and proofreading skills.*
5. *To use effective strategies and techniques to construct their academic projects*

### **I M. Tech. – II Sem.**

#### **(20EC4011) WIRELESS COMMUNICATIONS**

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

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

1. *To understand the basics of Wireless Communication.*
2. *To motivate the students to pursue research in the area of wireless communication.*
3. *Analyze and design receiver and transmitter diversity techniques.*
4. *Analyze Multiuser Systems, SSMA, CDMA network planning.*
5. *Summarize the principles of MIMO and specifications of communication standards.*

#### **(20EC4012) CODING THEORY & TECHNIQUES**

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

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

1. *Knowledge of properties and algorithms of linear block codes.*
2. *Apply coding theory and linear algebra in source coding and channel coding.*
3. *Understand various error control encoding and decoding techniques.*
4. *Knowledge of properties and algorithms of cyclic codes and convolution codes.*
5. *Analyze the performance of error control codes.*

#### **(20EC4109) INTRODUCTION TO IoT (Programme Elective – III)**

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

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

1. *Discuss the world of current technologies.*
2. *Describe the major application areas of IoT.*
3. *Describe about the networking in IoT.*
4. *Apply the concepts of python programming in IoT.*
5. *Design & develop IoT applications using python.*

#### **(20EC4013) ADAPTIVE SIGNAL PROCESSING (Programme Elective – III)**

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

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

1. Comprehend adaptive system and functions.
2. Understand the design criteria for a linear adaptive processor.
3. Develop different adaptive modelling systems.
4. Understand the properties of Kalman filtering.
5. Understand the properties of Non-Linear Adaptive Filtering.

**(20EC4014) COGNITIVE RADIO**  
**(Programme Elective – III)**

**COURSE OUTCOMES (COs)**

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

1. Demonstrate an understanding on software defined radio architecture and design principles.
2. Demonstrate an understanding on cognitive radio components, functions and capabilities.
3. Evaluate different spectrum sensing mechanisms in cognitive radio.
4. Analyse the spectrum management functions using cognitive radio systems and cognitive radio networks.
5. Demonstrate an understanding on cooperative communications.

**(20EC4015) IMAGE & VIDEO PROCESSING**  
**(Programme Elective – IV)**

**COURSE OUTCOMES (COs)**

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

1. Describe and use the principles of digital image and video processing to develop image processing algorithms.
2. Implement (for example with MATLAB) and assess the developed image processing algorithms.
3. Explain algorithm design choices using the principles of digital image/video processing.
4. Develop image processing algorithms for a given practical image/video processing problem.
5. Solve more advanced problems in all areas mentioned above
6. Identify and explain the challenges, propose possible solutions, and explain the chosen algorithm design.

**(20EC4016) PATTERN RECOGNITION AND MACHINE LEARNING**  
**(Programme Elective – IV)**

**COURSE OUTCOMES (COs)**

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

1. Able to understand the Bayesian approach to pattern recognition.
2. Able to Understand Linear Models for Regression and Classification.

3. Analyze the performance of neural networks.
4. Able to Understand Linear Discriminant Functions for Machine Learning.
5. Able to Understand Algorithm Independent MachineLearning .

**(20EC4017) DETECTION & ESTIMATION OF SIGNALS  
(Programme Elective – IV)**

**COURSE OUTCOMES (COs)**

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

1. To enable the students to acquire the fundamental concepts of Signal Detection and Estimation.
2. To get familiarize with different Hypotheses in detection and estimation problems
3. Use classical and Bayesian approaches to formulate and solve problems for parameter estimation from noisy signals.
4. To introduce the methods of Detection and estimation of signals in white and non-white Gaussian noise.
5. To enable the students to understand the time varying waveform detection and its estimation.

**(20EC4018) ADVANCED COMMUNICATIONS LAB (Virtual Lab)**

**COURSE OUTCOMES (COs)**

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

1. Understand the concepts behind various digital signaling schemes for fading channels.
2. Understand the concept of co-channel interference & Signal to Interference and Noise Ratio.
3. Understand the importance of Sectoring & Handoff.
4. Understand the impact of shadowing and path loss exponent on boundary coverage probability.
5. Understand the various Path losses that occur in real time.

**(20EC4019) IMAGE & VIDEO PROCESSING LAB**

**COURSE OUTCOMES (COs)**

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

1. Examine various types of images, intensity transformations and applying various filtering techniques.
2. Identify the suitable image enhancement and restoration techniques based upon the application.
3. Show how higher-level image concepts such as edge detection, segmentation, representation can be implemented and used.
4. To manipulate both binary and grayscale digital images using morphological filters and operators to achieve a desired result.
5. Apply image processing algorithms in practical applications.

