



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18 COURSE OUTCOMES

DEPARTMENT OF HUMANITIES & SCIENCES

I B.Tech-I Sem:

(R18A0001) ENGLISH

COURSE OUTCOMES:

Students will be able to:

- Write formal or informal letters and applications for different purposes.
- Select and extract relevant information through skimming and scanning.
- Utilize the strategy of brainstorming in preparing analytical, argumentative and expository essays.
- Draft concise emails following professional email etiquette.
- Enhance their grammatical competency by spotting errors.

(R18A0021) MATHEMATICS -I

COURSE OUTCOMES:

After learning the concepts of this paper the student will be able to

- Analyze the solution of the system of linear equations and to find the Eigen values and Eigen vectors of a matrix.
- Find the extreme values of functions of two variables with / without constraints.
- Solve first and higher order differential equations.
- Solve first order linear and non-linear partial differential equations.
- Solve differential equations with initial conditions using Laplace Transform.

(R18A0011) APPLIED PHYSICS

COURSE OUTCOMES:

After completion of studying Applied Physics the student is able to,

- Know the basic principles of quantum mechanics and the importance of behavior of a particle.
- Realize the importance of band structure of solids and their applications in various

electronic devices.

- Learn concentration estimation of charge carriers in semiconductors and working principles of PN diode.
- Learn dielectric, magnetic properties of the materials and apply them in material technology.
- Learn the principles and production of LASER beams and transfer of information by optical fiber communication systems.

(R18A0501) PROGRAMMING FOR PROBLEM SOLVING

COURSEOUTCOMES:

- Demonstrate the basic knowledge of computer hardware and software.
- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- Ability to apply solving and logical skills to programming in C language and also in other languages.

(R18A0082) ENGINEERING WORKSHOP/ IT WORKSHOP

COURSEOUTCOMES:

- Students can understand different machine shop operations
- Students can understand Foundry, welding, plumbing, house wiring and Tin smithy operations
- Student learned about metal cutting processes

(R18A0082) IT WORKSHOP LAB

COURSEOUTCOMES:

- The Students are able to identify the major components of a computer and its basic peripherals. They are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
- Students can detect and perform minor hardware and software level troubleshooting.
- The Students are capable of working on Internet & World Wide Web and can make effective usage of the internet for academics.
- The Students develop ability to prepare professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools.
- The students are able to create a static webpage's using HTML.

(R18A0581) PROGRAMMING FOR PROBLEM SOLVING LAB

COURSEOUTCOMES:

- Acquire knowledge about the basic concept of writing a program.
- Understand the Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Learn how to use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Understand the Role of Functions involving the idea of modularity.
- Understand the Concept of Array and pointers dealing with memory management.
- Learn Structures and unions through which derived data types can be formed.

(R18A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

COURSEOUTCOMES:

Students will be able to:

- Understand the importance of learning phonetics.
- Learn how to pronounce words using phonetic transcription.
- Know the importance of speaking English with rhythm and intonation.
- Effectively participate in JAM session.
- Use polite expressions in all formal situations.
- Effectively communicate through telephone.

I B.Tech-II Sem SUBJECTS COURSE OUTCOMES

(R18A0002) PROFESSIONAL ENGLISH

COURSEOUTCOMES:

Students will be able to:

- Draft coherent and unified paragraphs with adequate supporting details.
- Demonstrate problem solving skills, decision-making skills, analytical skills.
- Comprehend and apply the pre-interview preparation techniques for successful interview.
- Achieve expertise in writing resume and cover letter formats.
- Understand the steps of writing 'Reports and Abstract'.

(R18A0022) MATHEMATICS-II

COURSEOUTCOMES:

After learning the contents of this paper the student must be able to

- Find the roots of algebraic, non algebraic equations and predict the value of the data at an intermediate point from a given discrete data.

- Find the most appropriate formula for a guesses relation of the data variables using curve fitting and this method of analysis data helps engineers to understand the system for better interpretation and decision making.
- Find a numerical solution for a given differential equation.
- Evaluate multiple integrals and to have a basic understanding of Beta and Gamma functions..
- Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

(R18A0013) ENGINEERING CHEMISTRY

COURSEOUTCOMES:

The basic concepts included in this course will help the student to:

- Understand the operating principles of various types of electrochemical cells, including fuel cells and batteries. Analyze and develop a technically sound, economic and sustainable solution to corrosion problems related to engineering service.
- Achieve basic concepts of atomic, molecular and electronic changes related to conductivity and magnetism.
- Familiarize the student with the fundamentals of the treatment technologies and the considerations for its design and implementation in water treatment plants.
- Gain knowledge on synthesis of organic compounds by using different reaction mechanisms.
- Comprehend the types of fuels, characteristics and combustion systems with emphasis on engineering applications.

(R18A0201) BASIC ELECTRICAL ENGINEERING

COURSEOUTCOMES:

At the end of this course the student would get

- A thorough knowledge of the basic RLC circuit elements
- Understanding of the basic concepts of networks and circuits with RLC
- Concepts of single phase AC circuits
- Network theorems and their application to solve problems in Network analysis
- Fundamentals Of Constructional Details And Principle Of Operation Of DC Machines And Transformers

(R18A0083) ENGINEERING PHYSICS/ CHEMISTRY LAB

COURSEOUTCOMES

- The students learn the concepts of error analyze and try to formulate new solutions to the problems related to engineering physics.
- B.Tech students basically learning the mechanical behavior of the wire and

practically determining the elastic constant. Transverse and longitudinal waves are practically studied. Variation of the magnetic fields along with terrestrial magnetism is practically studied.

- Dispersion of the composite light is clearly observed by the students. Wavelengths of the source of light/laser are determined experimentally.
- Opto electronic devices and their working are practically realized by the students. In addition the functioning of optical fiber is practically studied.
- The students learn experimental skills to design new experiments suitable for requirements in different fields (industrial, medical, scientific fields etc.)

(R18A0083) ENGINEERING CHEMISTRY LAB

COURSE OUTCOMES:

At the end of the course students will be able to

- Estimate the total hardness present in a sample of water.
- Select lubricants for various purposes and determine the surface tension of a given liquid.
- Prepare synthetic drug molecule.
- Determine the strength of an acid by conductometric and potentiometric methods.
- Find the amount of Fe^{+2} and Cu^{2+} present in unknown substances using titrimetric and instrumental methods.

(R18A0281) BASIC ELECTRICAL ENGINEERING LAB

COURSE OUTCOMES:

After successfully studying this course, students will:

- Explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
- Be able to systematically obtain the equations that characterize the performance of an electric circuit as well as solving both single phase and DC Machines
- Acknowledge the principles of operation and the main features of electric machines and their applications.
- Acquire skills in using electrical measuring devices.

(R18A0003) HUMAN VALUES AND SOCIETAL PERSPECTIVE

COURSE OUTCOMES:

- The students will be able to obtain happiness and prosperity in their life.
- They will develop harmony at all levels.
- They can have satisfying human behavior throughout their life.

Department of Aeronautical Engineering

B.Tech. Aeronautical Engineering

R18 Course Outcomes

II YEAR I SEM

| MECHANICS OF FLUIDS | |
|---------------------|---|
| CO No. | STATEMENTS |
| 1 | To introduce and explain about fundamentals of Fluid Mechanics, which makes the student ready to understand about the applications of Aerodynamics, Hydraulics, Gas dynamics etc. |
| 2 | To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows. |
| 3 | To develop understanding about hydrostatic law, and application of mass, momentum and energy equation in fluid flow |
| 4 | Assess the fluid flow and flow parameters using measuring devices. |
| 5 | To make students understand about dimensional analysis and similitude. With which Students can able to create models for experimental analysis. |

| APPLIED MECHANICS | |
|-------------------|--|
| CO No. | STATEMENTS |
| 1 | Understand the vectorial and scalar representation of forces and moments. |
| 2 | Describe static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. |
| 3 | Analyse the properties of surfaces & solids in relation to moment of inertia. |
| 4 | Illustrate the laws of motion, kinematics of motion and their interrelationship. |
| 5 | Comprehend the effect of Friction on general plane motion |

| ENGINEERING THERMODYNAMICS | |
|----------------------------|---|
| COURSE OUTCOMES | |
| CO No. | STATEMENTS |
| 1 | Basic concepts can be applied by the students |
| 2 | To apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon |
| 3 | Students can correlate cycles applicable for engines. |
| 4 | To investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind |
| 5 | Students should be able to analyze the relationship between various processes and working mechanisms of the engines. |

INTRODUCTION TO AERONAUTICAL ENGINEERING

| CO No. | STATEMENTS |
|--------|--|
| 1 | Basic Understanding of fundamental concepts, and approaches of aerospace engineering |
| 2 | Ability to understand the aerodynamics and performance of aircraft |
| 3 | Analysis of aircrafts, rockets and missiles. |
| 4 | Knowledge of materials used for aircraft construction |
| 5 | Analysis of the measurement techniques used in experimental aerodynamics. |

| AIRCRAFT PRODUCTION TECHNOLOGY | |
|--------------------------------|---|
| CO No. | STATEMENTS |
| 1 | Acquire a knowledge of various manufacturing methods and the techniques involved in joining and forming process performed in aircraft industry. |
| 2 | Able to understand the various advancements in the machining process and the working principle of the equipment |
| 3 | understand the importance and process involved in unconventional machining process |
| 4 | Acquire a knowledge on material processing of various metal and alloys and also the techniques for improvement of their mechanical and physical properties. |
| 5 | Understand the various Assembly stages, Tools and equipment and inspection techniques used aircraft Assembly |

| AEROSPACE MATERIALS & COMPOSITES | |
|----------------------------------|---|
| CO No. | STATEMENTS |
| 1 | Study the types of mechanical behavior of materials for aircraft applications. |
| 2 | Understand the mechanical properties of materials by heat treatment processes. |
| 3 | Understand the analysis of composite laminates under different loading conditions and different environmental conditions. |
| 4 | Knowledge in usage of composite materials in aircraft component design. |
| 5 | Learning NDT methodologies |
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| AIRCRAFT PRODUCTION TECHNOLOGY LAB | |
|------------------------------------|--|
| CO No. | STATEMENTS |
| 1 | Students able apply some of the manufacturing process for preparation of complicated jobs. |
| 2 | Hands on experience on operating machinery |
| 3 | Students can correlate various welding technologies |
| 4 | Knowledge on sandwich structures and wood gluing concepts |
| 5 | Acquire knowledge on CNC operation and part programming |

| AIRCRAFT ENGINEERING DRAWING LAB | |
|----------------------------------|---|
| CO No. | STATEMENTS |
| 1 | Ability to understand and apply the knowledge of machine drawing as a system of communication |

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| 2 | Develop detailed drawings of machines parts from assembly drawing |
| 3 | Ability to get exposed to existing national standards related to technical drawings |
| 4 | Ability to evaluate external and internal details of the machine component from which it can be manufactured |
| 5 | Ability to model assembly drawings of aircraft components |

| ENVIRONMENTAL SCIENCE | |
|-----------------------|--|
| CO No. | STATEMENTS |
| 1 | Students will be able to articulate the basic structure, functions, and processes of key social systems affecting the environment. |
| 2 | Students will understand key concepts in the life and physical sciences, and will apply them to environmental issues. |
| 3 | Students will analyze and evaluate ideological and philosophical approaches used to understand environmental relationships. |
| 4 | Students will learn skills required to research and analyze environmental issues scientifically |
| 5 | Students will learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues. |

II YEAR II SEM

| AERODYNAMICS | |
|--------------|--|
| CO No. | STATEMENTS |
| 1 | Defines basic understanding of Aircraft Structural members. |
| 2 | Illustrate the methodologies to analyze beams and approximate aircraft structural members. |
| 3 | Solve complex problems such as indeterminate structures. |
| 4 | Analyze Columns with various boundary conditions. |
| 5 | Compare classical methods with Energy methods to justify solutions. |
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| MECHANICS OF SOLIDS | |
|---------------------|---|
| CO No. | STATEMENTS |
| 1 | Understand the fundamental concepts of stress and strain in materials |
| 2 | Knowledge of beams and analysis of Shear Force and Bending moments |
| 3 | Apply the basic concepts to find the shear stress distribution and deflection in simply supported and Cantilever beam |
| 4 | Analysis of Elastic stability in columns under loading conditions |
| 5 | Knowledge on failure theories and factor of safety |

| AIR BREATHING PROPULSION | |
|--------------------------|--|
| CO No. | STATEMENTS |
| 1 | Understand operation of different airbreathing propulsion systems and their applications |

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| 2 | Learn construction and design features of inlets, compressors and turbines |
| 3 | Develop knowledge on function of combustors and exhaust nozzles and their performance measurement techniques |
| 4 | Identify problems of high speed propulsion systems and study combined cycle engines suitable for hypersonic applications |
| 5 | Classify different non-airbreathing propulsion systems and their applications |

| AIRCRAFT PERFORMANCE | |
|-----------------------------|--|
| CO No. | STATEMENTS |
| 1 | To know about various mission profiles and estimate operational safety and performance |
| 2 | Acquaint with features involved in cruise performance also to understand effects of WAT on performance |
| 3 | Acquire knowledge in determine & applying the concept of climb and descent performance and to calculate bank angle, turn speed and radius in steady horizontal turning flight at a given load factor |
| 4 | Could explore the methods to calculate take off, landing runway distances and understands fuel planning, safety and environment effects of aircraft performance |
| 5 | understanding the Principal design features of rockets and missiles |

| PROBABILITY AND STATISTICS | |
|-----------------------------------|---|
| CO No. | STATEMENTS |
| 1 | Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions. |
| 2 | Define binomial outcomes and compute probability of getting X successes in N trials. |
| 3 | Identify the characteristics of different discrete and continuous distributions. |
| 4 | Identify the type of statistical situation to which different distributions can be applied. |
| 5 | Use Poisson, exponential distributions to solve statistical problems. |

| DATA STRUCTURES USING PYTHON | |
|-------------------------------------|---|
| CO No. | STATEMENTS |
| 1 | Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python |
| 2 | Express different Decision Making statements and Functions |
| 3 | Interpret Object oriented programming in Python |
| 4 | Explain how to design GUI Applications in Python and evaluate different database operations |
| 5 | Design and develop Client Server network applications using Python |

| MOS AND MOF LAB | |
|------------------------|--|
| CO No. | STATEMENTS |
| 1 | Analyze various strength of materials through characterization |
| 2 | Understand various characterization methods depending on the type of loading |

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| 3 | Prove good understanding of concepts and their applications in the laboratory |
| 4 | Demonstrate practical understanding of friction losses in internal flows. |
| 5 | Demonstrate the ability to work in groups on small design projects that are appropriate to the course |

| CAD LAB | |
|----------------|--|
| CO No. | STATEMENTS |
| 1 | Knowledge of various softwares available for engineering purpose. |
| 2 | Learning the basics of AutoCAD software |
| 3 | Application of various commands in AutoCAD to draw orthographic and isometric figures |
| 4 | Learning procedure to draw 3D figures by using AutoCAD |
| 5 | Learning different operations like threading, sweep and swept blend and implementation in modeling various components by using CREO software |

| FOREIGN LANGUAGE (GERMAN) | |
|----------------------------------|---|
| CO No. | STATEMENTS |
| 1 | Students familiarize with a modern foreign language – German |
| 2 | The students with German get acquainted for basic communication in everyday situations. |
| 3 | Students will know with the basics of writing simple direct sentences and short compositions. |
| 4 | Students get to know the basics of German language to communicate in the work place when they find the necessity. |
| 5 | Students will attain creative speaking skills |

III YEAR I SEM

| HIGH SPEED AERODYNAMICS | |
|--------------------------------|--|
| CO No. | STATEMENTS |
| 1 | Explain brief review of thermodynamics and fluid mechanics in relation to compressible flows |
| 2 | Demonstrate different types of shock waves and expansion waves and its properties across different situations. |
| 3 | Understand the importance of quasi one dimensional flow for obtaining supersonic speeds. |
| 4 | Illustrate the concepts of method of characteristics and its applications in nozzle designs. |
| 5 | Demonstrate the experimental methods and characteristics of various wind tunnels. |

| AIRCRAFT VEHICLE STRUCTURES | |
|------------------------------------|--|
| CO No. | STATEMENTS |
| 1 | Understand theoretical foundations, complexities, and design of modern aircraft structures. |
| 2 | Analyze shear flow and bending stress in various structural members |
| 3 | Idealize a real aircraft structure and apply theoretical foundations to convert into an analytical form. |
| 4 | Analyze various structural components like wing and fuselage subject to different loading conditions |
| 5 | Design and create simple aerospace structures to support mechanical loads. |

AIRCRAFT STABILITY & CONTROL

| CO No. | STATEMENTS |
|--------|--|
| 1 | student will be able to understand the need of static stability, marginal stability and the need for stability of the aircraft |
| 2 | Derive an expression for static longitudinal stability of the aircraft |
| 3 | Explain the condition for static longitudinal stability, lateral and directional stability |
| 4 | Diffentiate the aircraft components contribution for the longitudinal static stability of the aircraft |
| 5 | Formulate the importance of the aerodynamic derivatives i.e stability derivatives and control derivatives |

INTRODUCTION TO SPACE TECHNOLOGY

| CO | STATEMENTS |
|----|--|
| 1 | Basic Understanding of rocket propulsion, types equation, their stages as well as trajectories |
| 2 | Ability to understand about Atmospheric Re-entry |
| 3 | Analysis of orbit Mechanics and their maneuvers |
| 4 | Knowledge of Attitude determination of spacecraft/satellites |
| 5 | Analysis the space mission operations |

AERODYNAMICS & PROPULSION LAB

| CO No. | STATEMENTS |
|--------|---|
| 1 | Analyze aerodynamic performance of various models |
| 2 | Ability to understand details of piston and gas turbine engine |
| 3 | Ability to characterize various aircraft fuels |
| 4 | Ability to analyze the performance of 2 stroke and 4 stroke engines |
| 5 | Ability to estimate the efficiency of compressors |

AIRCRAFT STRUCTURES LAB

| CO No. | STATEMENTS |
|--------|--|
| 1 | Analyze the theoretical and experimental results of beams with various end conditions |
| 2 | Investigate the Maxwell's Reciprocal theorem and Principle of superposition using beams under various load conditions. |
| 3 | Analyze the shear centre for open and closed sections. |
| 4 | Ability to evaluate unsymmetrical bending stresses under various loading conditions |
| 5 | Ability to analyze the defects in materials by performing NDT |

CYBER SECURITY

| CO No. | STATEMENTS |
|--------|---|
| 1 | The students will be able to understand cyber-attacks, types of cybercrimes |
| 2 | Students gain knowledge on how to protect them self |

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| 3 | Able to study the defensive techniques against these attacks |
| 4 | Ability to protect the entire Internet community from cyber attacks. |
| 5 | Students will be familiarized about cyber laws |

III YEAR II SEM

| FINITE ELEMENT ANALYSIS | |
|--------------------------------|--|
| CO No. | STATEMENTS |
| 1 | Describe the general steps used in the finite element analysis to model problems in engineering. |
| 2 | Develop stiffness matrices for spring, truss, beam, plane stress problems and three dimensional problems |
| 3 | Develop the finite element formulations for heat transfer problems |
| 4 | Describe the concept of direct equilibrium method and potential energy method for structural mechanics problems. |
| 5 | Develop the finite element formulation for dynamic loadings |

| AEROSPACE PROPULSION SYSTEMS | |
|-------------------------------------|--|
| CO No. | STATEMENTS |
| 1 | Understand operation of different airbreathing propulsion systems and their applications |
| 2 | Learn construction and design features of inlets, compressors and turbines |
| 3 | Develop knowledge on function of combustors and exhaust nozzles and their performance measurement techniques |
| 4 | Identify problems of high speed propulsion systems and study combined cycle engines suitable for hypersonic applications |
| 5 | Classify different non-airbreathing propulsion systems and their applications |

| AIR TRANSPORTATION SYSTEMS | |
|-----------------------------------|--|
| CO No. | STATEMENTS |
| 1 | To understand the operational structure, establishment of the Airport |
| 2 | To gain insights in to setting up Airport and the economic considerations involved in it |
| 3 | To study the basic governing bodies of ATS, its laws and regulations |
| 4 | To understand the economic and business outcomes of the ATS operations |
| 5 | The student will acquire operational knowledge of air transport system |

| COMPUTATIONAL STRUCTURES LAB | |
|-------------------------------------|---|
| CO No. | STATEMENTS |
| 1 | Students will gain the knowledge of various structural elements and structural analysis under ANSYS platform. |
| 2 | Student gains knowledge about one dimensional element and respective mesh selection for a beam analysis. |
| 3 | Can able to understand 2D and 3D element and respective mesh. Also define compressive strength of plate with and without cutouts. |

