Program Outcomes

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

Civil Engineering

PSO 1: Professional skills: Attain the ability to understand the principles and working of computer systems, design and develop hardware and software based systems and provide creative solutions.

PSO 2: Ability to apply software development life cycle principles to design and develop the application software that meet the society needs.

PSO 3: Gain knowledge in diverse areas of computer science and upgrade skills to meet the demands of industry 4.0.

Computer Science & Engineering

PSO1: Professional skills: Attain the ability to understand the principles and working of computer systems, design and develop hardware and software based systems and provide creative solutions.

PSO2: Software system Design and Development: Ability to apply software development life cycle principles to design and develop the application software that meet the automation needs of society and industry.

PSO3: Successful career and Entrepreneurship: Gain knowledge in diverse areas of computer science and experience an environment conductive in cultivating skills for successful career, entrepreneurship and higher studies.

Electronics & Telecommunication Engineering

PSO1: Demonstrate the technical competency and use appropriate techniques in the realization of Advanced Communication Systems.

PSO2: Understand clearly the concepts and applications in the field of Communication/Networking, Signal Processing, Embedded Systems and Semiconductor Technology.

PSO3. Associate the learning from the courses related to Signal Processing, Computer Networks, Embedded and Communication Systems to arrive at solutions to real world problems.

PSO4. Have the capability to comprehend the technological advancements in the usage of modern design tools to analyze and design subsystems/processes for a variety of applications.

PSO5. Posses the skills to communicate in both oral and written forms, the work already done and the future plans with necessary road maps, demonstrating the practice of professional ethics and the concerns for societal and environmental wellbeing.

Information Technology

PSO1. Implement programming and computing skills in the areas related to web application development, Databases, Embedded Systems and Mobile Computing and Communication.

PSO2. Demonstrate knowledge in the areas such as, Software Engineering, Data Communication and Networking, Data Mining, Web Technologies, Information and Network Security and Operating Systems for building IT applications.

Mechanical Engineering

PSO1: After successful completion of the program students will be able to implement their ideas in developing mechanisms, machines, devices, automation systems etc. Which are the backbone of present manufacturing industry.

PSO2: Student will also be aware of high end software used in Mechanical Engineering which will help them to develop the systems virtually in less time and quickly implement.

CLASS – S.E. CIVIL

1) Engineering Mathematics – III
Course Outcomes

1) Student will demonstrate basic knowledge of L.D.E., Vector, P.D.E.,F.T.& Probability.
2) Student will show the understanding of impact of Engineering Mathematics in Civil.
3) Student will demonstrate their understanding of mathematical ideas from multiple perspectives, such as by

   (a) using the internal connections between geometry, algebra, and numerical computation,

   (b) applying the connections between theory and applications, or

   (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

2) STRENGTH OF MATERIALS
Course Outcomes

1) Students are able to understand the behaviour of material under different loading
2) Student are able to understand and calculate the different type of stress like, simple stress, shear stress, direct stress and bending stress in the material
3) Students are students are able to understand and calculate the shear force and bending moment for beam of different loading
4) Students are able to calculate the deflection of beam for different loading

3) FLUID MECHANICS-I
Course Outcomes

1) Student are able to understand the fluid characteristics and their application in different material manufacturing industry
2) Student are able to measure the pressures at various conditions with different types of pressure measuring devices
3) Students are able to calculate the discharges of fluid
4) Student are able to calculate the force acting on submerged bodies

4) SURVEYING
Course Outcomes

1) The students are able to understand the use of different surveying instruments and their use
2) Students are able to calculate compute the area and earthwork for different works by using surveying instruments.
3) Students are able to do the surveying of different civil engineering projects

5) BUILDING CONSTRUCTION

Course Outcomes

1) Students are able to understand the property , use , advantage and disadvantage of diffent material used in construction
2) Students are able to understand the component of building with their function
3) Students are able to understand construction procedure of different components

6) FLUID MECHANICS –II

Course Outcomes:-

1. Students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
2. They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady conditions.
3. Problems pertain to design, construction as well as efficient working of various types of hydraulics structures and machines is considerably simplified by using dimensional analysis and model studies.
4. Impact Of Jet on vanes which is a base for analysis and design of turbo machines.
5. They will have knowledge in hydraulic machines(pumps and turbines)