**(20HS0829) CONSTITUTION OF INDIA**

**COURSE OUTCOMES (COs)**

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

1. Explain the key concepts of political economy
2. Analyse the significant developments in the political ideologies

3. *Describe the salient features of the constitution of India interpret, integrate and critically*
4. *Analyse the political economy of Indian international relations and gain knowledge in Judiciary system*
5. *Apply their knowledge and skills acquired to write various competitive examinations*

## **II M.TechI Sem.**

### **(20EC4021 ) OPTICAL NETWORKS (Programme Elective – V)**

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

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

1. *Describe the various layers involved in network & Recall basic laws of optical physics.*
2. *Identify the necessity for using couplers and connectors in energy transmission.*
3. *Identify the various multiplexing techniques.*
4. *Recall basic of multiplexers add/drop.*
5. *Identify different types of protection in SONET/SDH.*
6. *Explain the use of cost tradeoffs & Able to know the overview of access network.*

### **(20EC4213) TESTING & TESTABILITY (Programme Elective – V)**

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

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

1. *Understand the elementary concepts of Testing and Testability.*
2. *Understand different types of faults associated with logic circuits and types of testing by employing fault models to the logic circuits.*
3. *Get complete knowledge about different methods of simulation and algorithms associated with testing.*
4. *Analyze BIST concepts and design self-test at Board Level.*
5. *Analyze Memory Test Requirements for MBIST and Embedded Core Testing.*
6. *Apply the concepts in testing which can help them design a better yield in IC design.*

### **(20EC4022) RF AND MICROWAVE CIRCUIT DESIGN (Programme Elective – V)**

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

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

1. *Establish and develop the overall knowledge of RF and microwave circuits and devices and relation between different parameters.*
2. *Design impedance matching network for any transmission line or system and familiarity with passive microwave components.*
3. *Use Smith Chart in RF applications.*
4. *Model and analyze the characteristics of microwave semiconductor diodes and transistors.*

5. Analyze and find applications and limitations of microwave tube Generators and Amplifiers.
6. Evaluate the Performance of RF active circuits through EDA tools.

**(20HS0824) BUSINESS ANALYTICS**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

7. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
8. Design alternatives to solve business problems utilizing quantitative analysis, critical thinking and sound ethical decision making.
9. Summarize, process and transform data for obtaining meaningful conclusions
10. Interpret data using latest data analytics tools to address organisational problems
11. Organize and critically apply the concepts and methods of business analytics
12. Assess decision problems and build models for creating solutions using business analytical tools.

**(20CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

On successful Completion of this course, the student will be able to

1. Summarise the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.
2. Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
3. Summarise the meaning and different types of project management and project execution, detailed engineering activities.
4. Understand the project contracts,
5. Describe the cost behaviour and profit planning types and contents, Bar charts and Network diagram.
6. Analyse by using quantitative techniques for cost management like PERT/CPM.

**(20EE2128) WASTE TO ENERGY**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

1. Analyse agro based, forest residue and industrial waste conversion processes.
2. Manufacture of Pyrolytic oils and gases
3. Manufacture of charcoal, yields and applications
4. Understand various types of gasifiers operation
5. Understand inclined and fluidized bed combustors operation
6. Understand types of biogas plants and biomass energy programme in India

**(20ME3121) INDUSTRIAL SAFETY**

### **(Open Elective)**

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

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

7. *Explain the Points of factories act 2048 for health and safety.*
8. *Define the term Cost & its relation with replacement economy.*
9. *Recognize the Concept of Wear, Corrosion and its Prevention methods*
10. *Understand the Concept of sequence of fault finding activities and the importance of decision tree*
11. *Elaborate the importance of scheduled preventive maintenance of mechanical and electrical equipment.*
12. *Distinguish between Periodic and Preventive maintenance of equipments.*

### **(20ME3021) ADVANCES IN OPERATIONS RESEARCH**

### **(Open Elective)**

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

On successful Completion of this course the student will be able to

1. *Create mathematical models of the real time situations.*
2. *Implement Transportation and Assignment problems to solve in real time industry*
3. *Choose the best strategy of Game and capable of identifying the suitable queuing theory*
4. *Enumerate fundamental techniques and apply it to solve various optimization areas*
5. *Investigate, study, Apply knowledge in Replacement models and*
6. *Understand the Inventory control Models*

### **(20ME3022) COMPOSITE MATERIALS**

### **(Open Elective)**

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

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

7. *Explain the Fundamental concept of composite materials.*
8. *Classify different types of composite materials.*
9. *Describe the Fabrication and processing of composite materials.*
10. *Illustrate the Methods of preparation of Metal matrix Composites and polymer matrix composites*
11. *Discuss about the Mechanical behavior of composite materials.*
12. *Explain the application of composite materials.*

## **SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR**

**(AUTONOMOUS)**

**M.Tech. (Electronics and Communication Engineering)**

**Specialization: Embedded Systems**

**Regulation-R20**

**I M.Tech – I Sem.**

### **(20HS0823) RESEARCH METHODOLOGY AND IPR**

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

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

1. *Recognize appropriate research problem, errors in selecting a research problem, Scope and objectives of research*
2. *Critically assess research methods pertinent to technology innovation research*
3. *Identify, explain, compare, and prepare the key elements of a research proposal/report*
4. *Skill to understand the need of intellectual property rights, IPR protection to inventors*
5. *Develop procedural knowledge to Legal System and solving the problem relating to intellectual property rights for further research work and investment in R & D*