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| 4 | Students can understand the knowledge about open and closed thin wall structure behavior. Further, gives knowledge about design and analysis of 3D structures like wingbox and fuselage. |
| 5 | Structural analysis of column-beam can understand by students pictorially. |

| PROGRAMMING LANGUAGE FOR MATHEMATICAL MODELS LAB | |
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| CO No. | STATEMENTS |
| 1 | Students learn the mathematical programming languages |
| 2 | Able to solve problems related to modeling, analysis and design of aerospace vehicle and systems. |
| 3 | The students should be able to Model aerospace problems using computer software |
| 4 | The students should be able analyze complex aerospace problems using computer software |
| 5 | Able to design controller for automatic control of aircraft or other aerospace vehicles |

| MINI PROJECT | |
|---------------------|--|
| CO No. | STATEMENTS |
| 1 | Acquire system integration skills, Documentation skills, Project management skills, Problem solving skills |
| 2 | Ability to Identify problems and solutions and also solve real-life problems |
| 3 | Develop Professionalism |
| 4 | Develop oral as well as written and presentation skills. |
| 5 | Team work to complete the task effectively |

| TECHNICAL COMMUNICATION AND SOFT SKILLS | |
|--|--|
| CO No. | STATEMENTS |
| 1 | The students will be able to understand information which assists in completion of the assigned job tasks more successfully. |
| 2 | Students will be able to communicate their ideas by writing projects, reports, instructions and diagrams. |
| 3 | Students will be able to communicate their idea in many forms of professional writing. |
| 4 | Students will also be able to adhere to ethical norms of scientific communication. |
| 5 | Students will be able to strengthen their individual and collaborative work strategies. |

IV YEAR I SEM

| COMPUTATIONAL AERODYNAMICS | |
|-----------------------------------|--|
| CO No. | STATEMENTS |
| 1 | Solve differential equations governing fluid flow problems. |
| 2 | The student will demonstrate an ability to recognize the type of fluid flow that is occurring in a particular physical system and to use the appropriate model equations to investigate the flow |
| 3 | Generation of grid according to geometry of flow and complexity of flow. |

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| 4 | The student can be able to select appropriate discretization method to solve given problem |
| 5 | Application of CFD techniques for aerospace problems |

MECHANICAL VIBRATIONS

| CO No. | STATEMENTS |
|--------|--|
| 1 | Identifies various vibrating systems and brief introduction on vibration terminology. |
| 2 | Understand the response of harmonically excited vibrating systems. |
| 3 | Analyze response of a vibration systems under various forcing conditions. |
| 4 | Evaluate frequencies and responses of higher order degree systems using numerical methods. |
| 5 | Devise solutions for application based real time solutions. |

FLIGHT VEHICLE DESIGN

| CO No. | STATEMENTS |
|--------|---|
| 1 | Define the design process overview followed during the design of the aircraft. |
| 2 | Demonstrate initial sizing and layout preparation and handwork for geometric sizing. |
| 3 | Discuss material properties, geometry, size and systems requirement to construct flight envelope. |
| 4 | understand performance and trade studies which allows to distinguish type of engine and design to be adopted. |
| 5 | Interpret importance of design on stability and control of the aircraft. |
| | |
| 5 | Explain flight planning-navigation and Guidance, performance prediction and flight path optimization |

AVIONICS

| CO No. | STATEMENTS |
|--------|--|
| 1 | Define the Importance and role of Avionics in modern aircraft |
| 2 | Understand the use of Helmet mounted displays, Head tracking systems and Head down displays |
| 3 | classify principles of gyroscope and accelerometers and Air data sensors and computing |
| 4 | Determine types of Navigation systems used in airplanes |
| 5 | Explain flight planning-navigation and Guidance, performance prediction and flight path optimization |
| | |
| 5 | Give knowledge about advanced quality control methods and illustrates concepts of computer integrated manufacturing system and material handling system. |

CAD/CAM

| CO No. | STATEMENTS |
|--------|---|
| 1 | Define the concepts of design and manufacturing of a product through CAD/CAM tools and describe the various hardware and software requirements for CAD/CAM applications |
| 2 | Construct the Geometric modeling and its facilities desired and apply the transformation equation to solve any irregular geometry. |
| 3 | Deliver the concept of CNC Machine centers and to Write a CNC programme for manufacturing the product. |

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| 4 | Define different grouping techniques to Generate a code for a component or object and develop various process planning of a product |
| 5 | Give knowledge about advanced quality control methods and illustrates concepts of computer integrated manufacturing system and material handling system. |

COMPUTATIONAL AERODYNAMICS LAB

| CO No. | STATEMENTS |
|--------|---|
| 1 | Experience in computing aerodynamic problems and understanding flow physics over the objects. |
| 2 | Knowledge in estimating flow analysis for different mach numbers. |
| 3 | Determining the aerodynamic forces like mainly lift and drag. |
| 4 | Analyze the coefficient of pressure, lift, drag and moment for different bodies for different flow conditions. |
| 5 | Develop a programme for solving the One dimensional equations using explicit method of lax equations using finite difference method |

FLIGHT VEHICLE DESIGN & INSTRUMENTATION LAB

| CO No. | STATEMENTS |
|--------|---|
| 1 | Students can perform the weight estimation and sizing of an a/c for a given mission profile |
| 2 | Able to generate graphs for CL, CD |
| 3 | Students will be able to generate airfoil, tail configurations |
| 4 | Students acquire a knowledge of modelling 3D aircraft |
| 5 | Acquire knowledge on the working of landing gear, hydraulic and pneumatic systems |

PROJECT I

| CO No. | STATEMENTS |
|--------|--|
| 1 | Acquire system integration skills, Documentation skills, Project management skills, Problem solving skills |
| 2 | Ability to Identify problems and solutions and also solve real-life problems |
| 3 | Develop Professionalism |
| 4 | Develop oral as well as written and presentation skills. |
| 5 | Team work to complete the task effectively |

IV YEAR II SEM

AIRCRAFT MAINTENANCS ENGINEERING

| CO No. | STATEMENTS |
|--------|---|
| 1 | Introduce the knowledge of Maintenance Programs |
| 2 | Understand the procedure of Aviation Certification Requirements and Documentation for Maintenance and Engineering and also for overhaul of Aero-Engine. |
| 3 | Analysis of the function of Engineering Department, Production Planning and Control. Improve the knowledge of Training Courses in Aviation Industry. |
| 4 | Ability in Maintenance and Line operation and also Material Support. |

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| 5 | Ability to Prepare Aircraft Maintenance Manuals and Art & Science of Trouble Shooting. |
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HELICOPTER ENGINEERING

| CO No. | STATEMENTS |
|--------|--|
| 1 | Understand the basic concepts of Helicopter flying, different configurations |
| 2 | Understand the difference between Aircraft and Helicopter principles, mechanisms |
| 3 | Understand the principles, theories and stability and control pertaining to it |
| 4 | Acquire the knowledge of rotor operations. |
| 5 | The significance of Stability and Control in different conditions |

AIRLINE & ARPORT MANAGEMENT

| CO No. | STATEMENTS |
|--------|---|
| 1 | Understand the functioning of the airline industry. |
| 2 | Focus on the underlying marketing, financial, operational and competitive factors that influence airline viability. |
| 3 | Investigate how the sensitivity of airline profitability impacts airline management decisions |
| 4 | Analyze the principles of airline economics, costs and pricing. |
| 5 | The student and assess the individual characteristics of low-cost carriers and business only airlines. |

PROJECT II

| CO No. | STATEMENTS |
|--------|--|
| 1 | Acquire System integration skills, Documentation skills, Project management skills, Problem solving skills |
| 2 | Ability to Identify problems and solutions and also solve real-life problems |
| 3 | Develop Professionalism |
| 4 | Develop oral as well as written and presentation skills. |
| 5 | Capable for industry or workshop exposure enabling lifelong learning |

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.TECH CSE - II YEAR I SEM : COURSE OUTCOMES

| DATA STRUCTURES | |
|------------------------|---|
| Course Outcomes | |
| C201.1 | Ability to select the data structures that efficiently model the information in a problem |
| C201.2 | Ability to assess efficiency trade-offs among different data structure implementations or combinations. |
| C201.3 | Implement algorithms for searching and sorting |
| C201.4 | Design programs using a variety of data structures, including hash tables |
| C201.5 | Implement advanced data structures, including search trees, AVL-trees, heaps and graphs |

| Computer Organization | |
|------------------------------|---|
| Course Outcomes | |
| C202.1 | Draw the functional block diagram of a single bus architecture of a computer and apply algorithms to perform arithmetic operations |
| C202.2 | Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface |
| C202.3 | Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process |
| C202.4 | Describe a memory module and analyze its operation by interfacing with the CPU. |
| C202.5 | Learn the techniques to enhance the performance using pipelining, parallelism and RISC methodology |

| Operating Systems | |
|--------------------------|--|
| Course Outcomes | |
| C203.1 | Create processes and threads. |
| C203.2 | Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time |
| C203.3 | For a given specification of memory organization the students will develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. |
| C203.4 | Design and implement file management system |
| C203.5 | For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers. |

| Discrete Mathematics | |
|-----------------------------|--|
| Course Outcomes | |
| C204.1 | For a given logic sentence express it in terms of predicates, quantifiers, and logical |

| | |
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| | connectives |
| C204.2 | For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference |
| C204.3 | For a given a mathematical problem, classify its algebraic structure |
| C204.4 | Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra |
| C204.5 | Develop the given problem as graph networks and solve with techniques of graph theory |

Analog and Digital Electronics

Course Outcomes

| | |
|--------|--|
| C205.1 | Understand and Analyze the PN and Zener diodes, operation and its characteristics |
| C205.2 | Understand and analyze the BJT Transistor |
| C205.3 | Understand the basic postulates of Boolean algebra and shows the correlation between Boolean expressions |
| C205.4 | Learn the methods for simplifying Boolean expressions |
| C205.5 | Understand the formal procedures for the analysis and design of combinational circuits and sequential circuits |

Probability and Statistics

Course Outcomes

| | |
|--------|---|
| C206.1 | Describe randomness in certain realistic situation which can be either discrete or continuous type |
| C206.2 | Provide very good insight which is essential for industrial applications by learning probability distributions |
| C206.3 | Make data-driven decisions by using correlation and regression. |
| C206.4 | Understand the importance of sampling distribution of a given statistic of a random sample. |
| C206.5 | Draw statistical inference using samples of a given size which is taken from a population and to apply statistical methods for analyzing experimental data. |

Operating Systems Lab

Course Outcomes

| | |
|--------|--|
| C207.1 | Ability to implement inter process communication between two processes. |
| C207.2 | Ability to design and solve synchronization problems |
| C207.3 | Ability to simulate and implement operating system concepts such as scheduling and Deadlock management. |
| C207.4 | Ability to simulate and implement operating system concepts such as file management, and memory management |

Data Structures Lab

| Course Outcomes | |
|------------------------|--|
| C208.1 | Implement a given Search problem (Linear Search and Binary Search) |
| C208.2 | Implement for a given problem of Stacks, Queues and linked list and analyze the same to determine the time and computation complexity |
| C208.3 | Implement Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity. |
| C208.4 | Implement tree traversal methods and AVL trees. |

| Foreign Language: French | |
|---------------------------------|--|
| Course Outcomes | |
| C209.1 | The students will be able to communicate in French at A1 level. |
| C209.2 | The student will have an advantage in the competitive job market. |
| C209.3 | This course benefits the graduates when pursuing study opportunities in the countries where French is the official language. |

B.TECH CSE - II YEAR II SEM

| Design and Analysis of Algorithms | |
|--|--|
| Course Outcomes | |
| 210.1 | Able to Understand different computational models, Asymptotic notations and various complexity measures |
| 210.2 | Evaluate and Analyze the complexity of certain divide and conquer, greedy, and dynamic programming algorithms. |
| 210.3 | Demonstrate the use of graph theory concepts and apply them in solving the real life problems. |
| 210.4 | Formulate the criteria and specifications appropriate to new problems, and design algorithms using appropriate algorithmic design technique. |
| 210.5 | Distinguish the classes P, NP, and NP-Complete and examine whether a problem is NP Complete or not. |

| Formal Language and Automata Theory | |
|--|---|
| Course Outcomes | |
| 211.1 | Design Finite Automata models. |
| 211.2 | Construct Regular Expressions and equivalent automata models. |
| 211.3 | Formulate Grammars for Formal languages. |
| 211.4 | Represent Normal Forms and Push Down Automata. |
| 211.5 | Experiment with Computational models |

Java Programming

| Course Outcomes | |
|------------------------|---|
| 212.1 | An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs that satisfy their requirements |
| 212.2 | Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements |
| 212.3 | Apply exception handlers for smooth execution and know the techniques to synchronise threads in multi threading. |
| 212.4 | Apply collection framework and implement methods to connect to databases. |
| 212.5 | Develop GUI using toolkits and knowledge in design patterns to implement the design patterns. |

| Database Management Systems | |
|------------------------------------|--|
| Course Outcomes | |
| C213.1 | Demonstrate the basic elements of a relational database management system |
| C213.2 | Express an ability to identify the data models for relevant problems |
| C213.3 | Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data |
| C213.4 | Apply normalization for the development of application software |
| C213.5 | Identify recovery techniques in concurrent transactions |

| Managerial Economics and Financial Analysis | |
|--|--|
| Course Outcomes | |
| C214.1 | To apply the basic economic principles, forecast the demand and supply |
| C214.2 | To estimate cost and understand market structure and pricing practices |
| C214.3 | To interpret the financial results of the organization |

| Java Programming Lab | |
|-----------------------------|--|
| Course Outcomes | |
| C215.1 | Able to analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP. |
| C215.2 | Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results. |
| C215.3 | Demonstrate an ability to design an object oriented system, AWT components or multithreaded process as per user needs and specifications. |
| C215.4 | Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets program |

| Database Management Systems Lab | |
|--|--|
| Course Outcomes | |
| C216.1 | In drawing the ER, EER, and UML Diagrams. |
| C216.2 | In analyzing the business requirements and producing a viable model for the implementation of the database. |
| C216.3 | In converting the entity-relationship diagrams into relational tables. |
| C216.4 | To develop appropriate Databases to a given problem that integrates ethical, social, legal, and economic concerns. |

| Environmental Science | |
|------------------------------|--|
| Course Outcomes | |
| C217.1 | Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of Ecological principles and environmental regulations which in turn will help in sustainable development |
| C217.2 | the course will sensitise the students through activities assigned to them after every unit |
| C217.3 | This course will help the students understand the complex relationships between natural and human systems |

| DIGITAL ELECTRONICS | |
|----------------------------|---|
| Course Outcomes | |
| C218.1 | Students will be introduced to basic postulates of Boolean algebra and shows the correlation between Boolean expressions. |
| C218.2 | Students will be introduced the methods for simplifying Boolean expressions. |
| C218.3 | Students will be outlined the formal procedures for the analysis and design of combinational and sequential circuits. |
| C218.4 | Students will be introduced to the concept of memories and programmable logic devices. |
| C218.5 | Students will be illustrated with the concept of synchronous and asynchronous sequential circuits |

| DATA BASE SYSTEMS | |
|--------------------------|--|
| Course Outcomes | |
| C219.1 | To understand the basic concepts and the applications of database systems |
| C219.2 | To Master the basics of SQL and construct queries using SQL |
| C219.3 | To understand the relational database design principles |
| C219.4 | To become familiar with the basic issues of transaction processing and concurrency control |
| C219.5 | To become familiar with database storage structures and access techniques |

DATA STRUCTURES USING PYTHON

Course Outcomes

| | |
|--------|---|
| C220.1 | Read, write, execute by hand simple Python programs. |
| C220.2 | Structure simple Python programs for solving problems. |
| C220.3 | Decompose a Python program into functions. |
| C220.4 | Represent compound data using Python lists, tuples, dictionaries. |
| C220.5 | Read and write data from/to files in Python Programs |

INTELLECTUAL PROPERTY RIGHTS

Course Outcomes

| | |
|--------|--|
| C221.1 | Prepare and protect the Inventions, startup ideas and rights of patents and copy rights etc., |
| C221.2 | Gain knowledge on Trademarks and Trade Secrets. |
| C221.3 | Brings awareness on the various types of Unfair Competition and gets well versed with exposure to licensing and transfer of Copyrights and Patents |
| C221.4 | Attain awareness of Cyber laws and Cyber Crime, to protect the data from Cybercrime. |
| C221.5 | Comprehend emerging trends in IPR globally. |

GREEN ENERGY SYSTEMS

Course Outcomes

| | |
|--------|--|
| C222.1 | The student shall understand the principles and working of solar, wind and biomass. |
| C222.2 | Green energy systems and appreciate their significance in view of their importance in the current scenario. |
| C222.3 | The student shall understand the principles and working of geo-thermal, oceanenergies. |
| C222.4 | Green energy systems and appreciate their significance in view of their importance for their potential futureapplications. |

DATA VISUALIZATION

Course Outcomes

| | |
|--------|---|
| C223.1 | Apply statistical methods for Data visualization. |
| C223.2 | Gain knowledge on R and Python |
| C223.3 | Understand usage of various packages in R and Python. |
| C223.4 | Demonstrate knowledge of Watson studio. |
| C223.5 | Apply data visualization tools on various data sets. |

B.TECH CSE - III YEAR I SEM

| Software Engineering | |
|-----------------------------|--|
| Course Outcomes | |
| C301.1 | To compare and select a process model for a business system. |
| C301.2 | To identify and specify the requirements for the development of an application. |
| C301.3 | To develop and maintain efficient, reliable and cost effective software solutions. |
| C301.4 | To critically think and evaluate assumptions and arguments of the client. |
| C301.5 | Gain knowledge in risk management and quality standards |

| Compiler Design | |
|------------------------|--|
| Course Outcomes | |
| C302.1 | Understand the necessity and types of different language translators in use. |
| C302.2 | Apply the techniques and design different components (phases) of a compiler. |
| C302.3 | Ability to implement practical aspects of compiler design. |
| C302.4 | Use the tools Lex, Yacc in compiler construction. |
| C302.5 | Describe the code generation algorithms using DAG representation |

| Embedded Systems | |
|-------------------------|---|
| Course Outcomes | |
| C303.1 | The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers. |
| C303.2 | Understand and design the Embedded systems |
| C303.3 | Understand Embedded Firmware design approaches |
| C303.4 | Learn the basics of RTOS |
| C303.5 | Learn the Macros and Functions, object oriented Programming, Embedded Programming in C++ & JAVA |

| Python Programming | |
|---------------------------|---|
| Course Outcomes | |
| C304.1 | Read, write, execute by hand simple Python programs. |
| C304.2 | Structure simple Python programs for solving problems. |
| C304.3 | Decompose a Python program into functions. |
| C304.4 | Represent compound data using Python lists, tuples, dictionaries. |
| C304.5 | Read and write data from/to files in Python Programs |

| Artificial Intelligence | |
|--------------------------------|---|
| Course Outcomes | |
| C305.1 | Ability to analyze & select a search algorithm for a problem. |
| C305.2 | Formalize a given problem using a suitable AI representation. |
| C305.3 | Ability to apply AI techniques to solve problems of expert systems , game |

| | |
|--------|--|
| | playing, machine learning & neural networks. |
| C305.4 | Apply machine learning algorithms and summarize the design issues of them. |
| C305.5 | Describe NIP algorithms |

| Pervasive Computing | |
|----------------------------|--|
| Course Outcomes | |
| C306.1 | Be able to learn pervasive computing devices and interfaces. Be able to learn XML role in pervasive computing. |
| C306.2 | To get clear idea about WAP architecture and security. |
| C306.3 | Be able to learn speech application in pervasive computing. |
| C306.4 | Become familiar with different voice standards. Identify user interface issues in pervasive computing |
| C306.5 | Be able to learn pervasive computing devices and interfaces. Be able to learn XML role in pervasive computing. |

| Information Security | |
|-----------------------------|--|
| Course Outcomes | |
| C307.1 | Student will be able to apply basic cryptographic algorithms on a given text/ message and identify web authentication and security issues. |
| C307.2 | Ability to identify information system requirements for both of them such as client and server. |
| C307.3 | Ability to understand the current legal issues towards information security |
| C307.4 | Gain knowledge in IP security |
| C307.5 | Explain the web security threats and its countermeasures. |

| Compiler Design Lab | |
|----------------------------|---|
| Course Outcomes | |
| C308.1 | Understand the practical approach of how a compiler is designed. |
| C308.2 | Apply the techniques used in compiler construction. |
| C308.3 | Construct components(few phase) of the compiler for the mini language |
| C308.4 | Understands of the language translation peculiarities |

| Python Programming Lab | |
|-------------------------------|---|
| Course Outcomes | |
| C309.1 | Implement Python programs with conditionals and loops. |
| C309.2 | Develop Python programs step-wise by defining functions and calling them. |
| C309.3 | Read and write data from/to files in Python |
| C309.4 | Use Python lists, tuples, dictionaries for representing compound data. |

| Technical Communication & Soft Skills | |
|--|---|
| Course Outcomes | |
| C310.1 | The students will be able to understand information which assists in completion of the assigned job tasks more successfully. |
| C310.2 | Students will be able to communicate their ideas by writing projects, reports, instructions, diagrams and many other forms of professional writing. |
| C310.3 | Students will be able to strengthen their individual and collaborative work strategies |
| C310.4 | Students will also be able to adhere to ethical norms of scientific communication. |

| MANAGEMENT INFORMATION SYSTEMS | |
|---------------------------------------|---|
| Course Outcomes | |
| C311.1 | Ability to apply Concepts & applications of Management Information Systems. |
| C311.2 | Ability to adapt Cyber crime procedures. |
| C311.3 | Ability to perform Information Systems Planning |
| C311.4 | Ability to adapt information security procedures. |
| C311.5 | Ability to perform Information Systems Implementations |

| INTRODUCTION TO JAVA PROGRAMMING | |
|---|--|
| Course Outcomes | |
| C312.1 | An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements. |
| C312.2 | A competence to design, writes, compile, test and execute straightforward programs using a high level language. |
| C312.3 | An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs. |
| C312.4 | Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem. |
| C312.5 | Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements. |

| SOFTWARE PROJECT MANAGEMENT | |
|------------------------------------|---|
| Course Outcomes | |
| C313.1 | Apply suitable capability Maturity model for specific scenarios & determine the effectiveness. |
| C313.2 | Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project |
| C313.3 | Compare and differentiate organization structures and project structures. |

| | |
|--------|---|
| C313.4 | Implement a project to manage project schedule, expenses and resource with the application of suitable project management tools |
| C313.5 | Summarize the modern process transitions and the next generation software economics |