7) ADVANCED SURVEYING

Course Outcomes:-

1) Students are able to do trigonometric and Geodetic Survey
2) Students are able to understand the surveying with advance instrument like remote sensing, GPS and GIS.
3) Students are able to understand the hydrographic survey
4) Students are able to understand the triangulation adjustment

8) CONCRETE TECHNOLOGY

Course Outcomes

1) After completion of this subject student will be familiar with different ingredients of concrete.
2) Students will be familiar with properties of different ingredients of concrete.
3) Student will be familiar with different admixtures.
4) Student will familiar with properties of fresh and harden concrete.
5) Student will be able to prepare concrete mix design.
6) Students will be familiar with special concretes.

9) THEORY OF STRUCTURES - I

Course Outcomes:

1) After completion of this subject student will be able to analyze Fixed and continuous beams.
2) Student will be able to analyze moving loads and will be able to draw influence line diagrams for simply supported beams.
3) Student will also be able to analyze columns.
4) Student will also be able to analyze three hinge arches and three hinge suspension bridges.

10)   BUILDING PLANNING AND DRAWING

Course Outcomes:
1) After completion of this students will able to understand basic principles of building design and planning.
2) They will explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings.
3) The student develops basic drawing skills; create multilayer architectural and working drawing drawings.

11)   PROFESSIONAL COMMUNICATION SKILLS

Course Outcomes:

1. Students would understand the concept, process and importance of Professional Communication
2. Students would acquire English Speaking and Writing Skills
3. Students would develop Presentation Skills

CLASS – Third Year

1) ENGINEERING GEOLOGY

Course outcomes

1) As a students in the Bachelor of Engineering (Civil Engineering) will undertake courses in geology Such as Rock and mineral.
2) Students are able to understand the different geological structures and their impact on civil engineering structure.
3) Students are able to decide the suitable site selection for civil engineering structures
4) Students are able to know the different geological hazards and its mitigation
5) Students are able to understand the different method of geological exploration
6) Students are able to identify the different rocks and minerals based on their property
7) Students are able to understand the use of different rock and mineral

2) GEOTECHNICAL ENGINEERING – I

Course Outcomes: -

1) Students are able to classify soils
2) Students are able to know how water affect the soil parameters
3) Students are able to understand the compaction, consolidation and shear strength parameters of soil.
4) Students are able to calculate the compaction, consolidation and shear strength of soil

3) THEORY OF STRUCTURES – II

Course Outcomes: -

1) The student will have the knowledge on advanced methods of analysis of structures like flexibity and stiffness method, kanis method, Moment distribution method, Slope and deflection method
2) Students are able to do the analysis of beam by using advance method of analysis
3) Students are able to do analysis of portal frame

4) DESIGN OF STEEL STRUCTURES-I (Steel) LSM

1) Students are able to design the connection of steel structure

2) Students are able to design the tension and compression members

3) Students are able to design the beam and roof truss in steel structure

4) Students able to design the plate and gantry design

5) Transportation Engineering-I

Course Outcome :
On successful completion of the course, the students shall be able to understand the following
1. Basic concept about Highway Engineering
2. To understand the principles of Highway geometrics design as per IRC standards
3. Perform geometric design for the Highway& Basic concept of Pavement design
4. To understand Types of pavements & Materials required for highway construction.
5. To understand Construction procedure for different type of pavements.
6. To understand maintenance procedure for different type of pavements.
7. To understand the Traffic engineering& different types of traffic control device.
8. Basic idea about the Bridge engineering & Components parts of a bridge

6) GEOTECHNICAL ENGINEERING – II
Course outcome
1) Student will solve actual problems of stability with various
   material,
2) Studnets are able to apply various theories and predict the risk factor.