### **(20EC4101)EMBEDDED SYSTEM DESIGN**

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

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

1. *Apply and analyse the applications in various processors and domains of embedded system*
2. *Analyse and develop embedded hardware and software development cycles and tools.*
3. *Analyse and understand a microprocessor and core of the embedded system.*
4. *Analyse to understand different concepts of a RTOS, sensors, memory interface, and communication interface.*
5. *Solve real world problems by doing projects using embedded systems.*

### **(20EC4102) SENSORS AND ACTUATORS**

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

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

1. *Describe basic laws and phenomena that define behaviour of sensors and actuator.,*
2. *Analyse various premises, approaches, procedures and results related to sensors and actuators.*
3. *Create analytical design and development solutions for sensors and actuator.*
4. *Conduct experiments and measurements in laboratory and on real components, sensors and actuators.*
5. *Describe development and application of sensors and actuators,*
6. *Take part in team work and be able to independently present various professional materials.*

**(20EC4103) STRUCTURAL DIGITAL SYSTEM DESIGN**  
**(Programme Elective-I)**

**COURSE OUTCOMES (COs)**

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

1. *Understand structural functionality of different digital blocks*
2. *Represent their designs in ASM charts*
3. *Realize their designs in ASM charts*
4. *Represent their designs in different modelling styles by using VHDL*
5. *Understand concept of Micro program and issues related to micro programming*

**(20EC4209) FPGA ARCHITECTURES & APPLICATIONS**  
**(Programme Elective-I)**

**COURSE OUTCOMES (COs)**

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

1. *Acquire Knowledge about Various Architectures and Device Technologies Of PLD's*
2. *Comprehend FPGA Architectures.*
3. *Describe FSM and Different FSM Techniques like Petrinets & Different Case Studies.*
4. *Acquire Knowledge on Hot Design Method*
5. *Analyze System Level Design and Their Application for Combinational and Sequential Circuits*

**(20EC4104) REAL TIME OPERATING SYSTEMS**  
**(Programme Elective-I)**

**COURSE OUTCOMES (COs)**

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

1. *Summarize the issues in real time computing*
2. *Explain and give examples of real time operating systems.*
3. *Solve scheduling problems and can apply them in real time applications in industry.*
4. *Design an RTOS and will be able to interpret the feasibility of a task set to accomplish or not.*
5. *Analyse the situation of fault occurrence and will be able to apply solutions accordingly.*

**(20EC4105) EMBEDDED NETWORKING**  
**(Programme Elective-II)**

## **COURSE OUTCOMES (COs)**

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

1. *Analyse the use of embedded networks in real time applications.*
2. *Analyse fundamentals of embedded communication protocols.*
3. *Apply the concepts of embedded Ethernet in embedded networking.*
4. *Apply the knowledge of wireless embedded networking in the design of network embedded systems.*

## **(20EC4011) WIRELESS COMMUNICATIONS (Programme Elective-II)**

## **COURSE OUTCOMES (COs)**

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

1. *To understand the basics of Wireless Communication.*
2. *To motivate the students to pursue research in the area of wireless communication.*
3. *Analyze and design receiver and transmitter diversity techniques*
4. *Analyze Multiuser Systems, SSMA, CDMA network planning.*
5. *Summarize the principles of MIMO and specifications of communication standards.*

## **(20EC4106) INTERNET PROTOCOLS (Programme Elective-II)**

## **COURSE OUTCOMES (COs)**

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

1. *Independently understand basic computer network technology.*
2. *Understand and explain Data Communications System and its components.*
3. *Enumerate the layers of the OSI model and TCP/IP.*
4. *Identify the different types of network devices and their functions within a network*
5. *Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.*

## **(20EC4107) EMBEDDED SYSTEM DESIGN LAB**

## **COURSE OUTCOMES (COs)**

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

1. *Experience with a set of tools for embedded systems programming and debugging.*
2. *Experience with implementing several embedded systems with particular focus on the interaction ARM-926 with RTOS devices.*
3. *Design products using ARM-CORTEX processor and various analog and digital ICs.*

## **(20EC4108) STRUCTURAL DIGITAL SYSTEM DESIGN LAB**

## **COURSE OUTCOMES (COs)**

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

1. Different modeling styles available in VHDL and Verilog and difference between them
2. Difference between Verilog and VHDL
3. Representation of different digital modules in different modelling styles available in VHDL and Verilog

### **(20HS0818) ENGLISH FOR RESEARCH PAPER WRITING**

**(Audit Course)**

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

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

1. Familiarize students with the key concepts of linguistics and develop awareness of the latest trends in language study.
2. Lead to a greater understanding of the human communicative action through an objective study of language.
3. Know and appreciate the location of literature within humanities.
4. Gain knowledge of research methods in literary studies and advanced knowledge of literature in the English language and literary theory.
5. Carry out an independent, limited research project under supervision, in accordance with applicable norms, ideals and conditions for literary research.
6. Improve common and basic scholarly requirements of logical and empirical rigor.