ENTERPRISE RESOURCE PLANNING

Course Outcomes

| | |
|--------|--|
| C314.1 | Students will be able to know the basics of ERP |
| C314.2 | Students will be able to understand the key implementation of ERP |
| C314.3 | Students will be able to understand Planning Evaluation and selection of ERP systems |
| C314.4 | Students will be able to know the business modules of ERP |
| C314.5 | Students will be able to evaluate the current and future trends in ERP |

NANO TECHNOLOGY

Course Outcomes

| | |
|--------|---|
| C315.1 | Students will be able to understand to learn about basis of NanoMaterials. |
| C315.2 | Students will be able to understand focus on synthetic aspects for the design of nano structured materials. |
| C315.3 | Students will be able to understand describe different approaches including both the bottom-up(includes both chemical and physical methods) and the top-down methods(mainly physical methods) for the synthesis of nano structured materials. |
| C315.4 | Students will be able to understand focus on different type of nanostructures with a special emphasis on carbon nano tubes(CNT), metal and metal oxide nano particles, core-shell nanostructures and self assembly of these nano structures. |
| C315.5 | Students will be able to understand the dependence of various properties (dielectric, magnetic and optical) with size will be discussed. |

B.TECH CSE - III YEAR II SEM

Web Technologies

Course Outcomes

| | |
|--------|---|
| C316.1 | Analyze a web page and identify its elements and attributes. |
| C316.2 | Create web pages using client side scripting languages. |
| C316.3 | Install web servers and apply server side packages that includes security |
| C316.4 | Establish connection to various databases and web applications. |
| C316.5 | Build dynamic flexible web applications based on standard technologies. |

Mobile Application Development

Course Outcomes

| | |
|--------|-----------------------------------|
| C317.1 | Appreciate the Mobility landscape |
|--------|-----------------------------------|

| | |
|--------|---|
| C317.2 | Familiarize with Mobile apps development aspects |
| C317.3 | Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications. |
| C317.4 | Perform testing, signing, packaging and distribution of mobile apps. |
| C317.5 | The student can design and develop mobile application using J2ME |

Computer Networks

Course Outcomes

| | |
|--------|---|
| C318.1 | Exploration of the various Computer Networks, Protocols and routing algorithms. |
| C318.2 | Employ the World Wide Web concepts and will be able to express the need for network security. |
| C318.3 | Ability to administrate a network and flow of information. |
| C318.4 | Describe the transport layer services and classify the flow control mechanisms |
| C318.5 | Identify the application layer services. |

Mini Project

Course Outcomes

| | |
|--------|---|
| C319.1 | Interpret literature with the purpose of formulating a project proposal |
| C319.2 | Planning, analyzing, designing and implementing a software project using SDLC model. |
| C319.3 | Finding the solution of identified problem with help of modern technology |
| C319.4 | Giving priority to real life problem |
| C319.5 | Learning to work as a team and to focus on getting a working project done within a stipulated period of time. |

Computer Graphics

Course Outcomes

| | |
|--------|--|
| C320.1 | Students can animate scenes entertainment. |
| C320.2 | Students are introduced to OpenGL and its working. |
| C320.3 | Students Will be able to work in computer aided design for content presentation. |
| C320.4 | Students can understand better analogy data with pictorial representation. |
| C320.5 | Students will be able to learn different algorithms in virtualization. |

Distributed Systems

Course Outcomes

| | |
|--------|--|
| C321.1 | Identification and analysis of the core concepts of distributed systems. |
| C321.2 | To design and implement sample distributed systems. |
| C321.3 | To examine state-of-the-art distributed systems. |
| C321.4 | Summarize the file systems in a distributed environment |
| C321.5 | Explain concurrent transactions and identify the control mechanisms |

| Cyber Security | |
|------------------------|---|
| Course Outcomes | |
| C322.1 | Students will be able to analyze threats and risks within context of the cyber security. |
| C322.2 | Students will be able to understand different attacks in cyber world. |
| C322.3 | Students will be able to recognize trends and risk involved with mobile and wireless devices. |
| C322.4 | Students are exposed to tools and methods used in cyber crimes. |
| C322.5 | Students will be able to evaluate organizations challenges and implications with respect to cyber security. |

| Web Technologies Lab | |
|-----------------------------|---|
| Course Outcomes | |
| C323.1 | Use WAMP Stack for web applications |
| C323.2 | Use Tomcat Server for Servlets and JSPs |
| C323.3 | Write simple applications with Technologies like HTML, Javascript, AJAX, PHP, Servlets and JSPs |
| C323.4 | Connect to Database and generate optimum results |

| Mobile Application Development Lab | |
|---|---|
| Course Outcomes | |
| C324.1 | Design and Implement various mobile applications using emulators |
| C324.2 | Deploy applications to hand-held devices |
| C324.3 | Develop an application using basic graphical primitives and databases |
| C324.4 | Develop an application using basic databases operations. |

| Indian Constitution | |
|----------------------------|---|
| Course Outcomes | |
| C325.1 | improve their knowledge about Indian constitution |
| C325.2 | Value their identity and exercise their fundamental rights. |
| C325.3 | Understand how differently government bodies function |

| ROBOTICS & AUTOMATION | |
|----------------------------------|--|
| Course Outcomes | |
| C326.1 | Understand the overview of Embedded Systems, Robots, Microprocessors & Microcontrollers. |
| C326.2 | Understand in detail about Robotics and sensors. |
| C326.3 | Understand AVR RISC Microcontroller architecture in detail. |
| C326.4 | Understand about ARM Processor in detail. |

| | |
|--------|---|
| C326.5 | Understand about Artificial Intelligence in Robotics. |
|--------|---|

INTERNET OF THINGS & ITS APPLICATIONS

Course Outcomes

| | |
|--------|---|
| C327.1 | Understand IoT Networking Core |
| C327.2 | Understand IoT related network fundamentals |
| C327.3 | Understand IoT Architecture. |
| C327.4 | Understand IoT Application Development procedure |
| C327.5 | Understand various case studies and IoT applications. |

SOFTWARE TESTING TECHNIQUES

Course Outcomes

| | |
|--------|--|
| C328.1 | Analyze the strategies for software testing. |
| C328.2 | Identify the issues in test management and testing activity. |
| C328.3 | Apply the suitable testing strategy for a given application. |
| C328.4 | Exposure to different types of testing methods |
| C328.5 | Development of test cases and selection of appropriate testing tool. |

TOTAL QUALITY MANAGEMENT

Course Outcomes

| | |
|--------|--|
| C329.1 | The student would be able to apply the tools and techniques of quality management to manufacturing processes. |
| C329.2 | Students learn the importance of Top Management Commitment in any organization for maintaining services quality. |
| C329.3 | The student would be able to apply the techniques of quality management to services processes. |
| C329.4 | Students will be able to understand an overview of TQM, various Quality aspects. |
| C329.5 | Students will be exposed to importance of Top Management Commitment in any organization for maintaining product quality. |

ELECTRICAL SYSTEMS & APPLICATIONS

Course Outcomes

| | |
|-------|---|
| 330.1 | Students will be able to Maintain/Troubleshoot various lamps and fittings in use. |
| 330.2 | Students will be able to design Illumination systems for various applications. |
| 330.3 | Students will be able to Utilize effectively the electrical systems in industries |

| OPERATING SYSTEM CONCEPTS | |
|----------------------------------|--|
| Course Outcomes | |
| C331.1 | Students will be able to Create processes and threads. |
| C331.2 | Students will be able to Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. |
| C331.3 | Students will be able to for a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. |
| C331.4 | Students will be able to design and implement file management system. |
| C331.5 | Students will be able to for a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers. |

B.TECH CSE - IV YEAR I SEM

| Software Testing Methodologies | |
|---------------------------------------|---|
| Course Outcomes | |
| C401.1 | Ability to test a process for continuous quality improvement |
| C401.2 | Generation of test cases from user requirements |
| C401.3 | Analyse of Modeling techniques: UML: FSM and State charts, Combinatorial designetc. |
| C401.4 | Apply logical based testing |
| C401.5 | Apply regression and transition testing |

| Cloud Computing | |
|------------------------|---|
| Course Outcomes | |
| C402.1 | To distinguish the different models and computing paradigms. |
| C402.2 | To realise the levels of virtualization and resources virtualization. |
| C402.3 | To analyze the reasons for migrating into cloud. |
| C402.4 | To effectively use the cloud services in various operating platforms. |
| C402.5 | To apply the services in the cloud for real world scenarios |

| Data Warehousing and Data Mining | |
|---|--|
| Course Outcomes | |
| C403.1 | Understand the main characteristics of different data warehousing and data mining techniques and Knowledge discovery process |
| C403.2 | Design a data warehouse or data mart to present information needed by management in a form that is usable for managers |
| C403.3 | Describe and implement the main algorithms in data warehousing and data mining in a computationally efficient way. |

| | |
|--------|---|
| C403.4 | Apply data mining techniques to solve classification and clustering problems in other disciplines |
| C403.5 | Apply data mining methodologies with information systems and which can be used by strategic level decision makers in well-defined business problems |

| Linux Programming | |
|--------------------------|--|
| Course Outcomes | |
| C404.1 | Identify and use Linux utilities to create and manage simple file processing operations |
| C404.2 | Develop shell scripts to perform more complex tasks. |
| C404.3 | Illustrate file processing operations such as standard I/O and formatted I/O. |
| C404.4 | Develop client server Inter Process Communication (IPC) Mechanisms. Generalize Signal generation and handling signals. |
| C404.5 | Illustrate multithreading concepts to reduce the wastage of CPU time. |

| Machine Learning | |
|-------------------------|--|
| Course Outcomes | |
| C405.1 | Able to Explain theory underlying machine learning |
| C405.2 | Construct algorithms to learn linear and non-linear models |
| C405.3 | Implement data clustering algorithms |
| C405.4 | Construct algorithms to learn tree and rule-based models |
| C405.5 | Apply reinforcement learning techniques |

| Mobile Computing | |
|-------------------------|---|
| Course Outcomes | |
| C406.1 | Able to think and develop new mobile application. |
| C406.2 | Able to take any new technical issue related to this new paradigm and come up with a solution(s). |
| C406.3 | Able to develop new ad hoc network applications and/or algorithms/protocols. |
| C406.4 | Able to understand & develop any existing or new protocol related to mobile environment |
| C406.5 | Tell data dissemination methods and ways for synchronisation. |

| Service Oriented Architecture | |
|--------------------------------------|---|
| Course Outcomes | |
| C407.1 | Students will be able to Build applications based on XML. |
| C407.2 | Students will be able to Develop web services using technology elements. |
| C407.3 | Students will be able to Build SOA-based applications for intra-enterprise and inter-enterprise applications. |
| C407.4 | Students will be able to Understand the key principles behind SOA. |
| C407.5 | Students will be exposed to various web service standards. |

| Project-I | |
|------------------------|---|
| Course Outcomes | |
| C408.1 | Interpret literature with the purpose of formulating a project proposal |
| C408.2 | Planning, analyzing, designing and implementing a software project using SDLC model. |
| C408.3 | Finding the solution of identified problem with help of modern technology |
| C408.4 | Giving priority to real life problem |
| C408.5 | Learning to work as a team and to focus on getting a working project done within a stipulated period of time. |

| Linux Programming Lab | |
|------------------------------|--|
| Course Outcomes | |
| C409.1 | Ability to understand the Linux environment |
| C409.2 | Ability to perform the file management and multiple tasks using shell scripts in Linux environment |
| C409.3 | Ability to verify the attributes of files |
| C409.4 | Ability to create processes and enable communication between them in shared mode |

| Software Testing Methodologies Lab | |
|---|---|
| Course Outcomes | |
| C410.1 | Students will be able to understand the work flow of looping and conditional statement. |
| C410.2 | Students will be able to why a program fails. |
| C410.3 | Students will be able to study system specification and report bugs. |
| C410.4 | Students will be able to study web testing tools. |

B.TECH CSE - IV YEAR II SEM

| Big Data Analytics | |
|---------------------------|---|
| Course Outcomes | |
| C411.1 | Summarize Big data concepts and its deployment in business market |
| C411.2 | Categorize the different big data analytics |
| C411.3 | Apply statistical tools to solve complex problems |
| C411.4 | Gain knowledge in data analytic tools |
| C411.5 | Apply machine learning algorithms for a real world dataset |

| Parallel and Distributed computing | |
|---|--|
| Course Outcomes | |

| | |
|--------|---|
| C412.1 | Students will be introduced to parallel programming platforms. |
| C412.2 | Students will learn different principles of parallel programming and CUDA programming models. |
| C412.3 | Students will be introduced to Analytical Modeling of Parallel Programs. |
| C412.4 | Students will learn about Dense Matrix Algorithms. |
| C412.5 | Students will implement Graph Algorithms and searching algorithms. |

Internet of Things

Course Outcomes

| | |
|--------|--|
| C413.1 | Explain the importance and usage of IOT. |
| C413.2 | Describe the various IOT levels and protocols. |
| C413.3 | Design IoT applications in different domain and be able to analyze their performance |
| C413.4 | Implementation of web based services on IoT devices |
| C413.5 | Relate IOT to cloud computing and web applications |

Advanced Algorithms

Course Outcomes

| | |
|--------|--|
| C414.1 | Students will be able to analyze the fundamental algorithm design strategies. |
| C414.2 | Students will be able to understand the advanced algorithm design, development, and analyses techniques. |
| C414.3 | Students will be able to demonstrate various aspects of advanced algorithms and classify them. |
| C414.4 | Students will be able to design of parallel, probabilistic and randomized algorithms. |
| C414.5 | Students will be able to analyze of parallel, probabilistic and randomized algorithms. |

Soft Computing

Course Outcomes

| | |
|--------|--|
| C415.1 | Students will be able to learn evolution of soft computing. |
| C415.2 | Students will be able to understand artificial neural networks. |
| C415.3 | Students will be able to learn about unsupervised learning networks. |
| C415.4 | Students will be able to understand classical and fuzzy sets. |
| C415.5 | Students will be able to learn fuzzy logic and measures. |

Block Chain Technology

Course Outcomes

| | |
|--------|--|
| C416.1 | Understand the fundamentals of block chain technology. |
| C416.2 | Apply knowledge of implementation of Bitcoin |
| C416.3 | Analyze the incentive structure in a block chain based system and critically assess its functions, benefits and vulnerabilities; |
| C416.4 | Explain the security issues of Bitcoin and Ethereum |

| | |
|--------|--|
| C416.5 | Attain awareness of the new challenges that exist in monetizing businesses around block chains and smart contracts |
|--------|--|

| Image Processing | |
|-------------------------|---|
| Course Outcomes | |
| C417.1 | Exploration of the limitations of the computational methods on digital images. |
| C417.2 | Expected to implement the spatial and frequency domain image transforms on enhancement and restoration of images. |
| C417.3 | Elaborate understanding on image enhancement techniques. |
| C417.4 | Expected to define the need for compression and evaluate the basic compression algorithms |
| C417.5 | To comprehend the relation between human visual system and machine perception and processing of digital images. |

| Project-II | |
|------------------------|--|
| Course Outcomes | |
| C418.1 | Understand programming language concepts, object oriented concepts as well as software engineering principles or go through the research work and gather knowledge over the field and develop an ability to apply them to software design of real life problems in an industry/ commercial environment |
| C418.2 | Plan, analyze, design a software project and demonstrate the ability to communicate effectively in speech and writing |
| C418.3 | Demonstrate originality in the application of knowledge, together with a practical understanding of how established techniques professional enquiries are used to create and interpret knowledge in their discipline. |
| C418.4 | Introduce with major software engineering topics and position them to lead medium sized software projects in industry or propose any new model over the selected field of research that will be useful for future activities |
| C418.5 | Advance their knowledge and to develop new skills to a high level with complex issues both systematically and creatively, make sound judgments on the complete data, and communicate their conclusions clearly to specialist and non-specialist audiences |

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

COURSE OUTCOMES-R18

II Year I & II Semesters

1. Mathematics – III

- Evaluate the improper Integrals, Beta and Gamma functions.
- Identify Bessel equation and Legendre equation and solve them under special conditions with the help of series solutions method. Also identify recurrence relations and orthogonality properties of Bessel and Legendre polynomials.
- Analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem.
- Find the Taylor's and Laurent series expansion of complex functions.
- The conformal transformations of complex functions can be dealt with ease.

2. Electronic Devices and Circuits

- Understand and analyze the different types of diodes, operation and its characteristics.
- Design and analyse the DC bias circuitry of BJT and FET.
- Design biasing circuits using diodes and transistors.
- To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.

3. Signals & Systems

- Understand the basic elementary signals
- Determine the Fourier Series for Continuous Time Signals
- Analyze the signals using F.T, L.T & Z.T and study the properties of F.T., L.T. & Z.T.
- Understand the principal of Linear System and Filter Characteristics of a System.
- Understand the concepts of auto correlation and cross correlation and power Density Spectrum.

4. Probability Theory and Stochastic Process

- To compute Simple probabilities using an appropriate sample space.
- To compute Simple probabilities and expectations from probability density functions (PDF)
- To compute Likelihood ratio tests from PDF for statistical engineering problems.
- To compute Least –square & maximum likelihood estimators for engineering problems.
- To compute Mean and covariance functions for simple random processes.

5. Switching Theory and Logic Design

- Be able to manipulate numeric information in different forms
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyze small combinational circuits and to use standard combinational functions to build larger more complex circuits.
- Be able to design and analyze small sequential circuits and to use standard sequential functions to build larger more complex circuits.

6. Network Analysis and Transmission Lines

- Understand the basic concepts of transient analysis of the circuits
- Understand the basic two-port network parameters, design analysis of the filters and attenuators and their use in the circuit theory,
- Analysis of the locus diagrams, resonance, magnetic circuits.
- The emphasis of this course is laid on the basic of Transmission Lines.

7. Electronic Devices and Circuit Lab

- To analyze voltage and current characteristics of semiconductor circuits and devices.
- To design & analyze rectifiers with & without filters.
- Analyze and realize the characteristics of various Diodes and Transistors.
- Design, Analysis, Implementation and testing of amplifiers using BJT.
- Design, Analysis, Implementation and testing of Transistorized Voltage regulators.

8. Basic Simulation Lab

- Understand & simulate generation of basic waveforms and general operations in linear time invariant systems.
- Understands the Concept of auto correlation, cross correlation and Convolution of given signal/ sequence and simulate it accordingly.
- Develop a precise understanding of various transforms in and its applications in signal processing areas.
- Better understanding of the concepts of PDF, PSD, and MSV etc practically.
- Gain comprehensive understanding about filter design.

9. Foreign Language: French

- The student will be in a position to speak in French, Which is the second most widely learned foreign language after English, and the ninth most widely spoken language in the world. French is also the only language, alongside English, that is taught in every country in the world.

- The Student will get the ability to speak French is an advantage on the international job market.
- Students with a good level of French are eligible for French government scholarships to enrol in postgraduate courses in France in any discipline and qualify for internationally recognized French degrees.

10. Control Systems

- A thorough knowledge on open loop and closed loop control systems, concept of feedback in control systems.
- Transfer function representation through block diagram algebra and signal flow graphs.
- Time response analysis of different ordered systems through their characteristic equation.
- Time domain specifications, stability analysis of control systems in s-domain through R-H criteria.
- Root locus techniques, frequency response analysis through Bode diagrams, Nyquist, Polar plots.
- The basics of state space analysis, design of lag, lead compensators, with which he/she can able to apply the above conceptual things to real world electrical and electronics problems and applications.

11. Analog Circuits

- Understand the concepts of wave shaping circuits
- Design of Multivibrators for various applications,
- Understand the concepts of Time Base Generators , sampling gates and logic gates
- Analyzed the different types of amplifiers and oscillators.