7) ENVIRONMENTAL ENGINEERING –I
Course outcome

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

1) Plan and design water supply systems for a rural/urban area
2) Use population forecasting methods.
3) Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
4) Apply knowledge of advanced water treatment processes for individual water purification

8) DESIGN OF STRUCTURES- II (RCC) LSM
Course outcome
1) Students have explored the stream "Limit State Method of Design for R.C. Structures" and are equipped with knowledge of different methods of design and its classifications.
2) Students have been introduced to Limit State Analysis as well which has opened their wisdom for redistribution of moments.
3) Students are now competent to Design the structures for Limit Sate of Collapse for Flexure (i.e. Singly, Doubly, Fanged beam sections, Slabs, Staircase and Footing etc), Compression (i.e. Column), Bon, Torsion and for Shear
4) Students are competent to Design the structures for Limit Sate of Serviceability for Deflection and Cracking.

9) Transportation Engineering-II
Course Outcome:-
1) In Airport Engineering students will get knowledge of Airport planning, layout and runway and taxiway components.
2) Students will get the feel of fundamentals of railway engineering from the syllabus. under railway Engineering students get knowledge of railway geometrics, Signaling & interlocking Points, crossing and turnouts etc.
3) Similarly students get knowledge regarding fundamentals of tunnel its excavation methods, support systems, and executional aspects of tunnel

10) Water Resources Engineering –I
Course Outcome :
1) Student will know the different terminologies related with hydrology .
2) Students will analyze hydrological parameters required for water resource management.
3) Student will assess ground water potential .
4) Students will identify suitable method of irrigation and drainage of waterlogged area .

11) a) Infrastructure Engineering –I (Elective- I)
Course Outcome

After the completion of this course the students would be able to:
1) Understand the role of Private sector in infrastructure growth.
2) Know stages of an Infrastructure Project Lifecycle.
3) Consider challenges to Successful Infrastructure Planning and Implementation.
4) Understand the strategies for Successful Infrastructure Project Implementation.
5) Prepare Strategies for Successful Infrastructure Project Implementation.
6) Understand the need to plan, develop and maintain infrastructure at a high level.
7) Understand the importance of Risk Management for the successful completion Infrastructure Projects

b) SOLID WASTE MANAGEMENT (Elective-I)
COURSE OUTCOMES:
course outcomes.
1) Explain municipal solid waste management systems with respect to its physical properties, and associated critical considerations in view of emerging technologies
2) Outline sources, types and composition of solid waste with methods of handling, sampling and storage of solid waste.
3) Select the appropriate method for solid waste collection, transportation, redistribution and disposal.
4) Describe methods of disposal of solid waste.

c) ADVANCE STRUCTURAL ANALYSIS. (Elective-I)

Course Outcome

1) Students are able to do the mathematical/computational methods for the analysis of basic structural elements to make
2) Students are able to do the suitable approximations so that an indeterminate structure is reduced to a determinate structure

d) Advanced Concrete Technology (Elective-I)

1) Students are able to decide the use of supplement cementatious in concrete, use of different admixture and its application as per requirement.
2) Students are capable to understand the special concrete, its properties and application as per requirement.
3) Students are able to do concrete mix design for required strength of concrete with different approach.
4) Students are able to know details of ready mix concrete plant.
5) Students are able to understand the durability of concrete, assessment and inspection of hardened concrete.

CLASS – Final Year

1) Environmental Engineering –II

Outcomes of course:

1. Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water

2. Students understood industrial waste water quantity and quality for achieving better sanitation in society

2) Design of Structure – III

Course outcome:

1) On the successful completion of course the students will be able to understand the difference between prestressed construction and RCC construction.
2) Also able to design the flat slab, combined footings, earth retaining structures and liquid retaining structures.

3) Water Resources Engineering – II

Course outcome:

1. Students understood all type of dams and reservoirs.
2. Students understood Spillways, Gates & Energy dissipaters.
3. Students understood various canal structures, river training works et

4) PROFFESIONAL ETHICS

Course Objectives:

1. Students are able to understand the functioning of different civil engineering related Industries / firms.
2. Students are able to aware on application of different drawings, contract documents in civil engineering.
3. Students are able to understand insight of code of ethics, duties and responsibilities as a Civil Engineer

5) a) STUCTURAL DYNAMICS- (Elective – II)

Course Outcomes:

1: Students are now explored to Dynamic Equilibrium
2: Student are now introduced to Single and Multi Degree of Freedom System for Dynamic System
3: Students are now introduced to Modal Analysis
4: Students are now introduced to earthquake engineering

b) Advance Steel Structures (Elective-II)

Course Outcome :

1) At the end of the course, students will be able to apply the recommendations in IS800:2007 to design steel structures economically and safely.