#### **I M.Tech – II Sem.**

### **(20EC4109) INTRODUCTION TO IoT**

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

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

1. Discuss the world of current technologies.
2. Describe the major application areas of IoT.
3. Describe about the networking in IoT.
4. Apply the concepts of python programming in IoT.
5. Design & develop IoT applications using python.

### **(20EC4110) ADVANCED MICROCONTROLLERS**

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

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

1. Describe the fundamentals of embedded systems
2. Describe the fundamentals of ARM Processors
3. Apply the knowledge of C & Assembly to program processor
4. Examine the architecture of MSP430 Processor.
5. Design applications based on MSP430 processors

**(20EC4111) HARDWARE SOFTWARE CO-DESIGN**  
**(Programme Elective-III)**

**COURSE OUTCOMES (COs)**

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

1. *Acquire the knowledge on various models*
2. *Explore the interrelationship between Hardware and software in embedded system*
3. *Acquire the knowledge of firmware development process and tools*
4. *Evaluate the requirements of programming Embedded Systems, related software architectures and tool chain for Embedded Systems.*
5. *Understand validation methods and adaptability*

**(20EC4213) TESTING & TESTABILITY**  
**(Programme Elective-III)**

**COURSE OUTCOMES (COs)**

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

1. *Understand the elementary concepts of Testing and Testability.*
2. *Understand different types of faults associated with logic circuits and types of testing by employing fault models to the logic circuits.*
3. *Get complete knowledge about different methods of simulation and algorithms associated with testing.*
4. *Analyze BIST concepts and design self-test at Board Level.*
5. *Analyze Memory Test Requirements for MBIST and Embedded Core Testing.*

**(20EC4112) MICRO ELECTROMECHANICAL SYSTEMS**  
**(Programme Elective-III)**

**COURSE OUTCOMES (COs)**

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

1. *Develop an understanding of microscale physics for use in designing MEMS system applications.*
2. *Understand concepts of basic MEM devices and systems.*
3. *Acquires knowledge on mechanical terms used in MEMS.*
4. *Understand the two terminal MEMS and its characteristics.*
5. *Design digital and analog applications in various silicon-based MEMS structures.*

**(20EC4201) VLSI TECHNOLOGY**  
**(Programme Elective-IV)**

**COURSE OUTCOMES (COs)**

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

1. *Understands various parameters of MOSFET based logic circuits.*
2. *Draw layout of a given circuit.*

3. *Design and Analyze Combinational and sequential Circuits.*
4. *Floor Planning and Physical Design Flows.*
5. *Familiar with basics of Chip Design*

**(20EC4202) DIGITAL IC DESIGN**  
**(Programme Elective-IV)**

**COURSE OUTCOMES (COs)**

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

1. *Understand Static and dynamic power consumption in Integrated Chips.*
2. *Design CMOS based Combinational circuits and Memory modules.*
3. *Demonstrate the delay and power consumption in BiCMOS circuits.*
4. *Design and Analyse Layout of given circuit in terms of various parameters.*
5. *Able to mimic and implement simple subsystems design.*

**(20EC4008) WIRELESS SENSOR NETWORKS**  
**(Programme Elective-IV)**

**COURSE OUTCOMES (COs)**

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

1. *Able to understand the basic WSN technology and supporting protocols, with emphasis.*
2. *Able to understand the sensor network hardware and operating systems.*
3. *Able to understand the sensor network protocols and addresses physical layer issues.*
4. *Able to understand and differentiate database management systems, data storage and Query processing.*
5. *Able to design and deploy the sensor networks.*

**(20EC4113) INTERNET OF THINGS LAB**

**COURSE OUTCOMES (COs)**

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

1. *Identify the requirements for the real-world problems.*
2. *Conduct a survey of several available literatures in the preferred field of study.*
3. *Study and enhance software/ hardware skills.*
4. *Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.*
5. *Demonstrate an ability to work in teams and manage the conduct of the researchstudy.*

**(20EC4114) MICROCONTROLLERS & INTERFACING LAB**

**COURSE OUTCOMES (COs)**

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

1. *Design and Implement basic circuits that are used in embedded systems.*
2. *Develop code using appropriate tools.*
3. *Test the circuit performance with standard benchmark circuits.*
4. *Provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems*

### **(20HS0829) CONSTITUTION OF INDIA**

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

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

1. *Explain the key concepts of political economy*
2. *Analyse the significant developments in the political ideologies*
3. *Describe the salient features of the constitution of India interpret, integrate and critically*
4. *Analyse the political economy of Indian international relations and gain knowledge in Judiciary system*
5. *Apply their knowledge and skills acquired to write various competitive examinations*