12. Electromagnetic Fields and Waves

- Study time varying Maxwell equations and their applications in electromagnetic problems
- Determine the relationship between time varying electric and magnetic field and electromotive force
- Use Maxwell equation to describe the propagation of electromagnetic waves
- Demonstrate the reflection and refraction of waves at boundaries.

13. Analog Communications

- Have broad idea on the fundamentals of communication systems and comprehensive description of telecommunication system.

- Be able to give mathematical and theoretical description of linear(amplitude) modulation
- Be able to give mathematical and theoretical description of angle modulation.
- Be able to analyze and compare the performance of the modulation techniques using SNR as a parameter and can work on improvising the techniques.
- Be able to relate the concepts of modulation and demodulation in radio transmitter and receiver. Have a basic understanding of pulse modulation techniques.

14. Managerial Economics and Financial Analysis

- To understand the basic economic principles, forecast demand and supply.
- To estimate cost and understand market structure, pricing practices.
- To interpret the financial results of the organisation.

15. Data Structures using Python

- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python Programs.

16. Analog Circuits Lab

- Have the ability to design and analyze circuits using the analog building blocks like diodes, BJT, FET etc for performing various functions.
- Be able to make a qualitative analysis and design simple models of circuits using hardware and software tools.
- Design, Analysis, Implementation and testing of Linear & Non-Linear wave shaping circuits using Diodes.
- Design; analyze the implementation of pulse generating circuits such as Multivibrators which are used in future in designing some communication system modules.
- Designing of Single stage & multiple Stage Amplifiers & Power Amplifiers.

17. Analog Communications Lab

- Design, test and analyze different amplitude modulation & demodulation circuits (AM, DSBSC, SSB) used in communication system & simulate.
- Design, test and analyze Frequency modulation & demodulation circuits & simulate.
- Spectrum Analysis of amplitude & angle modulation using simulation.
- Analyze the Implementation of different analog Pulse modulation techniques.
- Design & analyze different circuits used in communication system (AGC, Pre & De emphasis).

18. Environmental Science

- Understand /evaluate / develop technologies on the basis of Ecological principles and environmental regulations which in turn help in sustainable development.
- Understand the complex relationships between natural and human systems.

III Year I & II Semesters

1. Digital Communications

- Analyze different digital pulse modulation techniques.
- Give mathematical and theoretical description of different digital modulation techniques.
- Design optimum receivers for digital modulation techniques and Analyze the error performance of digital modulation techniques studied using probability.
- Understand concepts of Information theory & Channel Capacity.
- Know about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes.

2. Linear and Digital IC

- Conceptually understand the baseband signal & system.
- Identify various elements, processes, and parameters in telecommunications systems, and describe their functions, effects, and interrelationship.
- Design procedure of AM Transmission & Reception, analyze, measure, and evaluate the performance of a telecommunication system against given criteria.
- Understand basic knowledge of FM Transmission & Reception.
- Understand various types of SSB Transmission & reception.

3. Antennas and Wave Propagation

- Understand the antenna parameter considerations
- Analyze the designed antenna and field evaluation under various conditions and formulate the electric as well as magnetic fields equation set for far field and near field conditions
- Understand the array system of different antennas and field analysis under application of different currents to the individual antenna elements
- Understand the design issues, operation of fundamental antennas and their operation methodology in practice.
- Design a lens structure and also the bench set up for antenna parameter measurement of testing for their effectiveness.
- Understand the means of propagation of electromagnetic waves.

4. Cellular and Mobile Communications

- Understand impairments due to multipath fading channel
- Understand the fundamental techniques to overcome the different fading effects
- Understand co-channel and non co-channel interferences
- Familiarize with cell coverage/signal and traffic, diversity techniques and mobile antennas
- Understand the concepts of frequency management, channel assignment and types of handoffs

5. Computer Organization and Operating Systems

- Basic structure of a digital computer
- Arithmetic operations of binary number system
- The organization of the Control Unit, Arithmetic and Logical Unit, Memory Unit and the I/O unit.
- Operating system functions, types, system calls.
- Memory management techniques and dead lock avoidance
- Operating systems file system and implementation and its interface.

6. Introduction to JAVA programming

- An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements
- A competence to design, write, compile, test and execute straightforward programs using a high level language;
- An appreciation of the principles of object oriented programming;
- An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
- Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- Be able to make use of members of classes found in the Java API.
- Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
- Able to develop applications using Applet, awt and GUI Programming.

7. Digital Communications Lab

- Design various analog and digital pulse modulation techniques such as PAM, PPM, PWM, PCM, DPCM and DM.
- Design and Analyze the TDM circuits.
- Design the different digital modulation and demodulation circuits such as ASK, FSK, BPSK, and Differential PSK.
- Understand the concept of Companding and implement A-law and μ -law Companding.
- Understand and implement the Channel encoding and decoding techniques using Simulation tools.

8. LDIC Lab

- Design, Analysis, Implementation and testing of logic gates, combinational circuits, flip-flops, registers and counters
- To demonstrate basic engineering practices and conduct experiments using basic operational amplifiers.
- Test, measure and provide valid conclusions on oscillator and amplifier design using op-amps and other linear integrated circuits.
- Apply the knowledge of theoretical & practical aspects of transistor circuits to meet desired needs within realistic constraints.
- Be able to make a qualitative analysis and design simple models of circuits using hardware and software tools.

9. Cyber Security

- Understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

10. Digital Signal Processing

- Perform time, frequency and z-transform analysis on signals and systems.
- Understand the inter relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of rounding errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and Appreciate the FFT processing.
- Understand the trade-off between normal and multi rate DSP techniques and finite length word effects.

11. Microprocessors and Microcontrollers

- Understand architecture and operations of a microprocessor system in depth
- Demonstrate programming proficiency using the various addressing modes and data transfer instructions of the microprocessor

- Analyze, specify, design, write and test assembly language programs of moderate complexity
- Perform the detailed hardware design of a microprocessor system, and program the microprocessor using suitable techniques and software tools to interface the processor to external devices.
- Understand the fundamentals of 8051 microcontrollers, Design and interface the different peripheral device to the microcontroller. Understand the basics of ARM Processor

12. Artificial Intelligence

- Understand different types of AI agents, various AI search algorithms
- Fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning.
- Study of Markov Models enable the student ready to step into applied AI.

13. Instrumentation Engineering

- Describe the fundamental concepts and principles of instrumentation
- Explain the operation of various instruments required in measurements
- Apply the measurement techniques for different types of tests.
- To select specific instruments for specific measurement function.
- Students will understand functioning, specification and application of signal analyzing instruments.

14. Internet of things and its Applications

- Understand IoT Networking Core
- Understand IoT related network fundamentals
- Understand IoT Architecture.
- Understand IoT Application Development procedure
- Understand various case studies and IoT applications.

15. Microprocessors and Microcontrollers Lab

- Develop & execute various arithmetic, logical, String manipulation assembly language programs on 8086.
- Interface 8086 with different peripheral devices.
- Analyze & execute simple programs on 8051 micro controller

- Apply the concepts in interfacing the external devices to the processor and controllers according to the user requirements to create novel products and solutions for the real time problems
- Work in an industrial environment with a lifelong learning needed in embedded and real time system design.

16. Digital Signal Processing Lab

- Generate & Perform different operations on discrete time signals and systems.
- Analyze and implement digital systems using the Discrete Fourier Transform and Fast Fourier Transform (FFT) techniques using MATLAB and signal processing toolboxes.
- Use Z transforms to analyze a digital system finding the region of convergence using MATLAB and signal processing toolboxes.
- Design and Implement digital FIR and IIR filters.
- Design Up converter, Down converter & Sample rate converter.

17. Mini Project

- Select a suitable project making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.
- Collect and disseminate information related to selected project.
- Form a team and distribute the work among them.
- Understand, Plan and execute a Mini Project with team, using necessary literature survey.
- Design and Implementation of electronic system using appropriate hardware, software. Troubleshooting techniques & prepare technical report based on the Mini Project.

18. Indian Constitution

- Improve their knowledge about Indian constitution
- Value their identity and exercise their fundamental rights.
- Understand how differently government bodies function.

IV Year I & II Semesters

1. VLSI Design

- Acquire quality knowledge about the fabrication process of IC using MOS Transistor.

- Draw the layout of any logic circuits which helps to understand and estimate parasitic of any logic circuit.
- Provide design concepts required to design building blocks of data path using gates.
- Design simple logic circuits using PLA, PAL, FPGA and CPLD
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve the testability of the system.

2. RADAR Systems

- Demonstrate an understanding of the factors affecting the radar performance using Radar Range Equation.
- Analyze the principle of FM-CW radar and apply it in FM-CW Altimeter.
- Differentiate between a MTI Radar and a Pulse Doppler Radar based on their working principle.
- Demonstrate an understanding of the importance of Matched Filter Receivers in Radars.
- Familiarize with the different types of Radar Displays and their application in real time scenario.

3. Microwave Engineering

- Understand the basic properties and application areas of microwaves.
- Analyze the transmission lines, analyze the waveguides, and analyze the microwave networks.
- Be able to analyze methods to determine circuit properties of passive/active microwave devices.
- Be able to model and study of characteristics of a microwave circuit or system.
- Can set up a microwave bench for measuring microwave parameters.

4. Embedded System Design

- Understand the basics of Embedded Systems and its application areas.
- Understand the embedded firmware design approaches and Embedded C programming.
- Understand types of memory and interfacing to external world.
- Understand the basics of OS & Real Time Operation Systems (RTOS).
- Understand the basics of Onboard and external communication interfaces.

5. Digital Image Processing

- Have an appreciation of the fundamentals of Digital Image Processing including the topics of filtering, transforms and morphology, and image analysis and compression
- Be able to implement basic image processing algorithms in MATLAB.

- Have the skill base necessary to further explore advanced topics of Digital Image Processing.
- Be in a position to make a positive professional contribution in the field of Digital Image Processing.
- At the end of the course the student should have a clear impression of the breadth and practical scope of Digital Image Processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.

6. eCAD and VLSI Lab

- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts required to design building blocks of data path using gates and digital circuits using Xilinx and FPGA kits.
- Design simple memories using MOS transistors and can understand design of large memories.
- Design & simulation of different digital devices using the front end tools.
- Designing of ALU to perform arithmetic & logical operations.

7. Electromagnetic and Microwave Lab

- Write a Simulation program to study the Standing wave Pattern along a transmission line under different conditions
- Write Simulation programs to study the different parameters and radiation pattern of Antennas
- Apply analysis methods to determine circuit properties of passive/active microwave devices
- Set up a microwave bench for measuring microwave parameters.
- Analyze the characteristics of microwave tubes and compare them

8. Wireless Communications and Networks

- Have a fundamental understanding of the Wireless communication, networks & layered architecture.
- Understand the processes happening in Mobile radio propagation.
- Have a good knowledge about the different LAN networks.
- Understand the basic principles of GSM, Wireless ATM & HIPERLAN.
- Be familiar with some of the existing and emerging wireless standards and present them.

9. Digital Signal Processors and Architectures

- To distinguish between the architectural features of general purpose processors and DSP processors

- Understand the architectures of TMS 320C54XX and ADSP2100 DSP devices
- Able to write assembly language programs using instruction set of TMS320C54XX
- Can interface various devices to DSP Processors.

10. Satellite Communications

- Student will understand the historical background, basic concepts and frequency allocations for satellite communications
- Students will demonstrate the orbital mechanics, launch vehicles and launchers
- Student will demonstrate the design of satellite links for specified C/N with system design examples
- Students will be able to visualize satellites sub systems like telemetry, tracking, command and monitoring power systems etc.,
- Students will understand the various multiple access systems for satellite communication systems and satellite packet communications.

11. Project

- Select a suitable project making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.
- Collect and disseminate information related to selected project. Identify and work with the modern tools required for the implementation of the project.
- Form a team and distribute the work among them. Communicate technical and general information by means of oral as well as written presentation skills with professionalism.
- Refine and complete the selected project making use of the technical and engineering knowledge which meets the expected outcome.
- Acquire problem solving, system integration, project management and documentation skills.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

EEE II-I SUBJECTS COURSE OUTCOMES

(R18A0023) MATHEMATICS – III

COURSE OUTCOMES:

After going through this course the students will be able to

- Find the expansion of a given function by Fourier series in the given interval.
- Find Fourier sine, cosine transforms and inverse transformations.
- Analyze the complex functions with reference to their analyticity and integration using Cauchy's integral theorem.
- Find the Taylor's and Laurent series expansion of complex functions. Solution of improper integrals can be obtained by Cauchy's-Residue theorem.
- Understand the conformal transformations of complex functions can be dealt with ease.

(R18A0462) ANALOG ELECTRONICS

COURSE OUTCOMES:

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

- Understand and Analyze the different types of diodes, operation and its characteristics
- Design and analyze the DC bias circuitry of BJT and FET
- Design biasing circuits using diodes and transistors.
- To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.

(R18A0202) ELECTRICAL MACHINES – I

COURSE OUTCOMES:

At the end of this course the student would get

- Basic knowledge on principles of electromechanical energy conversion
- Knowledge on the Constructional features of DC Generators and DC motors
- Full understanding of the basic principle of operation of these machines
- Clear understanding of Operational characteristics and speed control methods of these machines.
- Testing of different types of DC Generators and DC motors

(R18A0205) ELECTROMAGNETIC FIELDS

COURSE OUTCOMES:

Upon completion of course, student will be able to apply vector calculus to static electric – magnetic fields.

- Compute the force, fields & Energy for different charge & current configurations & evaluate capacitance and inductance.
- Analyze Maxwell's equation in different forms (Differential and integral) in Electrostatic, Magnetic time varying fields.
- Ability to solve the problems in different Magnetic fields
- Ability to analyse moving charges on Magnetic fields.
- Ability to Solve Electromagnetic Relation using Maxwell Formulae.

(R18A0206) ELECTRICAL CIRCUIT ANALYSIS

COURSE OUTCOMES:

After going through this course the student gets thorough knowledge on basic parameters of two port network.

- Will able to articulate in working of various components of a circuit.
- Will be familiar with ac and dc circuits solving.
- Ability to measure Three phase voltages and current, active, reactive powers
- Ability to convert Three phase Star to Three phase Delta circuits and Vice-Versa.

(R18A0366) ELEMENTS OF MECHANICAL ENGINEERING

COURSE OUTCOMES:

- The student would be exposed to basic mechanical engineering machinery.
- The student learned about mechanical components.
- Students understand about engines and turbines.

(R18A0393) ELEMENTS OF MECHANICAL ENGINEERING LAB

COURSE OUTCOMES:

- Analyze the performance characteristics of an internal combustion engines.
- Analyze the air compressor characteristics.
- To provide the students' knowledge in calculating performance analysis in turbines, pumps and can be used in power plants.

(R18A0004) FOREIGN LANGUAGE-FRENCH

COURSE OUTCOMES:

- The students will be able to communicate in French at A1 level.
- The student will have an advantage in the competitive job market.
- This course benefits the graduates when pursuing study *opportunities* in the countries where French is the official language.

EEE II-II SUBJECTS COURSE OUTCOMES

(R18A0203) ELECTRICAL MACHINES – II

COURSE OUTCOMES:

At the end of this course the student would get

- Knowledge on the Constructional features of Transformers and Induction motors
- Full understanding of the basic principle of operation of these machines
- Clear understanding of Operational characteristics and speed control methods of Induction motors.
- Testing of different types of Transformers and Induction motors
- Calculate motor currents, power, speed and torque using an equivalent circuit model.
- Measure and calculate motor losses and efficiency.

(R18A0207) POWER SYSTEMS – I

COURSE OUTCOMES:

At the end of this course the student would

- Get Basic understanding of different types power generation stations
- Be able to draw the layout of different types of power plants like hydropowerplant,thermalpowerstation,Nuclearpowerplantandgaspowerplant
- Get a clear understanding of different transmission line parameters, installation and their performance details.
- Understand the various economic aspects of the power plant erection, operation and different tariff methods
- Evaluate voltage drop and line loss calculations and design the capacitors and voltage regulating equipment to improve the power factor and voltage profile

(R18A0209) CONTROL SYSTEMS

COURSE OUTCOMES:

After going through this course the student gets

- A thorough knowledge on open loop and closed loop control systems, concept of feedback in control systems.
- Understanding of transfer function representation through block diagram algebra and signal flow graphs.
- Time response analysis of different order systems through their characteristic equation.
- Time domain specifications, stability analysis of control systems in s-domain through-H criteria.
- Root locus techniques, frequency response analysis through Bode diagrams and Polar plots.

(R18A0404) SWITCHING THEORY AND LOGIC DESIGN**COURSE OUTCOMES:**

Upon completion of the course, student should possess the following skills:

- Be able to manipulate numeric information in different forms
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyze small combinational circuits and to use standard combinational functions to build larger more complex circuits.
- Be able to design and analyze small sequential circuits and to use standard sequential functions to build larger more complex circuits.

(R18A0061) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**COURSE OUTCOMES:**

Students should be able

- To understand the basic economic principles, forecast demand and supply.
- Should be able to estimate cost and understand market structure, pricing practices.
- Able to interpret the financial results of the organisation.

**(OPEN ELECTIVE – I)
(R18A0451) DIGITAL ELECTRONICS****COURSE OUTCOMES**

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

- Analyze different methods used for simplification of Boolean expressions

- Design and implement Combinational and Sequential circuits.
- Design and implement Synchronous and Asynchronous Sequential Circuits.

(R18A0551) DATABASE SYSTEMS

COURSE OUTCOMES:

- Demonstrate the basic elements of a relational database management system
- Ability to identify the data models for relevant problems
- Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.

(R18A0553) DATA STRUCTURES USING PYTHON

COURSE OUTCOMES:

Upon completion of the course, students will be able to

- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples and dictionaries.
- Read and write data from/to files in Python Programs

(R18A0351) INTELLECTUAL PROPERTY RIGHTS

COURSE OUTCOMES:

Student will be able to:

- Prepare and protect the Inventions, startup ideas and rights of patents and copy rights etc.,
- Gain knowledge on Trademarks and Trade Secrets.
- Brings awareness on the various types of Unfair Competition and gets well versed with exposure to licensing and transfer of Copyrights and Patents
- Attain awareness of Cyber laws and Cyber Crime, to protect the data from Cybercrime.
- Comprehend emerging trends in IPR globally.

(R18A0352) GREEN ENERGY SYSTEMS

COURSE OUTCOMES:

- The student shall understand the principles and working of solar, wind, biomass, geo- thermal, ocean energies.
- Green energy systems and appreciate their significance in view of their importance in the current scenario and their potential future applications.

(R18A0555) DATA VISUALIZATION

COURSE OUTCOMES:

At Completion of this course, students would be able to -

- Apply statistical methods for Data visualization.
- Gain knowledge on R and Python
- Understand usage of various packages in R and Python.
- Demonstrate knowledge of Watson studio.
- Apply data visualization tools on various data sets.

(R18A0282) ELECTRICAL MACHINES LAB – I

COURSE OUTCOMES:

After successfully studying this course, students will:

- Be able to systematically obtain the equations that characterize the performance of
- An electric circuit as well as solving both single phase and DC Machines.
- Acknowledge the principles of operation and the main features of electric machines and their applications.
- Acquire skills in using electrical measuring devices.

(R18A0284) ELECTRICAL CIRCUITS AND SIMULATION LAB

COURSE OUTCOMES:

After successfully studying this course, students will:

- Design electrical systems.
- Analyze a given network by applying various Network Theorems.
- Measure three phase Active and Reactive power.

(R18A0014) ENVIRONMENTAL SCIENCE

COURSE OUTCOMES:

After successfully studying this course, students will:

- Understand & evaluate technologies on the basis of Ecological principles and environmental regulations
- Develop environmental regulations which in turn help in sustainable development.
- Understand the complex relationships between natural and human systems.

EEE III-I SUBJECTS COURSE OUTCOMES

(R18A0208) POWER SYSTEMS – II

COURSE OUTCOMES:

- Understand A.C. and D.C. distribution systems.
- Able to analyze the performance of distribution lines
- Able to analyze the performance of Sag and Tension Calculations
- Able to understand overhead line insulators and underground cables.
- Able to understand between air insulated substations.

(R18A0204) ELECTRICAL MACHINES – III

COURSE OUTCOMES:

After this course the student gets a thorough knowledge on:

- Construction, operation, characteristics, regulation, parallel-operation, starting & speed control methods of synchronous machines.
- Construction, operation and characteristics of single-phase motors & special machines.
- Ability to apply the above concepts to real-world electrical problems and applications.

(R18A0210) POWER ELECTRONICS

COURSE OUTCOMES:

At the end of the course the students get:

- A thorough knowledge on construction operation V-I characteristics commutation firing and protection of various power semiconductor devices, thyristors nature of the R, RL and RLE loads for different power inputs.
- AC-to-DC power conversion through 1-phase & 3-phase controlled rectifiers, DC-to-DC power conversion through step-up and step-down choppers.
- Different types of PWM (pulse-width modulation) techniques, steady-state and transient state analysis of all the power converters, which can be to applied to concepts of real- world electrical and electronics problems &

applications.