2) They will be able to design moment connections, portal frames and multi-Storey rigid frames, Bridges, Water Tank and tower.

3) They will be able to do both elastic and plastic design of steel structures.

c) GROUND WATER ENGINEERING- (ELECTIVE-II)

Course Outcome :

1) It is desired that students after undergoing academic study sessions as cited this above shall be competent and able to work as Engineers in the field of Ground Water Engineering with confidence and success.

d) Air Pollution and control (Elective -II)

Course outcomes

1. The students completing the course will have an understanding of the nature and characteristics of air pollutants, and basic concepts of air quality management.
2. Ability to identify, formulate and solve air pollution problems.
3. Ability to design stacks and particulate air pollution control devices to meet applicable Standards

e) TOWN AND COUNTRY PLANNING (Elective-II)

1) Student are able to understand the evaluation of town planning

2) Students are able to understand the planning of legislation

3) Students are able to understand the urban and rural development

4) Studeants are able to understand the fundamentals of planning

f) CONSTRUCTION MANAGEMENT AND EQUIPMENT (ELECTIVE-II)

Course Outcomes:

1) On completion of this course the students will have the knowledge of construction equipment's practices and techniques to be used in the field.
2) Be able to apply theoretical and practical aspects of project management techniques to achieve project goals.
3) Become familiar with construction equipment and their capabilities

4) Learn how to best utilize construction equipment on site work and heavy civil projects
5) Properly select heavy equipment based on applications, utilization, productivity, and other factors

6) PROFESSIONAL PRACTICE

Course Outcome :
1) The above course of syllabus gives ample scope for the students to pick up diverse aspects of the subject Professional Practice.

2)student shall be able to serve in different organizations carrying out different project works and infrastructure activities. And even it is ensured that a student shall start his career as a consultant in this field .

7) Foundation Engineering

Course Outcome:-
1) The study of Foundation engineering .subject develops the knowledge &
confidence level of the students to select the proper type of foundation & its safe & economic design

8) PROJECT PLANNING AND MANAGEMENT

Course Outcomes:
1) The students will be able to understand and apply the knowledge of management functions like planning, scheduling, executing and controlling to construction projects.
2) The students will be able to demonstrate their capability for preparing the project networks to work out best possible time for completing the project.
3) The students will be able to understand and exercise the time- cost relationship in practices.
4) The students will be able to implement the safety aspects during the execution of civil engineering project.
5) The course will inculcate the managerial skills among the students which will be helpful for them in future during actual execution of projects.
6) On completion of this course the students will know different legal aspect and its provisions for construction project
7) The students will be able to carry out the Human resource Management efficiently.
8) The students will be able to plan for Equipment's and material requirements.
9) On completion of this course the students will know the various management techniques for successful completion of construction projects.

9) a) SEISMIC DESIGN OF STRUCTURES (ELECTIVE-III)

Course Outcomes:
1: Students are now explored to the stream of 'Seismology'
2: Students are now introduced Earthquake force on building structures
3: Students are now introduced Ductile Design of Structures
4: Students are now introduced to retrofitting

9) b) HYDROPOWER ENGINEERING (Elective -III)

Course Outcome :
1) It is desired that students after undergoing academic study sessions as cited this above shall be competent and able to work as Engineers in the field of **Hydropower Engineering** with confidence and success

9) c) Advance Reinforced Concrete Structure (Elective -III)

Course outcome
1) On the successful completion of course the student will be able to understand the design of special component of pile and pile cap,

2) Student are able to design the deep beam, shear wall, rise tread and curved staircase design.