#### **II M.Tech. – I Sem.**

### **(20EC4002) ADVANCED DIGITAL SIGNAL PROCESSING**

**(Common to ES & DECS)**  
**(Programme Elective-V)**

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

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

1. *Analyze the Discrete-time signals*
2. *Understand the digital Signal Processing algorithms and its applications*
3. *Apply the knowledge of usage of Digital systems in real time applications*
4. *Apply the algorithms for recent trend applications in Digital Signal Processing*
5. *Understand the modern filter design and their implementation*
6. *Able to understand the parametric method for estimation of power spectral density*

### **(20EC4116) RADIO FREQUENCY IDENTIFICATION**

**(Programme Elective-V)**

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

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

1. *Understand the fundamentals of RFID technology.*
2. *Recognize the development history of RFID technology.*
3. *Understand the global privacy policy and regulations of RFID technology.*
4. *Analyze the impact of RFID in various sectors.*
5. *Describe various applications of RFID technology.*
6. *Analyze the implementation of RFID technology in various application areas.*

**(20EC4117) SYSTEM ON CHIP ARCHITECTURE**  
**(Programme Elective-V)**

**COURSE OUTCOMES (COs)**

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

1. *Design processors keeping area, power and speed as constraints and to Deepen CMOS VLSI design knowledge.*
2. *Design full custom/ semicustom/ standard cells for ASIC.*
3. *Implement both hardware and software solutions, formulate hardware/software tradeoffs, and perform hardware/software codesign.*
4. *Implement network on chip technologies.*
5. *Analyze memories using reconfigurable architectures for rapid prototyping*
6. *Analyze system on chip and board based systems.*

**(20HS0824) BUSINESS ANALYTICS**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

13. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
14. Design alternatives to solve business problems utilizing quantitative analysis, critical thinking and sound ethical decision making.
15. Summarize, process and transform data for obtaining meaningful conclusions
16. Interpret data using latest data analytics tools to address organisational problems
17. Organize and critically apply the concepts and methods of business analytics
18. Assess decision problems and build models for creating solutions using business analytical tools.

**(20CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

On successful Completion of this course, the student will be able to

7. *Summarise the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.*
8. *Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.*
9. *Summarise the meaning and different types of project management and project execution, detailed engineering activities.*
10. *Understand the project contracts,*
11. *Describe the cost behaviour and profit planning types and contents, Bar charts and Network diagram.*
12. *Analyse by using quantitative techniques for cost management like PERT/CPM.*

**(20EE2128) WASTE TO ENERGY**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

7. Analyse agro based, forest residue and industrial waste conversion processes.
8. Manufacture of Pyrolytic oils and gases
9. Manufacture of charcoal, yields and applications
10. Understand various types of gasifiers operation
11. Understand inclined and fluidized bed combustors operation
12. Understand types of biogas plants and biomass energy programme in India

**(20ME3121) INDUSTRIAL SAFETY**  
**(Open Elective)**

**COURSE OUTCOMES(COs)**

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

13. Explain the Points of factories act 2048 for health and safety.
14. Define the term Cost & its relation with replacement economy.
15. Recognize the Concept of Wear, Corrosion and its Prevention methods
16. Understand the Concept of sequence of fault finding activities and the importance of decision tree
17. Elaborate the importance of scheduled preventive maintenance of mechanical and electrical equipment.
18. Distinguish between Periodic and Preventive maintenance of equipments.

**(20ME3021) ADVANCES IN OPERATIONS RESEARCH**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

On successful Completion of this course the student will be able to

1. Create mathematical models of the real time situations.
2. Implement Transportation and Assignment problems to solve in real time industry
3. Choose the best strategy of Game and capable of identifying the suitable queuing theory
4. Enumerate fundamental techniques and apply it to solve various optimization areas
5. Investigate, study, Apply knowledge in Replacement models and
6. Understand the Inventory control Models

**(20ME3022) COMPOSITE MATERIALS**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

13. Explain the Fundamental concept of composite materials.
14. Classify different types of composite materials.
15. Describe the Fabrication and processing of composite materials.
16. Illustrate the Methods of preparation of Metal matrix Composites and polymer matrix composites

17. Discuss about the Mechanical behavior of composite materials.

18. Explain the application of composite materials.

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
**(AUTONOMOUS)**

**M.Tech. (Electronics and Communication Engineering)**

**Specialization: VLSI**

**Regulation-R20**

**I M.Tech. – I Semester**

**(20HS0823) RESEARCH METHODOLOGY AND IPR**

**COURSE OUTCOMES (COs)**

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

1. *Recognize appropriate research problem, errors in selecting a research problem, Scope and objectives of research*
2. *Critically assess research methods pertinent to technology innovation research*
3. *Identify, explain, compare, and prepare the key elements of a research proposal/report*
4. *Skill to understand the need of intellectual property rights, IPR protection to inventors*
5. *Develop procedural knowledge to Legal System and solving the problem relating to intellectual property rights for further research work and investment in R & D*