(R18A0410) LINEAR & DIGITAL IC

COURSE OUTCOMES:

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

- Conceptually understand the baseband signal & system.
- Identify various elements, processes, and parameters in telecommunications systems, and describe their functions, effects, and interrelationship.
- Design procedure of AM Transmission & Reception, analyze, measure, and evaluate the performance of a telecommunication system against given criteria.
- Understand basic knowledge of FM Transmission & Reception.
- Understand various types of SSB Transmission & reception.

(PROFESSIONAL ELECTIVE – I) (R18A1205) ARTIFICIAL INTELLIGENCE

COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

- Explain the techniques for high voltage generation
- Measure high voltage in power systems and describe the electrostatic fields and its control, design insulators for high voltage applications,
- Capable to perform non-destructive insulation test techniques
- Describe the over-voltages, testing procedures and insulation coordination, learn how to design and do testing of external insulation

(R18A0211) HIGH VOLTAGE ENGINEERING

COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

- Explain the techniques for high voltage generation
- Measure high voltage in power systems and describe the electrostatic fields and its control, design insulators for high voltage applications,
- Capable to perform non-destructive insulation test techniques
- Describe the over-voltages, testing procedures and insulation coordination, learn how to design and do testing of external insulation

(R18A0212) DIGITAL CONTROL SYSTEMS

COURSE OUTCOMES:

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

- Learn the basics and digital control system for the real time analysis
- Design of control systems.
- Learn comprehensive knowledge of concepts of stability analysis
- Understand the design of discrete time systems
- Understand the concepts of optimal control for discrete domain.

OPEN ELECTIVE II

(R18A1251) MANAGEMENT INFORMATION SYSTEMS

COURSE OUTCOMES:

- Ability to apply Concepts & applications of Management Information Systems.
- Ability to perform Information Systems Planning & Implementations.
- Ability to adapt Cybercrime and information security procedures.

(R18A0552) INTRODUCTION TO JAVA PROGRAMMING

COURSE OUTCOMES:

- An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements;
- A competence to design, write, compile, test and execute straightforward programs using a high level language;
- An appreciation of the principles of object oriented programming;
- An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
- Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- Be able to make use of members of classes found in the Java API.
- Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
- Able to develop applications using Applet, awt and GUI Programming.

(R18A01252) SOFTWARE PROJECT MANAGEMENT

COURSE OUTCOMES:

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

- Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project

- Compare and differentiate organization structures and project structures.
- Implement a project to manage project schedule, expenses and resource with the application of suitable project management tools

(R18A0353) ENTERPRISE RESOURCE PLANNING

COURSE OUTCOMES:

- To know the strategic importance of Enterprise Resource Planning
- To Understand and implement ERP in various Sectors.

(R15A0354) NANO TECHNOLOGY

COURSE OUTCOMES:

- Will familiarize about the science of Nano Technology.
- Will demonstrate the preparation of Nano Technology.
- Will develop knowledge in characteristic Nano Technology & Nano Materials.

(R18A0283) ELECTRICAL MACHINES LAB – II

COURSE OUTCOMES:

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

- Understand the performance of different machines using different testing methods to convert from three phase to two phase and vice versa.
- Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods.
- Control the active and reactive power flows in synchronous machines Start different machines and control the speed and power factor.

(R18A0285) CONTROL SYSTEMS AND SIMULATION LAB

COURSE OUTCOMES:

After completion of this lab the student is able to

- Improve the system performance by selecting a suitable controller and/or a compensator for a specific application.
- Apply various time domain and frequency domain techniques to assess the system Performance.
- Apply various control strategies to different applications (example: Power systems, electrical drives etc)
- Test system controllability and observability using state space representation and applications of state space representation to various systems.

(R18A0006) TECHNICAL COMMUNICATION AND SOFT SKILLS

COURSE OUTCOMES:

- The students will be able to understand information which assists in completion of the assigned job tasks more successfully.
- Students will be able to communicate their ideas by writing projects, reports, instructions, diagrams and many other forms of professional writing.
- Students will also be able to adhere to ethical norms of scientific communication.
- Students will be able to strengthen their individual and collaborative work strategies.

EEE III-II SUBJECTS COURSE OUTCOMES

(R18A0213) ELECTRICAL MEASUREMENTS & INSTRUMENTATION

COURSE OUTCOMES:

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

- Understand different types of measuring instrument, their construction, operation and characteristics
- Identify the instruments suitable for typical measurements
- Apply the knowledge about transducers and instrument transformer to use them practically and effectively.

(R18A0415) MICROPROCESSORS AND MICROCONTROLLERS

COURSE OUTCOMES:

After going through this course the student will

- Learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
- Learn hardware and software interaction and integration.
- Learn the design of microprocessors/microcontrollers-based systems.

(R18A0214) POWER SYSTEM OPERATION AND CONTROL

COURSE OUTCOMES:

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

- Understand the concept of per unit system and faults in power systems.
- Evaluate the admittance matrix of a given power systems.
- Analyze the power system using iterative methods.
- Understand the concept of stability in power system.

- Understand the PF and computer control in power system.

(PROFESSIONAL ELECTIVE – II)
(R18A0463) SYSTEMS AND SIGNAL PROCESSING

COURSE OUTCOMES:

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

- Understand the basic elementary signals.
- Represent signals in the frequency domain using Fourier Series, Discrete Fourier series, Fourier transform and Discrete Fourier transform techniques.
- Understand the principle of Linear System and digital signal processing fundamentals.
- Implement DFT of any signal using FFT algorithm.
- Realize Digital Filters

(R18A0215) ELECTRICAL ESTIMATION AND COSTING

COURSE OUTCOMES:

After going through this course the student gets knowledge on:

- The estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability.
- Exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations design.
- These techniques should help the students to successfully estimate costing of the products/projects that are part of our everyday usage and apply the above concepts to real- world electrical and electronics problems and applications.

(R18A0216) OPTIMIZATION TECHNIQUES

COURSE OUTCOMES:

After going through this course the student gets a thorough knowledge on:

- Optimization of electrical and electronics engineering problems through classical optimization techniques, linear programming, simplex algorithm, transportation problem, unconstrained optimization.
- Constrained non-linear programming and dynamic programming, with which he/she can able to apply the above conceptual things to real world electrical and electronics problems and applications

(OPEN ELECTIVE - III)
(R18A0452) ROBOTICS & AUTOMATION

COURSE OUTCOMES:

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

- Understand the overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.

- Understand in detail about Robotics and sensors.
- Understand AVR RISC Microcontroller architecture in detail.
- Understand about ARM Processor in detail.
- Understand about Artificial Intelligence in Robotics.

(R18A0453) INTERNET OF THINGS & ITS APPLICATIONS

COURSE OUTCOMES:

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

- Understand IoT Networking Core
- Understand IoT related network fundamentals
- Understand IoT Architecture.
- Understand IoT Application Development procedure
- Understand various case studies and IoT applications.

(R18A0554) OPERATING SYSTEM CONCEPTS

COURSE OUTCOMES:

At the end of the course the students are able to:

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

(R18A0355) TOTAL QUALITY MANAGEMENT

COURSE OUTCOMES:

- The student would be able to apply the tools and techniques of quality management

to manufacturing and services processes.

- To give the students an overview of TQM, various Quality aspects and importance of Top Management Commitment in any organization for maintaining product / services quality.

(R18A0251) ELECTRICAL SYSTEMS & APPLICATIONS

COURSE OUTCOMES:

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

- Maintain/Troubleshoot various lamps and fittings in use.
- Design Illumination systems for various applications.
- Utilize effectively the electrical systems in industries.

(R18A1253) SOFTWARE TESTING TECHNIQUES

COURSE OUTCOMES:

- Analyze the strategies for software testing.
- Identify the issues in test management and testing activity.
- Apply the suitable testing strategy for a given application.
- Development of test cases and selection of appropriate testing tool.

(R18A0286) POWER ELECTRONICS AND SIMULATION LABORATORY

COURSE OUTCOMES:

After completion of this course, the student is able to

- Understand the operating principles of various power electronic converters.
- Use power electronic simulation packages & hardware to develop the power converters.
- Analyze and choose the appropriate converters for various applications.

(R18A0487) MICROPROCESSORS AND MICROCONTROLLERSLAB

COURSE OUTCOMES:

After going through this course the student will be able to

- Apply the concepts in the design of microprocessor/microcontroller based systems in real time applications
- Develop and execute the assembly language programs for interfacing Intel 8086 with peripheral devices.
- Develop and execute simple programs on 8051 microcontroller.

(R18A0521) CYBER SECURITY

COURSE OUTCOMES:

The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

EEE IV-I SUBJECTS COURSE OUTCOMES**(R18A0217) SWITCHGEAR AND PROTECTION****COURSE OUTCOMES:**

After this course, the student

- Gets a thorough knowledge on, various types of protective devices (circuit breakers, relays etc.) and their co-ordination, protection of generators, transformers, feeders, bus- bars, through different types of protective devices, overvoltage protection, lightening, concept of earthing and grounding
- By applying the above concepts to real-world electrical and electronics problems and applications.

(R18A0218) ELECTRICAL DRIVES**COURSE OUTCOMES:**

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

- Identify the choice of the electric drive system based on their applications.
- Explain the operation of single and multi-quadrant electric drives.
- Analyze single phase and three phase rectifiers fed DC motors as well as chopper fed DC motor.
- Explain the speed control methods for AC-AC & DC-AC converters fed to Induction motors and Synchronous motors with closed loop, and open loop operations.

(R18A0219) EHV AC & HVDC TRANSMISSION**COURSE OUTCOMES:**

After going through this course, the student gets knowledge on

- The Concept of extra high voltage AC and high voltage DC transmission.
- The behavior of the line parameters for extra high voltages.
- The effect of corona, electrostatic field, voltage control for extra high voltages.
- The basic concepts of HVDC, HVDC converters.
- The effect of harmonics and suppression of harmonics by using filters.

(PROFESSIONAL ELECTIVE - III)

(R18A0513)COMPUTER NETWORKS

COURSE OUTCOMES:

- To understand and explore the basics of Computer Networks and Various Protocols. Student will be in a position to understand the World Wide Web concepts.
- Able to administrate a network and flow of information further Student can understand easily the concepts of network security, Mobile, and ad hoc networks.

(R18A0220) ADVANCED POWER ELECTRONICS

COURSE OUTCOMES:

- Competency in function of various power electronics devices.
- Skill of analyzing power electronic devices, Know-how of advance Power electronics converter, Fitness in mitigating converter harmonics.
- Competency in developing Dynamic model of drive system, Fitness' in solving typical drive issues. Ability in control strategy of cyclo converter based Drives, Skill in Transient analysis of drive system.
- Competency in designing FACTS controllers, Capability in designing isolated converters.
- Ability to dynamic analysis of power Converters, Competency in operation of resonant converter.
- Capability in Control of Switched Reluctance Motor Drives, Competency in Control of BLDC Motor Drives. Proficiency in HVDC converter systems design. Know-how of operation of Power electronics in HVDC system.

(R18A1262)ARTIFICIAL NEURAL NETWORKS

COURSE OUTCOMES:

After the course the student should be able to:

- Explain the function of artificial neural networks of the Back-prop, Hopfield and SOM type
- Explain the difference between supervised and unsupervised learning
- Describe the assumptions behind, and the derivations of the ANN algorithms dealt with in the course
- Give example of design and implementation for small problems
- Implement ANN algorithms to achieve signal processing, optimization, classification and process modeling

(PROFESSIONAL ELECTIVE - IV)

(R18A0221) SOLAR & WIND ELECTRICAL SYSTEMS

COURSE OUTCOMES:

After going through this course, the student gets a working knowledge on:

- The basic concepts of solar energy, solar radiation and fundamentals of wind turbines.
- Different types of PV Solar cells, PV systems and their integration.
- Generation schemes with variable speed turbines and other types of Generators.
- Various other subsystems of Solar and Wind based power plants.
- Issues related to Grid-integration of Solar & Wind energy systems and their solutions

(R18A0222) QUALITY AND RELIABILITY ENGINEERING**COURSE OUTCOMES:**

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

- Model various systems applying reliability networks
- Evaluate the reliability of simple and complex systems
- Estimate the limiting state probabilities of repairable systems
- Apply various mathematical models for evaluating reliability of irreparable systems

(R18A0223) POWER PLANT ENGINEERING**COURSE OUTCOMES:**

At the end of the course the students will be able

- To Study various non-conventional sources in remote areas of the country.
- Students get the exposure of different power plants.
- To analyze the thermionic power generation.

(R18A0287) POWER SYSTEMS LAB**COURSE OUTCOMES:**

After completion of this lab, the student will be able to

- Perform various load flow techniques
- Understand Different protection methods
- Analyze the experimental data and draw the conclusions.

(R18A0288) ELECTRICAL MEASUREMENTS LABORATORY**COURSE OUTCOMES:**

After completion of this course the student is able to:

- Get the ability to choose instruments and can test any instrument can find the

accuracy of any instrument by performing experiment can calibrate PMMC instrument using D.C potentiometer.

EEE IV-II SUBJECTS COURSE OUTCOMES

(R18A0465) PLC SYSTEMS

COURSE OUTCOMES:

After going through this course the student will be able to

- Describe the main functional units in a PLC and be able to explain how they interact
- Develop ladder logic programming for simple process.
- Understand and design the embedded systems
- Understand Embedded Firmware design approaches
- Learn the basics of RTOS

(PROFESSIONAL ELECTIVE - V)

(R18A0224) INDUSTRIAL AND ALLIED ELECTRICAL SYSTEMS

COURSE OUTCOMES:

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

- Maintain/Troubleshoot various lamps and fittings in use.
- Understand various types of Heating, Welding and traction system.
- Design Illumination systems for various applications.
- Application of electrical equipment's in different types of industries
- Work in the areas of UPS systems and traction systems production, commissioning and maintenance.

(R18A0225) POWER SYSTEM DYNAMICS AND STABILITY

COURSE OUTCOMES:

Upon the completion of the subject, the student will be able to

- Choose the fundamental dynamic behavior and controls of power systems to perform basic stability analysis.
- Comprehend concepts in modeling and simulating the dynamic phenomena of power systems Interpret results of system stability studies
- Analyze theory and practice of modeling main power system components, such as
- synchronous machines, excitation systems and governors

(R18A0226) ELECTRICAL MACHINE DESIGN

COURSE OUTCOMES:

Upon completing the course students will be able to:

- Understand the design aspects of various parts of DC machines and solve the problems of design
- Student should be able to understand the design concepts of transformers and know about how to design the parts.
- Student is able to understand the design concepts of synchronous machines and solve the problems related to design.
- Student understands the importance of design of machines based on their applications.

(PROFESSIONAL ELECTIVE - VI) (R18A0227) POWER QUALITY AND FACTS DEVICES

COURSE OUTCOMES:

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

- Know the severity of power quality problems in distribution system and understand the concept of voltage sag transformation from up-stream (higher voltages) to downstream (lower voltage).
- Understand the Concept of improving the power quality to sensitive load by various mitigating custom power devices.
- Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping.
- Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC.

(R18A0228) POWER SYSTEM RELIABILITY

COURSE OUTCOMES:

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

- Apply the Concepts of probability theory for Systems Modelling and Evaluation of Reliability in different methods
- Apply the Concepts of Time dependent probability and Discrete Markov Chains & Continuous Markov Processes in establishing the reliability figure of practical systems
- Carry out multi Component & Approximate System Reliability Evaluation

(R18A0229) ELECTRICAL AND HYBRID VEHICLES

COURSE OUTCOMES:

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

- Study the models to describe hybrid vehicles and their performance.

- Implement the different possible ways of energy storage.
- Adopt the different strategies related to hybrid vehicle operation & energy management.

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE OUTCOMES FOR R18 SUBJECTS

B.TECH IT - II YEAR I SEM

| COMPUTER ORGANIZATION AND ARCHITECTURE | |
|---|---|
| Course Outcomes | |
| C201.1 | Draw the functional block diagram of a single bus architecture of a computer and apply algorithms to perform arithmetic operations |
| C201.2 | Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface |
| C201.3 | Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process |
| C201.4 | Describe a memory module and analyze its operation by interfacing with the CPU. |
| C201.5 | Learn the techniques to enhance the performance using pipelining, parallelism and RISC methodology |
| DATA STRUCTURES | |
| Course Outcomes | |
| C202.1 | Ability to select the data structures that efficiently model the information in a problem |
| C202.2 | Ability to assess efficiency trade-offs among different data structure implementations or combinations. |
| C202.3 | Implement algorithms for searching and sorting |
| C202.4 | Design programs using a variety of data structures, including hash tables |
| C202.5 | Implement advanced data structures, including search trees, AVL-trees, heaps and graphs |
| OPERATING SYSTEMS | |

| Course Outcomes | |
|---|--|
| C203.1 | Create processes and threads. |
| C203.2 | Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time |
| C203.3 | For a given specification of memory organization the students will develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. |
| C203.4 | Design and implement file management system |
| C203.5 | For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers. |
| | |
| DISCRETE MATHEMATICS | |
| Course Outcomes | |
| C204.1 | For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives |
| C204.2 | For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference |
| C204.3 | For a given a mathematical problem, classify its algebraic structure |
| C204.4 | Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra |
| C204.5 | Develop the given problem as graph networks and solve with techniques of graph theory |
| | |
| PROBABILTY AND STATISTICS | |
| Course Outcomes | |
| C205.1 | Describe randomness in certain realistic situation which can be either discrete or continuous type |
| C205.2 | Provide very good insight which is essential for industrial applications by learning probability distributions |
| C205.3 | Make data-driven decisions by using correlation and regression. |
| C205.4 | Understand the importance of sampling distribution of a given statistic of a random sample. |
| C205.5 | Draw statistical inference using samples of a given size which is taken from a population and to apply statistical methods for analyzing experimental data. |
| | |
| ANALOG & DIGITAL ELECTRONICS | |
| Course Outcomes | |

| | |
|-----------------------------------|--|
| C206.1 | Understand and Analyze the PN and Zener diodes, operation and its characteristics |
| C206.2 | Understand and analyze the BJT Transistor |
| C206.3 | Understand the basic postulates of Boolean algebra and shows the correlation between Boolean expressions |
| C206.4 | Learn the methods for simplifying Boolean expressions |
| C206.5 | Understand the formal procedures for the analysis and design of combinational circuits and sequential circuits |
| OPERATING SYSTEMS LAB | |
| Course Outcomes | |
| C207.1 | Ability to implement inter process communication between two processes. |
| C207.2 | Ability to design and solve synchronization problems |
| C207.3 | Ability to simulate and implement operating system concepts such as scheduling, Deadlock management, file management, and memory management |
| Data Structures Laboratory | |
| Course Outcomes | |
| C208.1 | Implement a given Search problem (Linear Search and Binary Search) |
| C208.2 | Implement for a given problem of Stacks, Queues and linked list and analyze the same to determine the time and computation complexity |
| C208.3 | Write program for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity. |
| FRENCH | |
| Course Outcomes | |
| C209.1 | The students will be able to communicate in French at A1 level. |
| C209.2 | The student will have an advantage in the competitive job market. |
| C209.3 | This course benefits the graduates when pursuing study opportunities in the countries where French is the official language. |

B.TECH IT - II YEAR II SEM

| SOFTWARE ENGINEERING | |
|---------------------------------------|---|
| Course Outcomes | |
| C210.1 | To compare and select a process model for a business system. |
| C210.2 | To identify and specify the requirements for the development of an application. |
| C210.3 | To develop and maintain efficient, reliable and cost effective software solutions. |
| C210.4 | To critically think and evaluate assumptions and arguments of the client. |
| C210.5 | Gain knowledge in risk management and quality standards |
| | |
| AUTOMATA & COMPILER DESIGN | |
| Course Outcomes | |
| C211.1 | Understand the necessity and types of different language translators in use. |
| C211.2 | Apply the techniques and design different components (phases) of a compiler. |
| C211.3 | Ability to implement practical aspects of automata theory. |
| C211.4 | Use the tools Lex, Yacc in compiler construction. |
| C211.5 | Describe the code generation algorithms using DAG representation |
| | |
| JAVA PROGRAMMING | |
| Course Outcomes | |
| C212.1 | An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs that satisfy their requirements |
| C212.2 | Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements |
| C212.3 | Apply exception handlers for smooth execution and know the techniques to synchronise threads in multi threading. |
| C212.4 | Apply collection framework and implement methods to connect to databases. |
| C212.5 | Develop GUI using toolkits and knowledge in design patterns to implement the design patterns. |
| | |
| DATABASE MANAGEMENT SYSTEMS | |
| Course Outcomes | |

| | |
|--------|--|
| C213.1 | Demonstrate the basic elements of a relational database management system |
| C213.2 | Express an ability to identify the data models for relevant problems |
| C213.3 | Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data |
| C213.4 | Apply normalization for the development of application software |
| C213.5 | Identify recovery techniques in concurrent transactions |