3) Student are able to understand the importance of Reinforcement detailing, and ductile detailing

9) d) INDUSTRIAL WASTE WATER TREATMENT (IWWT) (ELECTIVE-III)

Course outcome

1. Understand Characterize different industrial wastes
2. Suggest treatment alternative based on characteristics of industrial waste.
3. Demonstrate basic knowledge of legislation for pollution control
4. Understand manufacturing process and treatment of wastewater of different industries

9) e) CONSTRUCTION PROJECT ECONOMICS (ELECTIVE-III)

Course Outcomes:

1) Students are able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

2) Students are able to perform and evaluate payback period and capitalized cost on one or more economic alternatives.

3) Students are able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives

4) On completion of this course the students will be able to know Life cycle costing, Financial Planning and Management for the construction project, Economical analysis for Inventory control

9) f) ADVANCE SOIL ENGINEERING (ELECTIVE-III)

Course Outcomes:

1) This course will enable the students to recognize the major geosynthetics applications and their significance.

2) They develop the knowledge of problem solving, analysis and design. Students will understand various IS codes.

Course Outcomes [CO]

Semester III

Subject: Engineering Mathematics - III
Course code: BTCOC301

CO1: Apply the Laplace Transform technique to evaluate integrals , differential equations and their applications to engineering problems.

CO2: Demonstrate the concept of Partial Differential Equation and their applications to engineering problems.

CO3: Apply the Fourier Transform technique to evaluate improper integral and their applications to engineering problems

CO4: Identify the analytic function and their applications to solve complex integrals

CO5: Discuss the complex transformations and their applications to rotate, translate and magnify the images.

Subject: Discrete Mathematics
Course code: BTCOC302

CO1: Solve problems based on Sets theory, Basics of Number theory and apply Propositional Logic and First order logic.

CO2: Identify Properties/types of Relations, Functions and Partial Order Sets.

CO3: Analyze computational process using analytic and combinatorics methods.

CO4: Design a discrete model for a given Graph problems and solve. Understand the basic Graph theory and its applications in computer science.

CO5: Apply concept of Rooted Tree, Minimum Cost Spanning Tree to solve various problems on MST.

CO6: Demonstrate Groups, Rings and Fields. Express and solve number theoretic problems using Algebraic properties of Groups, Rings and Fields.

Subject: Data Structures
Course Code: BTCOC303

CO1: Classify different data structures such as stack, queues, linked list, trees and graphs

CO2: Analyze and implement various searching and sorting techniques

CO3: Implement linear and non-linear data structures

CO4: Apply appropriate data structures to solve specific problems

CO5: Evaluate algorithms and data structures in terms of time and space complexity of basic operations.

Subject: Computer Architecture & Organization
Subject Code: BTCOC304

CO1: Identify the basic structure and functional units of a computer to analyze the merits and pitfalls in architecture and performance.

CO2: Demonstrate the impact of instruction set architecture, central processing unit on cost-performance of computer design and apply it in assembly language programming.

CO3: Select and classify various interrupts used to implement I/O control and data transfers.

CO4: Describe the design process of a computer with arithmetic and logical operation and critical elements in each step.

CO5: Identify the pros and cons of different types of memory hierarchy, cache design and data transfer techniques in computer.

CO6: Analyze the interconnection networks, multiprocessors designs and use research based various design techniques to be employed.

Subject: Digital Electronics & Microprocessors
Course Code: BTCOC305

CO1: Identify numbers in various number systems and perform basic arithmetic operations and code conversions.

CO2: Compute different errors in codes using error detection and correction methods.

CO3: Analyze, Design simple and complex combinational and sequential logic circuits.

CO4: Compare accepted standards and guidelines to select appropriate Microprocessor from 8085, 8086, 80386 to meet specified performance requirements.

CO5: Interface various i/o devices and Memory with 8086 microprocessor.6CO6Write assembly language and C programs for microprocessors

Subject: Basic Human Rights
Course code: BTHM3401

CO1: Discuss the importance, philosophical and historical perspectives of human rights.

CO2: Analyze the challenges of the pluralistic society and the rising conflicts and tensions in the

CO3: name of particular loyalties to caste, religion, region and culture.

CO4: Explain prominent issues such as Economy, Poverty, Unemployment and the responsibility of the government.