**(18EC4201) VLSI TECHNOLOGY**

**COURSE OUTCOMES (COs)**

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

1. *Understands various parameters of MOSFET based logic circuit.*
2. *Draw layout of a given circuit.*
3. *Design and Analyze Combinational and sequential Circuits.*
4. *Floor Planning and Physical Design Flows.*
5. *Familiar with basics of Chip Design.*

**(18EC4202) DIGITAL IC DESIGN**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. *Understand Static and dynamic power consumption in Integrated Chips.*
2. *Design CMOS based Combinational circuits and Memory modules.*
3. *Demonstrate the delay and power consumption in BiCMOS circuits.*
4. *Design and Analyze Layout of given circuit in terms of various parameters.*
5. *Able to mimic and implement simple subsystems design.*

**(20EC4203) ASIC DESIGN**

**(Programme Elective-I)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Demonstrate VLSI tool-flow and appreciate FPGA architecture.
2. Understand the issues involved in ASIC design, including technology choice, design management, tool-flow, verification, debug and test, as well as the impact of technology scaling on ASIC design.
3. Understand the algorithms used for ASIC construction
4. Understand the basics of System on Chip, On chip communication architectures like AMBA, AXI anutilizing Platform based design.
5. Appreciate high performance algorithms available for ASICs.

**(20EC4204) SYSTEM MODELLING & SIMULATION**

**(Programme Elective-I)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Understand the topics in digital logic design.
2. Understand modeling and verification with Hardware Description Language.
3. Understand the tuning filtering.
4. Understand the signals and events.
5. Understand the simulation software.

**(20EC4101) EMBEDDED SYSTEM DESIGN**

**(Programme Elective-I)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Apply and analyse the applications in various processors and domains of embedded system
2. To Analyse and develop embedded hardware and software development cycles and tools.
3. To Analyse and understand a microprocessor and core of the embedded system.
4. To Analyse to understand different concepts of a RTOS, sensors, memory interface, and communication interface.
5. To solve real world problems by doing projects using embedded systems.

**(20EC4205) VERILOG HDL**

**(Programme Elective-I)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Understand the basic concepts of Verilog HDL and write simple programs.
2. Design of Combinational and sequential logic circuits using user defined primitives, data types and operators.

3. Design and Simulate circuits using test vectors and to write the programs more effectively to reduce delay using Verilog tasks and directives.
4. Analyze Synthesis methodology of combinational and sequential logic and Finite State Machines.
5. Analyze MOS and CMOS circuits.

**(20EC4206)ANALOG IC DESIGN**  
**(Programme Elective-II)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Analyze the Advanced MOS Modeling concept and also learn the behavior of Current Mirrors.
2. Develop mathematical modeling of op-amps.
3. Analyze the design of MOS based sample and hold circuits.
4. Learn the design of data converters (ADC/DAC).
5. Analyze the concept of Over Sampling Converters.

**(20EC4015) IMAGE & VIDEO PROCESSING**  
**(Common to DECS & VLSI)**  
**(Programme Elective-II)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Describe and use the principles of digital image and video processing to develop image processing algorithms.
2. Implement (for example with MATLAB) and assess the developed image processing algorithms.
3. Explain algorithm design choices using the principles of digital image/video processing.
4. Develop image processing algorithms for a given practical image/video processing problem.
5. Solve more advanced problems in all areas mentioned above
6. Identify and explain the challenges, propose possible solutions, and explain the chosen algorithm design.

**(20EC4207) DIGITAL ELECTRONIC CIRCUITS LAB (Virtual Lab)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course ,the Student will be able to

1. Convert different type of codes and number systems which are used in digital communication and computer systems.
2. Employ the codes and number systems converting circuits and Compare different types of logic families.
3. Analyse different types of digital electronic circuit using various mapping and logical tools.
4. Simplified circuit using various mapping and mathematical methods.
5. Design different types of with and without memory element digital electronic circuits for particular operation.

**(20EC4208) DIGITAL IC DESIGN LAB**

## **COURSE OUTCOMES (COs)**

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

1. Achieve Knowledge and Awareness of various components to design stable analog circuits.
2. Minimize the Boolean expression using Boolean algebra and design it using logic gates
3. Analyse and design combinational circuit.
4. Design and develop sequential circuits
5. Translate real world problems into digital logic formulations using VHDL.

## **(20HS0818) ENGLISH FOR RESEARCH PAPER WRITING**

## **COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. To recognize and demonstrate the style and conventions of research writing.
2. To improve the clarity and coherence of their written proposal.
3. Able to use a variety of sentence patterns.
4. To enhance their revision and proofreading skills.
5. To use effective strategies and techniques to construct their academic projects.