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Outcomes

| | |
|--------|--|
| C214.1 | To apply the basic economic principles, forecast the demand and supply |
| C214.2 | To estimate cost and understand market structure and pricing practices |
| C214.3 | To interpret the financial results of the organization |

JAVA PROGRAMMING LAB

Course Outcomes

| | |
|--------|--|
| C215.1 | Able to analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP. |
| C215.2 | Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results. |
| C215.3 | Demonstrate an ability to design an object oriented system, AWT components or multithreaded process as per user needs and specifications. |
| C215.4 | Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets program |

DATABASE MANAGEMENT SYSTEMS LAB

Course Outcomes

| | |
|--------|--|
| C216.1 | In drawing the ER, EER, and UML Diagrams. |
| C216.2 | In analyzing the business requirements and producing a viable model for the implementation of the database. |
| C216.3 | In converting the entity-relationship diagrams into relational tables. |
| C216.4 | To develop appropriate Databases to a given problem that integrates ethical, social, legal, and economic concerns. |

ENVIRONMENTAL SCIENCES

Course Outcomes

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|--------|--|
| C217.1 | Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of Ecological principles and environmental regulations which in turn will help in sustainable development |
| C217.2 | the course will sensitise the students through activities assigned to them after every unit |
| C217.3 | This course will help the students understand the complex relationships between natural and human systems |
| | |

B.TECH IT - III YEAR I SEM

| DESIGN AND ANALYSIS OF ALGORITHMS | |
|-----------------------------------|--|
| Course Outcomes | |
| C301.1 | Able to Understand different computational models, Asymptotic notations and various complexity measures |
| C301.2 | Evaluate and Analyze the complexity of certain divide and conquer, greedy, and dynamic programming algorithms. |
| C301.3 | Demonstrate the use of graph theory concepts and apply them in solving the real life problems. |
| C301.4 | Formulate the criteria and specifications appropriate to new problems, and design algorithms using appropriate algorithmic design technique. |
| C301.5 | Distinguish the classes P, NP, and NP-Complete and examine whether a problem is NP Complete or not. |
| | |
| COMPUTER NETWORKS | |
| Course Outcomes | |
| C302.1 | Exploration of the various Computer Networks, Protocols and routing algorithms. |
| C302.2 | Employ the World Wide Web concepts and will be able to express the need for network security. |
| C302.3 | Ability to administrate a network and flow of information. |
| C302.4 | Describe the transport layer services and classify the flow control mechanisms |
| C302.5 | Identify the application layer services. |
| | |
| WEB TECHNOLOGIES | |
| Course Outcomes | |
| C303.1 | Analyze a web page and identify its elements and attributes. |
| C303.2 | Create web pages using client side scripting languages. |
| C303.3 | Install web servers and apply server side packages that includes security |

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| C303.4 | Establish connection to various databases and web applications. |
| C303.5 | Build dynamic flexible web applications based on standard technologies. |
| DISTRIBUTED SYSTEMS | |
| Course Outcomes | |
| C304.1 | Identification and analysis of the core concepts of distributed systems. |
| C304.2 | To design and implement sample distributed systems. |
| C304.3 | To examine state-of-the-art distributed systems. |
| C304.4 | Summarize the file systems in a distributed environment |
| C304.5 | Explain concurrent transactions and identify the control mechanisms |
| COMPUTER NETWORKS LAB | |
| Course Outcomes | |
| C305.1 | Understand fundamental underlying principles of computer networking and implement the functionalities of data link layer |
| C305.2 | Implement network routing algorithms. |
| C305.3 | Apply mathematical foundations to solve computational problems in computer network security |
| WEB TECHNOLOGIES LAB | |
| Course Outcomes | |
| C306.1 | Use WAMP Stack for web applications |
| C306.2 | Use Tomcat Server for Servlets and JSPs |
| C306.3 | Write simple applications with Technologies like HTML, Javascript, AJAX, PHP, Servlets and JSPs |
| C306.4 | Connect to Database and generate optimum results |
| C306.5 | Parse XML files using Java (DOM and SAX parsers) |
| TECHNICAL COMMUNICATION AND SOFT SKILLS | |
| Course Outcomes | |
| C307.1 | The students will be able to understand information which assists in completion of the assigned job tasks more successfully. |
| C307.2 | Students will be able to communicate their ideas by writing projects, reports, instructions, diagrams and many other forms of professional writing. |
| C307.3 | Students will be able to strengthen their individual and collaborative work strategies |

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| C307.4 | Students will also be able to adhere to ethical norms of scientific communication. |
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B.TECH IT - III YEAR II SEM

| SOFTWARE PROCESS & PROJECT MANAGEMENT | |
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| Course Outcomes | |
| C310.1 | Apply suitable capability Maturity model for specific scenarios & determine the effectiveness. |
| C310.2 | Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project |
| C310.3 | Compare and differentiate organization structures and project structures. |
| C310.4 | Implement a project to manage project schedule, expenses and resource with the application of suitable project management tools |
| C310.5 | Summarize the modern process transitions and the next generation software economics |
| | |
| DATA WAREHOUSING AND DATA MINING | |
| Course Outcomes | |
| C311.1 | Understand the main characteristics of different data warehousing and data mining techniques and Knowledge discovery process |
| C311.2 | Design a data warehouse or data mart to present information needed by management in a form that is usable for managers |
| C311.3 | Describe and implement the main algorithms in data warehousing and data mining in a computationally efficient way. |
| C311.4 | Apply data mining techniques to solve classification and clustering problems in other disciplines |
| C311.5 | Apply data mining methodologies with information systems and which can be used by strategic level decision makers in well-defined business problems |
| | |
| LINUX PROGRAMMING | |
| Course Outcomes | |
| C312.1 | Identify and use Linux utilities to create and manage simple file processing operations |
| C312.2 | Develop shell scripts to perform more complex tasks. |
| C312.3 | Illustrate file processing operations such as standard I/O and formatted I/O. |

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| C312.4 | Develop client server Inter Process Communication (IPC) Mechanisms. Generalize Signal generation and handling signals. |
| C312.5 | Illustrate multithreading concepts to reduce the wastage of CPU time. |
| ARTIFICIAL INTELLIGENCE | |
| Course Outcomes | |
| C313.1 | Ability to analyze & select a search algorithm for a problem. |
| C313.2 | Formalize a given problem using a suitable AI representation. |
| C313.3 | Ability to apply AI techniques to solve problems of expert systems , game playing,machine learning & neural networks. |
| C313.4 | Apply machine learning algorithms and summarize the design issues of them. |
| C313.5 | Describe NIP algorithms |
| INFORMATION SECURITY | |
| Course Outcomes | |
| C314.1 | Student will be able to apply basic cryptographic algorithms on a given text/ message and identify web authentication and security issues. |
| C314.2 | Ability to identify information system requirements for both of them such as client and server. |
| C314.3 | Ability to understand the current legal issues towards information security |
| C314.4 | Gain knowledge in IP security |
| C314.5 | Explain the web security threats and its countermeasures. |
| C314 | |
| MOBILE COMPUTING | |
| Course Outcomes | |
| C315.1 | Able to think and develop new mobile application. |
| C315.2 | Able to take any new technical issue related to this new paradigm and come up with a solution(s). |
| C315.3 | Able to develop new ad hoc network applications and/or algorithms/protocols. |
| C315.4 | Able to understand & develop any existing or new protocol related to mobile environment |
| C315.5 | Tell data dissemination methods and ways for synchronisation. |
| DATAWARE HOUSING & DATAMINING LAB | |
| Course Outcomes | |
| C316.1 | Gain knowledge in data warehouse schemas and algorithms for pre-processing data |
| C316.2 | Develop algorithms for data extraction and transformation |

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| C316.3 | Ability to apply mining techniques for real world data |
| C316.4 | Ability to add mining algorithms as a component to the existing tools |
| C316.5 | Construct classification algorithms for data analysis |
| | |
| LINUX PROGRAMMING LAB | |
| Course Outcomes | |
| C317.1 | Ability to understand the Linux environment |
| C317.2 | Ability to perform the file management and multiple tasks using shell scripts in Linux environment |
| C317.3 | Ability to verify the attributes of files |
| C317.4 | Ability to create processes and enable communication between them in shared mode |
| C317.5 | Develop interaction between server and client process using sockets |
| | |
| Mini Project | |
| Course Outcomes | |
| | Interpret literature with the purpose of formulating a project proposal |
| | Planning, analyzing, designing and implementing a software project using SDLC model. |
| | Finding the solution of identified problem with help of modern technology |
| | Giving priority to real life problem |
| | Learning to work as a team and to focus on getting a working project done within a stipulated period of time. |

B.TECH IT - IV YEAR I SEM

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| PROGRAMMING FOR APPLICATION DEVELOPMENT | |
| Course Outcomes | |
| C401.1 | Implementation of OOPs Concepts in ASP.net |
| C401.2 | Develop console applications |
| C401.3 | Implement, Compile, Test & Run Applications Programs |
| C401.4 | Demonstrate the ability to use Exception Handling Mechanisms. |
| C401.5 | Able to Develop Applications using .NET framework |
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| MOBILE APPLICATION DEVELOPMENT | |
| Course Outcomes | |
| C402.1 | Appreciate the Mobility landscape |

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|--------------------------------|---|
| C402.2 | Familiarize with Mobile apps development aspects |
| C402.3 | Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications. |
| C402.4 | Perform testing, signing, packaging and distribution of mobile apps. |
| C402.5 | The student can design and develop mobile application using J2ME |
| CLOUD COMPUTING | |
| Course Outcomes | |
| C403.1 | To distinguish the different models and computing paradigms. |
| C403.2 | To realise the levels of virtualization and resources virtualization. |
| C403.3 | To analyze the reasons for migrating into cloud. |
| C403.4 | To effectively use the cloud services in various operating platforms. |
| C403.5 | To apply the services in the cloud for real world scenarios |
| BUSINESS DATA ANALYTICS | |
| Course Outcomes | |
| C404.1 | Summarize Big data concepts and its deployment in business market |
| C404.2 | Categorize the different big data analytics |
| C404.3 | Apply statistical tools to solve complex problems |
| C404.4 | Gain knowledge in data analytic tools |
| C404.5 | Apply machine learning algorithms for a real world dataset |
| MACHINE LEARNING | |
| Course Outcomes | |
| C405.1 | Able to Explain theory underlying machine learning |
| C405.2 | Construct algorithms to learn linear and non-linear models |
| C405.3 | Implement data clustering algorithms |
| C405.4 | Construct algorithms to learn tree and rule-based models |
| C405.5 | Apply reinforcement learning techniques |
| INTERNET OF THINGS | |
| Course Outcomes | |
| C406.1 | Explain the importance and usage of IOT. |
| C406.2 | Describe the various IOT levels and protocols. |
| C406.3 | Design IoT applications in different domain and be able to analyze their performance |

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| C406.4 | Implementation of web based services on IoT devices |
| C406.5 | Relate IOT to cloud computing and web applications |
| SOFTWARE TESTING METHODOLOGIES | |
| Course Outcomes | |
| C407.1 | Ability to test a process for continuous quality improvement |
| C407.2 | Generation of test cases from user requirements |
| C407.3 | Analyse of Modeling techniques: UML: FSM and State charts, Combinatorial design etc. |
| C407.4 | Apply logical based testing |
| C407.5 | Apply regression and transition testing |
| | |
| PROGRAMMING FOR APPLICATION DEVELOPMENT LAB | |
| Course Outcomes | |
| C408.1 | Gain knowledge in visual Studio Development Environment and able to develop a console application project |
| C408.2 | Able to apply object oriented concepts and develop classes to handle exceptions |
| C408.3 | Able to develop applications and establish communication between server and client |
| | |
| MOBILE APPLICATION DEVELOPMENT LAB | |
| Course Outcomes | |
| C409.1 | Design and Implement various mobile applications using emulators |
| C409.2 | Deploy applications to hand-held devices |
| C409.3 | Develop an application using basic graphical primitives and databases |
| | |
| Project-1 | |
| Course Outcomes | |
| C410.1 | Interpret literature with the purpose of formulating a project proposal |
| C410.2 | Planning, analyzing, designing and implementing a software project using SDLC model. |
| C410.3 | Finding the solution of identified problem with help of modern technology |
| C410.4 | Giving priority to real life problem |
| C410.5 | Learning to work as a team and to focus on getting a working project done within a stipulated period of time. |
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B.TECH IT - IV YEAR II SEM

| TOOLS AND TECHNIQUES OF DATA SCIENCES | |
|--|--|
| Course Outcomes | |
| C410.1 | Demonstrate the basic knowledge of data science process. |
| C410.2 | Setup the software environment for Python and R Lanaguage and apply various techniques to work with data. |
| C410.3 | Able to handle and manage data andits workflow |
| C410.4 | Apply regression models on real world data using modern tools |
| C410.5 | Manipulate and visualize the data using tools like Pandas and Matplotlib. |
| | |
| ADHOC AND SENSOR NETWORKS | |
| Course Outcomes | |
| C411.1 | Explain the Concepts, Network Architecture and Applications of Ad-hoc and Wireless Sensor Networks |
| C411.2 | Analyze the protocol design issues of Ad-hoc Networks. |
| C411.3 | Describe the Concepts, Architecture of ad-hoc and sensor networks and MAC layer protocols. |
| C411.4 | Comprehend the design of routing protocols for ad-hoc and wireless networks |
| C411.5 | Evaluate the QOS related performance measurements of ad-hoc and sensor networks. |
| | |
| Service Oriented Architecture | |
| Course Outcomes | |
| C412.1 | Build applications based on XML. |
| C412.2 | Gained knowledge on various service oriented analysis techniques and also understand the technology underlying the service design. |
| C412.3 | Develop web services using technology elements. |
| C412.4 | Learn standards related to Web services: Web Services Description Language (WSDL), Simple Object Access Protocol (SOAP), and Universal Description, Discovery and Integration (UDDI) |

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| C412.5 | Build SOA-based applications for intra-enterprise and inter-enterprise applications. |
| BLOCK CHAIN TECHNOLOGY | |
| Course Outcomes | |
| C413.1 | Understand the fundamentals of blockchain technology. |
| C413.2 | Apply knowledge of implementation of Bitcoin |
| C413.3 | Analyze the incentive structure in a blockchain based system and critically assess its functions, benefits and vulnerabilities; |
| C413.4 | Explain the security issues of Bitcoin and Ethereum |
| C413.5 | Attain awareness of the new challenges that exist in monetizing businesses around blockchains and smart contracts |
| | |
| Project - 2 | |
| Course Outcomes | |
| C414.1 | Understand programming language concepts,object oriented concepts as well as software engineering principles or go through the research work and gather knowledge over the field and develop an ability to apply them to software design of real life problems in an industry/commercial environment |
| C414.2 | Plan, analyze, design a software project and demonstrate the ability to communicate effectively in speech and writing |
| C414.3 | Demonstrate originality in the application of knowledge, together with a practical understanding of how established techniques professional enquiries are used to create and interpret knowledge in their discipline. |
| C414.4 | Introduce with major software engineering topics and position them to lead medium sized software projects in industry or propose any new model over the selected field of research that will be useful for future activities |
| C414.5 | Advance their knowledge and to develop new skills to a high level with complex issues both systematically and creatively, make sound judgments on the complete data, and communicate their conclusions clearly to specialist and non-specialist audiences |
| | |

DEPARTMENT OF MECHANICAL ENGINEERING
COURSE OUTCOMES
II B.TECH I SEM

II YEAR I SEM

ENGINEERING MECHANICS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium. | Gain the knowledge on the concepts of force, moment and its application. |
| 2 | Perform analysis of bodies lying on rough surfaces. | Understand and apply the knowledge on drawing free body diagrams and solve the problems using analytical methods and law of triangle of forces. |
| 3 | Explain the concept of analysis of trusses using method of joints and method of sections. | Students are capable of finding centroid, centre of gravity, moment of inertia and polar moment of inertia including transfer methods and their applications. |
| 4 | Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections. | Understanding the motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion |
| 5 | Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies. | Understand and apply the knowledge on concepts of D'Alembert's principle and particle motion. |

II YEAR I SEM

THERMODYNAMICS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | To understand the concepts of energy transformation, conversion of heat into work. | To differentiate between quality and quantity of energy, heat and work, enthalpy and entropy, Etc. |
| 2 | To understand why and how natural processes occur only in one direction unaided. | Quantify the irreversibility's associated with each possibility and choose an optimal cycle. |

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| 3 | To apply the concepts of thermodynamics to basic energy systems. | Able to analyze Mollier chart, Gas tables in order to estimate thermodynamic properties such as WBT, DBT, RH etc. |
| 4 | To understand how the change of state results in a process | Able to utilize psychrometric chart and estimate the various psychrometric properties. |
| 5 | Why air standard cycles are important. | Assess which cycle to use for a given application and source of heat. |

II YEAR I SEM FLUID MECHANICS HYDRAULIC MACHINES

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | To give insight knowledge on fluid statics and kinematics. | Gain the knowledge on fluid mechanics fundamentals like fluid statics and fluid kinematics. |
| 2 | To gain knowledge on fluid dynamics. | Have basic idea about the fundamental equations used in Fluid Dynamics and are able to apply these concepts in real working environment. |
| 3 | To give basic understanding of Hydro Electric power plant and importance of impact of jets. | Study the fundamentals of turbo machinery and elements of hydroelectric power plant. |
| 4 | To become familiar about different types of turbines and able to analyse the performance characteristics of various turbines. | Measure the performance of the different types of Hydraulic Turbines. |
| 5 | To be able to understand the working of power absorbing devices like pumps and able to analyse their performance. | Calculate the performance of the different types of Hydraulic Pumps. |

II YEAR I SEM MATERIALS ENGINEERING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | To understand various mechanical properties of materials. | Summarizing the concepts of material science properties in the design and development of mechanical systems. |
| 2 | To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels. | Creativeness in new systems components and processes in the field of engineering. |
| 3 | To understand how and why the structure and composition of a material may be controlled by processing. | Interpreting the heat treatment process and types of alloys for mechanical engineering applications useful to the society. |

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| 4 | To create different types of composite materials and its applications. | Produce different methods of composite materials for automobile and aeronautical applications. |
| 5 | To remember polymer material classifications and applications. | To recalling relevant knowledge from long term memory in types of polymers. |

II YEAR I SEM

MACHINE DRAWING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To visualize an object and convert it into a drawing, | Student will be able to Visualize and prepare detail drawing of a given object. |
| 2 | To gain knowledge of conventional representation of various machining and mechanical details as per IS. | Student will able to draw threads, bolts, nuts, stud bolts, tap bolts, set screws, Keys, Cottered joints and knuckle joint. |
| 3 | To gain knowledge of threads, bolts, nuts, stud bolts, tap bolts, set screws, Keys, cottered joints and knuckle joint. | Draw Riveted joints, shaft coupling, pipe joints. |
| 4 | To gain knowledge of Riveted joints, shaft coupling, pipe joints. | Draw details and assembly of mechanical systems, Read and interpret a given drawing |
| 5 | To become conversant with 2-D and 3-D drafting. | Create 2-D and 3-D models using any standard CAD software with manufacturing considerations. |

II YEAR I SEM

KINEMATICS OF MACHINERY

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | To impart knowledge on various types of Mechanisms and Synthesize and analyse 4 bar mechanisms. | Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms. |
| 2 | To impart skills to analyse the position, velocity and acceleration of mechanisms. | Analyse the planar mechanisms for position, velocity and acceleration. |
| 3 | To perform synthesis of mechanism by analytical and graphical method. | Synthesize planar four bar and slider crank mechanisms for specified kinematic conditions. |
| 4 | To familiarize higher pairs like cams and principles of cams design | Design cams and followers for specified motion profiles. |
| 5 | To study the relative motion analysis and design of gears, gear trains. | Evaluate gear tooth geometry and select appropriate gears for the required applications. |

II YEAR ISEM**FM&HM LAB**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To gain knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps at constant speed and head. | To provide the students' knowledge in calculating performance analysis in turbines. |
| 2 | To provide practical knowledge in verification of principles of fluid flow. | Student's exposure to study various operating characteristics of Centrifugal pump and Reciprocating pump. |
| 3 | To calculate c_d , c_c , c_v and Coefficient of impact of various hydraulic systems. | Analyse a variety of fluid flow devices and utilize fluid mechanics principles in design. |
| 4 | To understand Major and minor losses. | Get Exposure to verification of Bernoulli's Theorem. |
| 5 | Student able to learn about measuring pressure, discharge and velocity of fluid flow. | To provide the students with a solid foundation in fluid flow principles. |

**MATERIALS
ENGINEERING LAB****II YEAR I SEM**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To Remembering the composition of metals, mechanical properties depending upon their micro structure. | Summarizing can understand micro structures of different material. |
| 2 | To Understand the Heat treatment methods and their effect on micro structure of materials. | Different heat treatment methods and change of mechanical properties based on micro structure of methods. |
| 3 | To applying the procedure for Micro Structure of pure metals. | Produce different methods in Iron carbon equilibrium diagrams for material science applications |
| 4 | To Know the Hardness of steels by different tests. | Find out the hardenability of the steels Jominy End Quench Test. |
| 5 | To learn the processing of different materials in the lab. | Understand the processing of different materials in the lab. |