**I M.Tech – II Sem.**

## **(20EC4209) FPGA ARCHITECTURES & APPLICATIONS**

## **COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Acquire Knowledge about Various Architectures and Device Technologies Of PLD's
2. Comprehend FPGA Architectures.
3. Describe FSM and Different FSM Techniques like Petrinets & Different Case Studies.
4. Acquire Knowledge on Hot Design Method
5. Analyze System Level Design and Their Application for Combinational and Sequential Circuits

## **(20EC4210) LOW POWER VLSI DESIGN**

## **COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Analyze the low power MOSFET Device Behavior.
2. Analyze Low- Voltage Low Power CMOS /BiCMOS Logic Circuits.
3. Analyze and Design the Low Power Latches/Flipflops.
4. Learn Special Techniques for Low Power Clocks and Memories.
5. Analyze the Advanced Bi- CMOS Digital Circuits at low power.

## **(20EC4211) NANO ELECTRONICS**

## **COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Able to understand nanoelectronics holds the capacity for mass production of high-Qualitynanodevices.
2. Able to analyze the scaling of transistors and other devices to smaller and smaller sizes, which has provided the basis for this exponential growth.
3. Able to analyze and design different types random access memories.
4. Able to analyze different mass storage devices which are useful in electronic gadgets.
5. Able to know in the near future from photonics, molecular electronics or revolutionary engineering solutions.

**(20EC4212) ALGORITHMS FOR VLSI DESIGN AUTOMATION**  
**(Programme Elective-III)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. To analyze&design Methodologies, Design Automation Tools and general-purpose methods for combinational optimization.
2. To analyze modeling and simulation of digital systems.
3. To analyze logic synthesis and verification of digital system's
4. To analyze high-level synthesis of digital systems.
5. To impartthe knowledge about physical design automation of FPGA's and MCM's.

**(20EC4001) ADVANCED DIGITAL SYSTEM DESIGN**  
**(Common to VLSI & DECS)**  
**(Programme Elective-III)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. To impart the knowledge about Design of digital systems and sequential circuit design
2. To impart the knowledge about Fault Modeling, Test Patten generation and different methods for fault diagnosis of Combinational circuits.
3. Analyze D – Algorithm, PODEM, Random testing, Transition Count Testing, Signature Analysis and Testing for bridging faults for Test pattern generation of digital system design.
4. Analyze the functionality of sequential circuits using different fault diagnosis & test methods.
5. Analyze fault models, diagnosis methods of PLA Design and Asynchronous sequential circuits.

**(20EC4213) TESTING & TESTABILITY**  
**(Programme Elective-IV)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course, the Student will be able to

1. Understand the elementary concepts of Testing and Testability.
2. Understand different types of faults associated with logic circuits and types of testing byemploying fault models to the logic circuits.

3. Get complete knowledge about different methods of simulation and algorithms associated with testing.
4. Analyze BIST concepts and design self-test at Board Level.
5. Analyze Memory Test Requirements for MBIST and Embedded Core Testing.

### **(20EC4104) REAL TIME OPERATING SYSTEM**

**(Programme Elective-IV)**

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

On Successful Completion of this Course, the Student will be able to

1. Student will be able to summarize the issues in real time computing
2. Student will be able to explain and give examples of real time operating systems.
3. Student will be able to solve scheduling problems and can apply them in real time applications in industry.
4. Student can also design an RTOS and will be able to interpret the feasibility of a task set to accomplish or not.
5. Analyze the situation of fault occurrence and will be able to apply solutions accordingly.

### **(20EC4214) SOLID STATE DEVICE MODELING AND SIMULATION**

**(Programme Elective-IV)**

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

On Successful Completion of this Course, the Student will be able to

1. Able to analyze the principles of basic device modeling
2. Able to understand the changes introduced in the device models as well as contribute to the development of appropriate device models
3. Able to Analyze General Purpose Circuit Simulators
4. Able to Analyze mathematical techniques for device simulations
5. Able to Analyze Simulation of Semiconductor Devices

### **(20EC4215) MIXED SIGNAL LAB**

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

On Successful Completion of this Course, the Student will be able to

1. Model analog circuit with, simulate, synthesis in Micro wind.
2. Understand chip level issues and need of testability.
3. Design OP-AMP circuits for specified applications

### **(20EC4216) DIGITAL VLSI DESIGN LAB (VIRTUAL LAB)**

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

On Successful Completion of this Course the Student will be able to

1. Design and simulate list of combinational and sequential digital circuits using Modelism&Xilinx– VHDL language.
2. Understand the static and dynamic characteristics of CMOS Inverter.

3. Design and simulate the brawn array multiplier and ALU using Modelsim and Xilinx-Verilog Language.
4. Characterize Combinational circuits using Pass Transistor logic
5. Design & Analyse the sequential circuit
6. Design RAM and FSM using Questa software.

### **(20EC4216) DIGITAL VLSI DESIGN LAB (Virtual Lab)**

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

On Successful Completion of this Course the Student will be able to

1. Design and simulate list of combinational and sequential digital circuits using Modelism&Xilinx–VHDL language.
2. Understand the static and dynamic characteristics of CMOS Inverter.
3. Design and simulate the brawn array multiplier and ALU using Modelsim and Xilinx-Verilog Language.
4. Characterize Combinational circuits using Pass Transistor logic
5. Design & Analyse the sequential circuit
6. Design RAM and FSM using Questa software.