II B.TECH II SEM**II YEAR II SEM****APPLIED THERMODYNAMICS**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
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| 1 | Introduction, Engine Types and their Operation. Application of the principles of thermodynamics to components and systems. | To be able to recognize main and supplementary elements of SI and CI engines and define operational principles. |
| 2 | Understand and describe the gas exchange and combustion processes in diesel engines. | To be able to describe the most important combustion concepts and problems in concern with SI engines and CI engines. |
| 3 | Good understanding of the various IC engines, Compressors and cycles for electricity generation. | To be able to analyse energy distribution in an internal combustion engines. Develop problem solving skills through the application of thermodynamics. |
| 4 | The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behaviour of various systems | To understand the velocity triangles in compressors. Solve problems associated with Rotodynamic compressors. |
| 5 | Student have knowledge of methods of analysis and design of complicated thermodynamic systems. | Solve problems associated with reciprocating compressors and expanders and internal combustion engines. |

II YEAR II SEM

STRENGTH OF MATERIALS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | To understand the nature of stresses induced in material under different loads. | Determine the simple stresses and strains when members are subjected to axial loads. |
| 2 | To plot the variation of shear force and bending moments over the beams under different types of loads. | Draw the shear force and bending moment diagrams for the beam subjected to different loading conditions. |
| 3 | To understand the behaviour of beams subjected to shear loads. | Evaluate stresses induced in different cross-sectional members subjected to shear loads. |
| 4 | To understand the behaviour of beams under complex loading. | Evaluate the deflections in beams subjected to different loading conditions. |
| 5 | To analyse the cylindrical shells under circumferential and radial loading. | Analyse the Shafts and thick cylindrical shells. |

**DYNAMICS
OF
MACHINER
Y****II YEAR****II SEM**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|---|--|
| 1 | To study about gyroscope and its effects during precession motion of moving vehicles. | Knowledge acquired about Gyroscope and its precession motion. |
| 2 | To understand the force-motion relationship in components subjected to external forces and analysis of standard mechanisms. | Able to predict the force analysis in mechanical system and able to solve the problem. |
| 3 | Able to learn about the working of Clutches, Brakes, Dynamometers and Fly wheel. | The student will learn about the kinematics and dynamic analysis of machine elements. |
| 4 | To study about the balancing, unbalancing of rotating masses and the effect of Dynamics of undesirable vibrations. | Ability to understand the importance of balancing and implications of computed results in dynamics to improve the design of a mechanism. |

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| 5 | To understand the working principles of different type governors and its characteristics. | Student gets the exposure of different governors and its working principle. |
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MANUFACTURING PROCESSES

| II YEAR | II SEM | |
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| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
| 1 | The primary objective of this course is to introduce the concept of manufacturing technology with the help of various processes widely employed in industries. | Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| 2 | The course consists of casting, welding, sheet metal forming, extrusion and forging processes with the related details of equipment and applications. | Acquire knowledge and hands-on competence in applying the concepts of manufacturing science in the design and development of mechanical systems. |
| 3 | To understand various metal working process. To appreciate the capabilities, advantages and the limitations of the processes. | Competence to design a system, component or process to meet societal needs within realistic constraints. |

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| 4 | To understand the various concepts of drawing, its classification and their applications. | Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular. |
| 5 | To understand the various concepts of metal forming and forging along with their applications. | An ability to formulate solve complex engineering problem using modern engineering and information Technology tools. |

**PROBABILITY
AND
STATISTICS**

| II YEAR | II SEM | |
|---------|--|---|
| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
| 1 | To understand a random variable that describes randomness or an uncertainty in certain realistic situations which can be either discrete or continuous type? | Describe randomness in certain realistic situation which can be either discrete or continuous type. |
| 2 | To learn functions of multiple random variables through joint distributions since the random situations are described as functions of multiple random variables. | Provide very good insight which is essential for industrial applications by learning probability distributions. |
| 3 | To learn some of the important probability distributions like Binomial, Poisson Distributions (discrete case) and the Normal Distribution (continuous case). | Make data-driven decisions by using correlation and regression. |
| 4 | To understand linear relationship | Understand the |

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| | between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable. | importance of sampling distribution of a given statistic of a random sample. |
| 5 | To make inferences about a population from sample data (large and small samples) using probability theory. | Draw statistical inference using samples of a given size which is taken from a population and to apply statistical methods for analysing experimental data. |

**INTELLECTUAL
PROPERTY
RIGHTS**

II YEAR

II SEM

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|--|--|
| 1 | To understand various agreements on IPR internationally. | It allows students how to prepare and protect the Inventions, startup ideas and rights of patents and copy rights etc. |
| 2 | Create awareness on the protection of Intellectual property rights. | Students get the knowledge on TRIPS. |
| 3 | Understand the issues and legal systems of Intellectual Property Internationally. | This subject brings awareness to the students the basic legal aspects at present following at Global level. |
| 4 | To create awareness on Licensing and Transferring the intellectual property rights, understand the process of agreements for the transfer. | Student gets the exposure of license agreement legal systems and generalities. |
| 5 | To understand various agreements on IPR internationally. | Student gets exposure to licensing and transfer of intellectual property and the |

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| | | agreements based on transfer. |
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| II YEAR | | II SEM | | DIGITAL ELECTRONICS |
|----------------|---|---------------|--|----------------------------|
| S No | COURSE OBJECTIVES | | COURSE OUTCOMES | |
| 1 | To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions. | | Analyse different methods used for simplification of Boolean expressions. | |
| 2 | To introduce the methods for simplifying Boolean expressions. | | Design and implement Combinational and Sequential circuits. | |
| 3 | To outline the formal procedures for the analysis and design of combinational and sequential circuits. | | Design and implement Synchronous and Asynchronous Sequential Circuits. | |
| 4 | To introduce the concept of memories and programmable logic devices. | | Explain about memories & Programmable logic devices. | |
| 5 | To illustrate the concept of synchronous and asynchronous sequential circuits. | | Implement the concept of synchronous and asynchronous sequential circuits. | |

| II YEAR | | II SEM | | DATABASE SYSTEMS |
|----------------|--|---------------|--|-------------------------|
| S No | COURSE OBJECTIVES | | COURSE OUTCOMES | |
| 1 | To understand the basic concepts and the applications of database systems. | | Demonstrate the basic elements of a relational database management system. | |
| 2 | To Master the basics of SQL and construct queries using SQL. | | Ability to identify the data models for relevant problems. | |

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| 3 | To understand the relational database design principles. | Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data. |
| 4 | To become familiar with the basic issues of transaction processing and concurrency control. | Ability to explain issues of transaction processing and concurrency control. |
| 5 | To become familiar with database storage structures and access techniques. | Ability to select the database storage structures and access techniques. |

**II YEAR II SEM
INTRODUCTION TO DATA STRUCTURES**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | Exploring basic data structures such as stacks and queues. | Ability to select the data structures that efficiently model the information in a problem. |
| 2 | Introduces a variety of data structures such as hash tables, search trees, heaps, graphs. | Ability to assess efficiency trade-offs among different data structure implementations or Combinations. |
| 3 | Introduces sorting algorithms. | Implement and know the application of algorithms for sorting. |
| 4 | Able to learn Representation of Trees, Properties, Graph Representations. | Implement the representation of Trees, Properties, and Graph |

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| | | Representations. |
| 5 | Able to know Priority Queue, Different Types, insertion and Deletion. | Ability to write programme using Priority Queue, Different Types, insertion and Deletion. |

STRENGTH OF MATERIALS LAB

II YEAR

II SEM

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|---|--|
| 1 | To determine experimental data include universal testing machines and torsion equipment. | Analyse and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behaviour of materials. |
| 2 | To determine experimental data for spring testing machine, compression testing machine, impact tester, hardness tester. | Understand the basic concepts of stress, strain, deformation, and material behaviour under different types of loading (axial, torsion, bending). |
| 3 | To determine stress analysis and design of beams subjected to bending and shearing loads using several methods. | Perform stress analysis and design of beams subjected to bending and shearing loads using several methods. |
| 4 | To determine Flexural strength of a beam. | Calculate the stresses and strains in axially-loaded members subject to flexural loadings. |
| 5 | To determine experimental stress with fatigue and compression Tests. | Ability to conduct compression tests and Fatigue of cast iron and steel. |

II YEAR II SEM

MANUFACTURING PROCESSES LAB

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|--------------------------|------------------------|
|-------------|--------------------------|------------------------|

| | | |
|---|--|---|
| 1 | To know about the casting of different materials. | Learn about patterns and casting of metals. |
| 2 | Study and Practice different welding processes. | Understand the concept of Arc, Spot, TIG welding and brazing process. |
| 3 | To learn the operation of hydraulic press operation for different materials. | Understand the Process of simple, compound and progressive press and Hydraulic press. |
| 4 | Understand the Process of blow and Injection Moulding. | Learn the Moulding process of plastic materials. |
| 5 | To learn the Processing of different materials. | Understand the processing of different materials in the lab. |

III B.TECH I SEM

III YEAR I SEM

COMPUTER INTEGRATED MANUFACTURING TECHNOLOGIES

| S N o | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|---|--|
| 1 | Learn about the geometry of metal cutting theory, mechanism of chip formation and mechanics of orthogonal cutting and merchant's force diagram. | Students should be able to understand the function of micro controllers and PLCs. |
| 2 | Gain the knowledge and features, working principles and applications of lathe, shaper, planer, slotter, milling, drilling, and machines. | Apply Computer aided process planning, MRP and CNC part programming. |
| 3 | Learn about the ways to reduce the surface roughness by using different Machining processes. | Understand the fundamentals of metal cutting, chip formation, cutting forces involved in orthogonal metal cutting, and different cutting forces will be learned. |
| 4 | To understand computer aided planning and control and compu | Analyse the classification |

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| | ter monitoring. | of lathe, shaper, planer, slotter, milling, drilling, and machines. |
| 5 | To understand APT and CNC programming concepts. | Evaluate the surface finishing operations with abrasive processes such as Grinding and broaching machines, types and working principle. |

III YEAR I SEM MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To create the evolution and basic principles of managerial economics and to understand the concept of demand, its significance. | To understand fundamental concepts of economics and enables students how these concepts are utilized in business management. |
| 2 | To understand analysis of cost and production in the process of utility creation. | Evaluates students to understand the production, its process and impact of various costs on production. |
| 3 | To understand the concept of market, types of markets and how firms determine price out put | To understand students to know types of markets and how firms determine their production levels |
| 4 | To understand the theory of capital and its significance, accounting principles, and various formats for preparation of final accounts. | It remembers students to understand how business will maintain accounting books and financial position of the business in the market. |
| 5 | To analyse various capital budgeting methods to take decision making towards projects and investments. | To understand Students should be able that how to take better decisions towards investment proposals. |

III YEAR I SEM

INTERNAL COMBUSTION ENGINES

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | Applications and the principles of thermodynamics to components and systems. | Recognize and recall the importance of thermal power plant and its thermodynamic analysis for improvement of efficiency. |
| 2 | The purpose | Understand the operation of steam boiler, |

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| | of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems. | steam nozzle, condenser and steam turbine. |
| 3 | Student have knowledge of methods of analysis and design of complicated thermodynamic systems. | Able to do thermodynamic analysis for steam nozzles, condensers and steam turbines. |
| 4 | Acquires knowledge about thermodynamic analysis for steam nozzles. | Evaluate the thermodynamic efficiency of gas turbine and jet propulsion systems. |
| 5 | Acquires knowledge on condensers and steam turbines. | Create the jet propulsion system and do the thermodynamic analysis for better efficiency. |

III YEAR

I SEM

MACHINE DESIGN-I

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | The students should be able to understand. Types of loading on machine elements and allowable stresses. | Acquires the knowledge about the principles of design. |
| 2 | To understand Stress concentration and the factors responsible. Determination of stress | Understands the concepts of principal stresses. |

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| | concentration factor; experimental and theoretical methods. | |
| 3 | To develop the Knowledge on Basic failure mechanisms of riveted joints. Concepts of design of a riveted joint, welded joints and Bolted Joints to determine the forces in welds and riveted joints. | Understand different welded and riveted joints structure and able to apply its knowledge to analyze its strength when subjected to simple. |
| 4 | To learn the design Procedure for the different machine elements such as fasteners, couplings, keys, axially loaded joints etc. | Explain and design the basic of mechanical design process of simple machine components like. |
| 5 | To learn the design Procedure for the different Shafts under loading condition, able to know various shafts coupling. | Design the solid hollow shafts and to finding the critical speeds. |

III YEAR I SEM DESIGN OF HYDRAULIC AND PNEUMATIC SYSTEMS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries. | Identify hydraulic and pneumatic components and its symbol and usage. |
| 2 | To study the fundamental principles, design and operation of hydraulic and pneumatic machines, components and systems and their application in recent automation revolution. | Ability to design hydraulic and pneumatic circuits. |
| 3 | To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system. | Identify and analyse the functional requirements of a power transmission system for a given application. |
| 4 | To develop a measurable degree of competence in the design, construction and operation of | Ability to visualize how the hydraulic/pneumatic circuit will work to accomplish the |

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| | fluid power circuits. | function. |
| 5 | To emphasize basic theory, components sizing, construction and function, how to read pneumatics and fluid power circuit diagrams using the correct symbols and troubleshooting techniques. | Ability to Design and understand the electro-hydraulic and electro-pneumatic circuits. |

III YEAR I SEM

INNOVATION AND DESIGN THINKING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | Understand the conceptual development techniques to find solution for a critical design issue. | The importance of design in innovation. |
| 2 | Understand Principles to translate the conceptual ideas to engineering design. | Design tools and processes can generate innovative new ideas. |
| 3 | Understand Principles of Design for Manufacturing and Assembly. | Design and design thinking to innovative in areas such as engineering, software development and business operations. |
| 4 | To know about the design for assembly principles. | Strengthen students' individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, and collect appropriate data. |
| 5 | To know about the design for environment and design for recycling. | To describe the various case studies for design for environment. |

III YEAR

I SEM

MECHANICAL VIBRATIONS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | Fully understand and appreciate the importance of vibrations in mechanical design of machine parts. | Ability to analyse the mechanical model of a linear vibratory system. |
| 2 | To understand the fundamentals of Vibration Theory. | To be able to model reciprocating and oscillatory motions of mechanical systems. |
| 3 | Operate in different vibratory conditions. | To be able to model undamped and damped mechanical systems and structures. |

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| 4 | To know about different degrees of freedom. | To be able to model single- and multi-degree of freedom systems. |
| 5 | To be able to mathematically model real-world mechanical vibration problems. | An ability to identify, formulate, and solve engineering problems. |

III YEAR I SEM ROBOTICS & AUTOMATION

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | This introductory course is valuable for students who wish to learn about robotics through a study of industrial robot systems analysis and design. | Upon the completion of this course, the student will be able to Describe the various elements that make an industrial robot system |
| 2 | This course is suited to students from engineering and science backgrounds that wish to broaden their knowledge through working on a subject that integrates multi-disciplinary technologies. | Able to know different technologies in industrial robotics. |
| 3 | This course is to analyse the industrial robotic applications. | Discuss various applications of industrial robot systems. |
| 4 | To understand the robot manipulators of their Kinematics and Kinetic control m. | Analyse robot manipulators in terms of their kinematics, kinetics, and control. |
| 5 | The performance of manipulate can analyse through simulation by MATLAB. | Model robot manipulators and analyse their performance, through running simulations using a MATLAB-based Robot Toolbox. |

III YEAR I SEM INTRODUCTION TO JAVA PROGRAMMING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To Create Java Programs That Leverage The Object-Oriented Features Of The Java Language, Such As Encapsulation, Inheritance And Polymorphism; | A competence to design, write, compile, test and execute straightforward programs using a high level language; |
| 2 | Use Data Types, Arrays And Strings; | An appreciation of the principles of object oriented programming; |
| 3 | Implement Error-Handling Techniques Using Exception Handling, | An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs. |

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| 4 | Create And Event-Driven GUI Using AWT Components. | Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem. |
| 5 | Understand the principles of inheritance, packages and interfaces by different classes. | Demonstrate the concepts of polymorphism and inheritance. |

III YEAR I SEM SOFTWARE PROJECT MANAGEMENT

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | Understanding the specific roles within a software organization as related to project and process management. | Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project. |
| 2 | Understanding the basic infrastructure competences (e.g., process modelling and measurement). | Compare and differentiate organization structures and project structures. |
| 3 | Understanding the basic steps of project planning, project management. | It focuses Implement a project to manage project schedule, expenses and resource to with the application of suitable project management tools. |
| 4 | Understand the quality assurance, and process management and their relationships. | Principles, techniques, methods & tools for model-based management of software projects, assurance of product quality. |
| 5 | To create a software system with a predetermined functionality and quality in a given time frame and with given costs. | Models are required for determining target values and for continuously controlling these values. |

ENTERPRISE RESOURCE PLANNING

III YEAR I SEM

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | To know the basics of ERP. | To know the strategic importance of Enterprise Resource Planning. |
| 2 | To understand the key implementation of ERP. | To Understand and implement ERP in various Sectors. |
| 3 | To know the business modules of ERP. | To understand the business modules of ERP. |
| 4 | To evaluate the current and future trends in ERP. | To explain the Future and current trends In ERP. |
| 5 | To explain Organizational and Industrial impact; Success and Failure factors of ERP. | To understand the Industrial impact; Success and Failure factors of ERP. |

III YEAR I SEM**NANO TECHNOLOGY**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To learn about basis of Nano Materials. | Upon completion of course, students will familiarize about Nano Technology. |
| 2 | In this course we focus on synthetic aspects for the design of nanostructured materials. | Students should demonstrate the preparation of Nano Technology. |
| 3 | We describe different approaches including both the bottom-up(includes both chemical and physical methods) and the top-down methods(mainly physical methods) for the synthesis of nanostructured materials. | Upon course completion, students will develop knowledge in characteristic Nano Technology & Nano Materials. |
| 4 | The course will then focus on different type of nanostructures with a special emphasis on carbon nanotubes (CNT), metal and metal oxide nanoparticles, core-shell nanostructures and self-assembly of these nanostructures. | Student should able to explain about carbon nanotube metal oxide formation. |
| 5 | The dependence of various properties (dielectric, magnetic and optical) with size will be discussed. | Student able to understand different properties along with sizes. |

III YEAR I SEM THERMAL ENGINEERING AND ENERGY RESOURCES LAB

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To study procedure to draw the valve and port timing diagram of CI/SI engines. | Draw the valve and port timing diagram of SI engine & CI engine. |
| 2 | To understand the performance characteristics of IC engines (both SI and CI engines) in terms of heat balancing, economical speed variations, air fuel ratio influence on the engine. | Calculate & Compare the performance characteristics of diesel and petrol engines. |
| 3 | To demonstrate and understand Morse test on multi cylinder SI engine. | Apply the concept of Morse test on multi cylinder SI engine. |
| 4 | To understand working and performance of reciprocating air compressor. | Analyse the efficiency of reciprocating air compressor. |
| 5 | To Study design and working of the different types of boilers.. | Understand the working of boilers. |

III YEAR I SEM**MANUFACTURING TECHNOLOGY LAB**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To know about the casting of different materials. | Learn about patterns and casting of metals. |
| 2 | Study and Practice different welding processes. | Understand the concept of Arc, Spot, TIG welding and brazing process. |
| 3 | To learn the operation of hydraulic press operation for different materials. | Understand the Process of simple, compound and progressive press and Hydraulic press. |
| 4 | Understand the Process of blow and Injection Moulding. | Learn the Moulding process of plastic materials. |
| 5 | To learn the Processing of different materials. | Understand the processing of different materials in the lab. |

III YEAR I SEM

CONSTITUTION OF INDIA

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To enable the students to understand the constitution's origin and its power. | Improve their knowledge about Indian constitution.. |
| 2 | To enable the students to analyse the political principles. | Value their identity and exercise their fundamental rights. |
| 3 | To enable the students to be aware of their fundamental rights and duties. | Understand how differently government bodies function. |
| 4 | Student able to learn about federal structure Parliamentary form of Governments. | Students can explain about federal structure of governance. |
| 5 | Student able know about historical perspectives of the constitutional amendments in India. | Student to understand the historical perspectives Emergency provisions: Local self-government. |

III B.TECH II SEM

III YEAI II SEM

HEAT TRANSFER

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | Student can able to learn about modes of heat transfer and conduction heat transfer. | To identify the modes of heat transfer and calculate the conduction in various solids. |
| 2 | Solve lumped and Heisler charts parameter transient heat transfer problems. | Calculate unsteady state heat conduction problems applied to different geometries. |

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| 3 | Student can learn types of convection and dimensional analysis. | To solve the heat convection in various medium. |
| 4 | Student can learn phases of heat transfer, heat exchanger performance. | To evaluate the heat transfer in phase change process, design heat exchange equipment based on the need that fit to application. |
| 5 | Student able to learn different laws of Radiation and its applications. | To learn about the radiation and its use in real life. |