### **(20HS0829) CONSTITUTION OF INDIA**

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

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

6. Explain the key concepts of political economy
7. Analyse the significant developments in the political ideologies
8. Describe the salient features of the constitution of India interpret, integrate and critically
9. Analyse the political economy of Indian international relations and gain knowledge in Judiciary system
10. Apply their knowledge and skills acquired to write various competitive examinations

#### **II M.Tech.- I Sem.**

### **(20EC4218) SCRIPTING LANGUAGE FOR VLSI DESIGN AUTOMATION (Programme Elective-V)**

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

On Successful Completion of this Course, the Student will be able to

1. Develop the basic knowledge on data types of Perl
2. Design and revision of Perl scripts
3. Develop the knowledge of standard input , output and files in programming
4. Develop substantial knowledge on Modules and CGI Programming.
5. Debug the techniques appropriate for the Perl language
6. Compare and contrast different regular expressions using operators and control structures.

### **(20EC4219) NANO MATERIALS AND NANOTECHNOLOGY**

**(Programme Elective-V)**

**COURSE OUTCOMES (COs)**

On Successful Completion of this Course the Student will be able to

1. Define the basic concepts of semiconductor nanostructures.
2. Illustrate the various parameters and explain about the characteristics of the magnetic nanostructures.
3. Understand the measurements performed for Nano sensors.
4. Analyze the different actuators.
5. Design the nanoparticles for different application fields based on molecular electronics.
6. Design the different nanostructured and nanomaterials for different applications

**(20EC4008) WIRELESS SENSOR NETWORKS**

**(Common to VLSI, DECS & ES)**

**(Programme Elective-V)**

**COURSE OUTCOMES (COS)**

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

1. Understand the basic concepts of wireless sensor networks, sensing, computing and communication tasks
2. Understand the radio standards and communication protocols adopted in wireless sensor networks
3. Describe and explain the hardware, software and communication for wireless sensor network nodes
4. Understand the architectures, features, and performance for wireless sensor network systems and platforms
5. Describe and analyze the specific requirements of applications in wireless sensor networks for energy efficiency, computing, storage and transmission
6. Design and deploy the sensor networks

**(20HS0824) BUSINESS ANALYTICS**

**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

19. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
20. Design alternatives to solve business problems utilizing quantitative analysis, critical thinking and sound ethical decision making.
21. Summarize, process and transform data for obtaining meaningful conclusions
22. Interpret data using latest data analytics tools to address organisational problems
23. Organize and critically apply the concepts and methods of business analytics
24. Assess decision problems and build models for creating solutions using business analytical tools.

**(20CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS**

**(Open Elective)**

**COURSE OUTCOMES (COs)**

On successful Completion of this course, the student will be able to

13. Summarise the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.
14. Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
15. Summarise the meaning and different types of project management and project execution, detailed engineering activities.
16. Understand the project contracts,
17. Describe the cost behaviour and profit planning types and contents, Bar charts and Network diagram.
18. Analyse by using quantitative techniques for cost management like PERT/CPM.

**(20EE2128) WASTE TO ENERGY**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

13. Analyse agro based, forest residue and industrial waste conversion processes.
14. Manufacture of Pyrolytic oils and gases
15. Manufacture of charcoal, yields and applications
16. Understand various types of gasifiers operation
17. Understand inclined and fluidized bed combustors operation
18. Understand types of biogas plants and biomass energy programme in India

**(20ME3121) INDUSTRIAL SAFETY**  
**(Open Elective)**

**COURSE OUTCOMES(COs)**

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

19. Explain the Points of factories act 2048 for health and safety.
20. Define the term Cost & its relation with replacement economy.
21. Recognize the Concept of Wear, Corrosion and its Prevention methods
22. Understand the Concept of sequence of fault finding activities and the importance of decision tree
23. Elaborate the importance of scheduled preventive maintenance of mechanical and electrical equipment.
24. Distinguish between Periodic and Preventive maintenance of equipments.

**(20ME3021) ADVANCES IN OPERATIONS RESEARCH**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

On successful Completion of this course the student will be able to

1. Create mathematical models of the real time situations.
2. Implement Transportation and Assignment problems to solve in real time industry
3. Choose the best strategy of Game and capable of identifying the suitable queuing theory
4. Enumerate fundamental techniques and apply it to solve various optimization

*areas*

5. *Investigate, study, Apply knowledge in Replacement models and*
6. *Understand the Inventory control Models*

**(20ME3022) COMPOSITE MATERIALS**  
**(Open Elective)**

**COURSE OUTCOMES (COs)**

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

19. *Explain the Fundamental concept of composite materials.*
20. *Classify different types of composite materials.*
21. *Describe the Fabrication and processing of composite materials.*
22. *Illustrate the Methods of preparation of Metal matrix Composites and polymer matrix composites*
23. *Discuss about the Mechanical behavior of composite materials.*
24. *Explain the application of composite materials.*