III YEAI II SEM

COMPUTER AIDED DESIGN

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | To provide an overview of how computers are being used in design, development of manufacturing plans and manufacture. | Understand the applications of computer in the design and manufacturing. |
| 2 | To get effective knowledge on the usage of mathematical equations in model development through the computer. | Understand and develop the Mathematical representations of curves used in geometric construction. |
| 3 | To understand different functions of computers in design and manufacturing. | Understand the concept and working principle of NC, CNC, and DNC and can develop a program using G and M codes. |
| 4 | To understand the need for integration of CAD and CAM . | Make use of GT, FMS and CAPP concepts and are able to apply these concepts in bringing the benefits of mass production in real working environment. |
| 5 | Study of different types of production, Knowledge of group technology (GT). | Plan the computer integrated production planning in working environment and able to analyse the quality of a product through computer aided quality control. |

III YEAI II SEM

MACHINE DESIGN-II

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To apply principles of design to mechanical power transmission elements like bearings and to design appropriate bearing . | To gain the knowledge on bearings and Select suitable bearings and its constituents from manufacturers catalogues under given loading conditions. |
| 2 | To design the engine parts like piston, connecting rod and analyze design procedure different loading conditions. | Calculate the design parameter for energy storage element and engine components, connecting rod and piston. |
| 3 | To introduce the concept, | To understand the types belt drives and Select suitable belt drives and associated |

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| | procedures, and data to analyze machine elements in power transmission systems. | elements from manufacturers catalogues under given loading conditions to design the springs for different loading conditions. |
| 4 | To apply principles of design and Analyze the forces in mechanical power transmission elements such gears. | Select appropriate gears for power transmission on the basis of given load and speed Design gears based on the given conditions. |
| 5 | Implement basic principles for the design of power screws And the forces, couples, torques etc. | Analyse power screws subjected to loading. |

III YEAR II SEM SMART MANUFACTURING TECHNOLOGIES

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | This course introduces the concepts of Industrial Internet of Things, and Cloud Computing. | Students should be able to understand basic concepts of computer integrated manufacturing. |
| 2 | The objective of this course is to learn the statistics and optimization methodologies in smart manufacturing systems. | Students should be able to understand basic Components of Knowledge Based Systems. |
| 3 | The students will know how to apply artificial intelligence (AI) and data mining (DM) techniques. | Understand the Concept of Artificial Intelligence. |
| 4 | Evaluation criteria and industry benchmarks for determining where and how smart manufacturing processes can benefit your organization. | Students should be able to understand Automated Process Planning. |
| 5 | Detailed understanding of how sensors, automation and data science are transforming individual processes. | Students should be able to understand about grouping the parts. |
| | | |

III YEAR II SEM COMPUTATIONAL FLUID DYNAMICS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | Understand The Geometrical model of a fluid flow. | Demonstrate & explain geometrical model of a fluid flow. |
| 2 | Solve one and two-dimensional ordinary and partial differential equations using traditional CFD tools. | Describe specific boundary conditions and solution parameters. |
| 3 | Understand the various discretization | Analyse the results and draw the |

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| | techniques. | appropriate inferences. |
| 4 | Understand the turbulence models and grid generation techniques. | Solve fluid flow fields using CFD methods. |
| 5 | How to apply explicit, implicit and semi-implicit methods of finite differencing. | Model fluid flow problems and heat transfer. |

III YEAR II SEM

TOOL DESIGN

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To understand the functions and design principles of Jigs, fixtures and press tools. | Upon completion of this course, the students can able to design jigs, fixtures and press tools. |
| 2 | To gain proficiency in the development of required views of the final design. | Students can able to follow the general principles to design jigs, fixtures and press tools. |
| 3 | To gain the knowledge on Press Working Terminologies And Elements Of Cutting Dies. | Students can understand the terminology and elements of cutting dies. |
| 4 | To explain between bending and drawing. | Student can Differentiate between bending and drawing. |
| 5 | To know about different types of the forming techniques. | Student can explain about all other forms forming techniques. |

III YEAR II SEM

EMBEDDED SYSTEMS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To understand the basics of microprocessors and microcontrollers architecture and its functionalities. | The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers. |
| 2 | Understand the core of an embedded system. | Understand and design the Embedded systems. |
| 3 | To learn the design process of embedded system applications. | Understand Embedded Firmware design approaches. |
| 4 | To understands the RTOS and inter-process communication. | Learn the basics of RTOS. |
| 5 | How to apply explicit, implicit and semi-implicit methods of finite differencing. | Model fluid flow problems and heat transfer. |

III YEAR II SEM

INTERNET OF THINGS & APPLICATIONS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|-------------------------------|---------------------------------|
| 1 | To study IoT Networking Core. | Understand IoT Networking Core. |

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| 2 | To study IoT related network fundamentals. | Understand IoT related network fundamentals. |
| 3 | To study IoT Architecture. | Understand IoT Architecture. |
| 4 | To study IoT Application Development procedure. | Understand IoT Application Development procedure. |
| 5 | To study various case studies and IoT applications. | Understand various case studies and IoT applications. |

**III YEAR II SEM
SOFTWARE TESTING**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | Knowing the concepts of Software Engineering and software development life cycle. | Analyze the strategies for software testing. |
| 2 | Understanding the foundations, techniques, and tools in the area of software testing and its practice in the industry. | Identify the issues in test management and testing activity. |
| 3 | Learning the functional aspect of the various testing techniques. | Apply the suitable testing strategy for a given application. |
| 4 | Knowledge of the creation of test cases and usage of testing tools. | Development of test cases and selection of appropriate testing tool. |
| 5 | Learning about different testing types in software testing. | Identify the suitable testing techniques in software testing. |

III YEAR II SEM

TOTAL QUALITY MANAGEMENT

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | To facilitate the understanding of Quality Management principles and process. | The student would be able to apply the tools and techniques of quality management to manufacturing and services processes. |
| 2 | To understand Customer focus, Employee focus and their involvement and Supplier Management. | To give the students an overview of TQM, various Quality aspects and. |
| 3 | Student able to know about Organizing for TQM. | Student can able to manage industrial quality organizing for TQM. |
| 4 | To gain the knowledge on The Cost of Quality | To give importance of Top Management Commitment in any organization for maintaining product / services quality. |
| 5 | To gain the knowledge on all Universal Standards of Quality.. | To give suitable standards of quality for TQM. |

III YEAR II SEM**MANAGEMENT INFORMATION SYSTEMS**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|--|--|
| 1 | To understand the competitive advantage of using information systems in the organization for the needful assistance in decision making and management. | Ability to apply Concepts & applications of Management Information Systems. |
| 2 | To learn how to plan for information systems & implementation. | Ability to perform Information Systems Planning & Implementations. |
| 3 | To learn about Management of IS: Information system planning. | Able to explain Information system planning. |
| 4 | To understand Building of Information Systems Structured Analysis Tools, System Design. | Ability to adapt Building of Information Systems Structured Analysis Tools, System Design. |
| 5 | To study about security aspects of information systems. | Ability to adapt Cyber-crime and information security procedures. |

III YEAR II SEM**OPERATING SYSTEM CONCEPTS**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|--|---|
| 1 | To learn the fundamentals of Operating Systems. | Create processes and threads. |
| 2 | To learn the mechanisms of OS to handle processes and threads and their communication. | Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time. |
| 3 | To learn the mechanisms involved in memory management in contemporary OS. | For a given specification of memory organization develop the techniques for optimally allocating memory to processes. |
| 4 | Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols. | Design and implement file management system. |
| 5 | To know the components and management aspects of concurrency management. | For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform. |

**III YEAR II SEM
CAD/CAM LAB**

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|--|---|
| 1 | To study the need of computers in Industrial Manufacturing, product cycle, CAD/CAM hardware, computer graphics. | Understand the need of computers in industrial manufacturing, product cycle, CAD/CAM hardware, and computer graphics. |
| 2 | To study geometric modelling which includes curve representation and surface representation. | Understand the geometric modelling to represent curves and surfaces. |
| 3 | To study drafting and modelling systems which includes basic geometric commands and numerical control? | Understand the basic geometric commands and numerical control. |
| 4 | To understand the concept of group technology in part family, production flow analysis, and computer aided process planning. | Understand the concept of group technology, production flow analysis, process planning. |
| 5 | To study computer aided quality control and computer integrated manufacturing systems. | Understand computer aided quality control and computer integrated manufacturing. |

III YEAR II SEM

HEAT TRANSFER LAB

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|--|---|
| 1 | The primary objective of this course is to provide the fundamental knowledge necessary. | Perform experiments to determine the thermal conductivity of a metal rod. |
| 2 | To understand the behaviour of thermal systems. | Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values. |
| 3 | This course provides a detailed experimental analysis, | Estimate the effective thermal resistance in composite slabs |
| 4 | Including the application and heat transfer through solids, fluids, and vacuum. | Determine surface emissivity of a test plate. |
| 5 | Convection, conduction, and radiation heat transfer in one and two dimensional steady and unsteady systems are examined. | Estimate performance of effectiveness of fin. |

III YEAR II SEM

TECHNICAL COMMUNICATION & SOFT SKILLS LAB

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|-------------|---|---|
| 1 | To make the students recognize the role of Technical English in their | The students will be able to understand information which assists |

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|---|---|---|
| | academic and professional fields. | in completion of the assigned job tasks more successfully. |
| 2 | To improve language proficiency and develop the required professional skills. | Students will be able to communicate their ideas by writing projects, reports, instructions, diagrams and many other forms of professional writing. |
| 3 | To equip students with tools to organize, comprehend, draft short and long forms of technical work. | Students will also be able to adhere to ethical norms of scientific communication. |
| 4 | to strengthen their individual and collaborative work strategies. | Students will be able to strengthen their individual and collaborative work strategies. |
| 5 | The future placement needs of the students group discussions and mock interviews. | Acquiring and improving the skills required for placements and professional success. |

IV B.TECH I SEM

IV YEAR ISEM

AUTOMATION & CONTROL ENGINEERING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | To perform one or more processing operations. | The importance of automation in industries and Identification of key elements of mechatronics system. |
| 2 | To understand the need of Mechatronics systems. | Set up testing strategies to evaluate performance characteristics of different types of sensors and transducers. |
| 3 | To make students familiar with the constructions and working principle of different types of sensors and transducers. | Describe and analyse working principles of various types of motors, differences, characteristics and selection criteria, control methods. |
| 4 | Understand the fundamental concepts of electro mechanics and fluid mechanics (hydraulics and pneumatics) of Actuators and drive systems. | Understand fundamental elements of drive systems, analyse the steady-state characteristics of a few commonly used types of actuators used in the industry. |
| 5 | To impart knowledge on the control elements. | The students will be able to handle different types of controller like electronic, pneumatic and hydraulic. |

**IV YEAR ISEM
RESEARCH**

OPERATIONS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | Define and formulate linear programming problems & appreciate their limitations. | Student will be able to Identify & develop operational research models from the verbal description of the real system. |
| 2 | Solve linear programming problems using appropriate techniques interpret the results obtained. | Understand the mathematical tools that are needed to solve optimization problems. |
| 3 | Conduct and interpret post-optimal and sensitivity analysis and explain the primal-dual relationship. | Develop a report that describes the model analyses the results &+ propose recommendations in language understandable in Management Engineering. |
| 4 | Develop mathematical skills to analyse & solve integer programming and network models arising from a wide range of applications. | Student able to understand Multi-criteria decision techniques, Decision making under uncertainty and risk, Game theory, and Dynamic programming. |
| 5 | Effectively communicate ideas, explain procedures and interpret results and solutions in simulation. | Use mathematical software to solve the proposed simulation models. |

IV YEAR ISEM MECHANICAL MEASUREMENTS & INSTRUMENTATION

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To study concept of architecture of the measurement system. | Learner should be able to Identify and select proper measuring instrument for specific application Illustrate working principle of measuring instruments. |
| 2 | To deliver working principle of mechanical measurement system. | Explain calibration methodology and error analysis related to measuring instruments. |
| 3 | To impart knowledge of mathematical modelling of the control system and control system under different time domain. | Mathematically model and analyse for different measurements. |
| 4 | To analyse the stress and strain measurements and humidity measurements. | Acquire knowledge in stress and strain measurements and Humidity measurement. |
| 5 | To understand the Measurement of Force, Torque and Power Elements of Control Systems. | Identify, analysis, and solve mechanical engineering problems useful to the society. |

IV YEAR ISEM

FINITE ELEMENT ANALYSIS

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|-------------------|-----------------|
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|---|---|---|
| 1 | To understand the functions and design principles of Jigs, fixtures and press tools. | Learner should be able to Identify and select proper measuring instrument for specific application Illustrate working principle of measuring instruments. |
| 2 | To gain proficiency in the development of required views of the final design. | Explain calibration methodology and error analysis related to measuring instruments. |
| 3 | To enable the students to understand fundamentals of finite element analysis. | Mathematically model and analyse for different measurements. |
| 4 | To learn the principals involved in the discretization of domain with various elements, polynomial interpolation and assembly of global arrays. | Acquire knowledge in stress and strain measurements and Humidity measurement. |
| 5 | To learn the application of FEM in various structural and non-structural problems by incorporating boundary conditions. | Identify, analysis, and solve mechanical engineering problems useful to the society. |

IV YEAR ISEM

PRODUCTION & OPERATIONS MANAGEMENT

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To create a comprehensive exposure to and its significance of POM in Industries. | The understand significance of POM, students able to Illustrate production planning functions and manage manufacturing functions in a better way. |
| 2 | To understand students with various activities of scheduling and control operation to give insight into the ongoing & futuristic trends in the control of inventory. | Memorable competency in scheduling and sequencing in manufacturing operations and effect affordable manufacturing lead time. |
| 3 | To analyse and apply techniques to quality control | To apply the techniques of quality control and control inventory with cost effectiveness. |
| 4 | To remember the importance of material management. | Get conversant with various documents procedural aspects and preparation of orders for various MRP and stores management. |
| 5 | To understand and to apply various analyse in cost reduction in production. | Analysed and applied various techniques in cost reduction. |

IV YEAR I SEM HEATING VENTILATION AND AIR CONDITIONING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | The course aims to emphasize the importance of heating and ventilation | Students will assist in the installations of Heating, Air Conditioning and |

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| | systems. | Refrigeration equipment. |
| 2 | This program includes heating, ventilation and air conditioning. | Perform preventive maintenance on heating and air conditioning systems. |
| 3 | Graduates will possess the skills necessary to obtain an entry-level HVAC Technician position. | Students will identify site hazards. |
| 4 | Graduates will have an understanding of safe HVAC practices | The student shall understand the principles and working HVAC systems. |
| 5 | Graduates will understand the importance of professional behaviour and life-long learning, and will meet the challenges of continued technological growth within the field. | To be able to study and analyse psychrometric chart in refrigeration systems. Develop problem solving skills through the application of thermodynamics. |

IV YEAR ISEM

PRODUCT DESIGN & DEVELOPMENT

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | To study the basic concepts of product design and development process. | Ability to select suitable design and development process for a given application. |
| 2 | To study the applicability of product design and development in industrial applications. | Suitable ergonomic principles can be identified for the product development. |
| 3 | To acquaint the practical knowledge regarding conceptualization design and development of a new product. | Appropriate standardization method can be used for product and process development. |
| 4 | To study the concepts of Ergonomics in context of the product design has been explained with the help of case studies. | Cost estimation methods can be developed to minimise the cost. |
| 5 | To understand the fundamental concept of Rapid Prototyping as well the working principles of the basic rapid prototyping techniques. | Able to classify and select proper rapid prototyping and reverse engineering techniques for specific technical applications. |

IV YEAR ISEM

MECHANICAL MEASUREMENTS &

INSTRUMENTATION LAB

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To prepare the students for successful career in industry and motivate for higher education. | At the end of the course, the student will be able to characterize and calibrate measuring devices. |
| 2 | To provide strong foundation in basic science and mathematics necessary to formulate, solve and analyse Control and | Identify and analyse errors in measurement. |

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| 5 | To work with group and share responsibilities. | Learn team work and share responsibility. |
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IV Year B.Tech II-Sem

IV YEAR IISEM

AUTOMOBILE ENGINEERING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | To understand basics of automobile engineering, conversant with vehicle structure & Engines. | Ability to identify & description of different components & system of automobile. |
| 2 | To make the student conversant with auxiliary systems. | Students will be able to explain working principle of various systems automobile. |
| 3 | To make the student conversant with transmission systems. | Students will be able to explain working principle of transmission systems. |
| 4 | To make the student conversant with steering, brakes & suspension systems. | Able to understand steering, brakes & suspension systems. |
| 5 | To make the student conversant with alternative energy sources. | Students will be able to understand different alternative energy sources used in IC engine. |

IV YEAR IISEM

INDUSTRIAL ENGINEERING AND MANAGEMENT

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To understand the concepts of management and organization structure. | The concepts of management and organization structure are understood by students. |
| 2 | To Remember the plant location and work study objectives and work measurements. | The plant location and work study objectives and learned and remembered. |
| 3 | To Create importance of material management and TQM. | Importance of material management and TQM are known. |
| 4 | To evaluate PERT CPM for various projects. | Evaluated PERT CPM various techniques for various projects. |
| 5 | To apply quality control techniques and to understand functions of HRM. | Applied quality control techniques and remembered functions of HRM. |

IV YEAR IISEM

MAINTENANCE & SAFETY ENGINEERING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|---|
| 1 | To ensure the desired plant availability at an optimum cost within the safety prescription. | Describe the various categories of maintenance. |

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| 2 | Student able to know about the objectives of maintenance. | Assemble, dismantle and align mechanisms in sequential order. |
| 3 | To minimize the total cost of unavailability and resources. | Carry out plant maintenance using tribology, corrosion and preventive maintenance. |
| 4 | Explain the repair methods of beds and slide ways. | Student gets the exposure of Maintenance Policies and Preventive Maintenance. |
| 5 | Discuss various condition monitoring techniques. | Explain the repair methods of material handling equipment's. |

IV YEAR IISEM

TECHNOLOGY MANAGEMENT

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | The course aims at providing an overview of various issues connected with Management of Technology in organizations. | Understanding Technology Management and applying thoughts. |
| 2 | The course provides an exposure to technology related issues like technology identification, | Carry out Technology Transfers. |
| 3 | The course also provides an appreciation of linkages of technology with policy and support systems. | Student gets the exposure of Technology strategy. |
| 4 | This course aims to know Technology forecasting, technology acquisition and technology absorption. | Student can understand the Technology forecasting, technology acquisition and technology absorption. |
| 5 | This course aims to know Technology environment in country Science & Technology in India. | Student can explain Technology environment in country Science & Technology in India. |

IV YEAR IISEM

RENEWABLE ENERGY SOURCES

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|---|--|
| 1 | To explain concept of various forms of Non-renewable and renewable energy. | Understanding Of Commercial Energy And Renewable Energy Sources. |
| 2 | To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications. | Knowledge In Working Principle Of Various Energy Systems. |
| 3 | To analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels. | Capability To Do Basic Design Of Renewable Energy Systems. |
| 4 | At the end of the course, the students are expected to identify the new methodologies / technologies for | Upon Completion Of This Course, The Students Can Able To Identify The New Methodologies / Technologies |

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| | effective utilization of renewable energy sources. | For Effective Utilization Of Renewable Energy Sources. |
| 5 | This course aims to understand the Technologies For Effective Utilization Of Renewable Energy Sources. | Able to know the Technologies For Effective Utilization Of Renewable Energy Sources. |

IV YEAR IISEM

BIOMASS ENGINEERING

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|---|
| 1 | Gain knowledge on biomass energy. | Students should able to get knowledge on bio-mass energy. |
| 2 | Gain knowledge of sustainable energy. | Students should able to understand the concept Thermo chemical Conversion. |
| 3 | Gain knowledge on renewable energy policies. | Students should able to implement Biological Conversion. |
| 4 | To have an exposure on the types of biomass, its surplus availability and characteristics. | Students should able to know about Chemical Conversion. |
| 5 | Analyse the technologies available for conversion of biomass to energy in terms of its technical competence and economic implications. | Student gets a practical understanding on the various biomass energy conversion technologies and its relevance towards solving the present energy crisis. |

IV YEAR IISEM

ENERGY CONSERVATION AND MANAGEMENT

| S No | COURSE OBJECTIVES | COURSE OUTCOMES |
|------|--|--|
| 1 | Understand and analyse the energy data of industries. | Students should able to carry out energy accounting and balancing. |
| 2 | Carryout energy accounting and balancing. | Students should able to suggest methodologies for energy savings. |
| 3 | Conduct energy audit and suggest methodologies for energy savings and utilize the available resources in optimal ways. | Students can able to analyze the energy data of industries. |
| 4 | To impart knowledge in the domain of energy conservation. | Apply knowledge of Energy Conservation Opportunities in a range of contexts. |
| 5 | To bring out Energy Conservation Potential and Business opportunities across different user segments under innovative business models. | Develop innovative energy efficiency solutions and demand management strategies. |