CO5: Discuss Fundamental Rights and Directive Principles of State Policy in the Constitution of India in context with the present situation

Subject: Python Programming
Course Code: BTCOL307

CO1: Use and Explain the fundamentals of Python programming, conditional statements, control statements and loops

CO2: Apply the proficiency in handling Numbers, Strings and functions to solve computational problems.

CO3: Select various data structures in python such as List, Tuple, Set and Dictionary.

CO4: Use common operations involved in file handling and Exception handling

CO5: Design and Develop solution for real-time application using Database operations

Python Programming Lab

CO1: Use programming basics and loops for the solution of real-time applications.

CO2: Apply String, Functions and Exception handling for solving diverse problems.

CO3: Implement various Data Structures (such as List, Dictionary, Tuple, Set) and its operations.

CO4: Demonstrate programs using File Handling operations.

Subject: Data Structures Lab
Course Code: BTCOL308

CO1: Differentiate static and dynamic memory allocation techniques

CO2: Implement various operations on linear and non-linear data structures

CO3: Analyze and implement different searching and sorting techniques

CO4: Identity the appropriate data structure to solve a given problem

CO5: Compute time complexities of different algorithms

Subject: Digital Electronics & Microprocessor Lab
Course Code: BTCOL309

CO1: Identify the various digital ICs and elaborate their operation.

CO2: Verify functionalities of digital gates.

CO3: Construct Boolean equations, design circuits and verify functionalities of circuits.

CO4: Analyze, design and implement combinational and sequential circuits.

CO5: Analyze the sequential logic circuits design in synchronous and asynchronous modes for various complex logic and switching devices.

Semester IV

Subject: Design and Analysis of Algorithm
Course Code: BTCOC401

CO1: Describe the major modern algorithms and selected techniques that are essential to today's computers.

CO2: Identify the key characteristics of a given problem and analyze the suitability of a specific algorithm design technique for the problem. (Knowledge, Application (level 1, level 3))

CO3: Describe, apply and analyze the complexity of certain divide and conquer, greedy and dynamic programming algorithm.(Knowledge, Application (level 1, level 3).

CO4: Analyze NP-complete problems and develop algorithms to solve the problems.

Subject: Probability & Statistics
Course Code: BTCOC402

CO1: Demonstrate the concept of probability to solve real world problems using addition, multiplication and Baye's theorem.

CO2: Apply the concept of random variable and mathematical expectation .

CO3: Demonstrate the ability to apply different probability distribution.

CO4: Compute and inter pet result of regression and correlation analysis.

CO5: Apply the technique of curve fitting to straight line , parabola and more general curves.

Subject: Operating System
Course Code: BTCOC403

CO1: Explain the basic concepts, types, and system components of OS

CO2: Illustrate and compare the performance of process scheduling techniques

CO3: Apply the knowledge of process management, synchronization, deadlock to solve basic problems.

CO4: Analyze various memory management techniques.

CO5: Exemplify I/O management and file systems

Subject: Object Oriented Programming in Java (Elective-I)

Course Code: BTCOE404(B)

CO1: Use an integrated development environment to write, compile, run and test simple object oriented Java programs

CO2: Identify classes, objects, members of a class and relationships among them

CO3: Use arrays and class array

CO4: Create and access packages

CO5: Describe features of classes and interfaces in Java

CO6: Demonstrate the concepts of polymorphism and inheritance

Subject: Numerical Methods (Elective-II)
Course Code: BTCOE405(A)

CO1: Apply numerical methods to obtain approximate solutions to mathematicalproblems

CO2: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations

CO3: Analyze and evaluate the accuracy of common numerical methods

CO4: Apply various interpolation methods and finite difference concepts

CO5: Interpret calculation and errors in numerical method.

Subject: Introduction to Data Science with R
Course Code: BTCOL408

CO1: Understand the basics in R programming in terms of constructs, control statements and functions.

CO2: Import, review, manipulate and summarize data-sets in R

CO3: Apply the R programming from a statistical perspective.

CO4: Create and edit visualizations with R

R Programming Lab

CO1: Install and master the use of the R and RStudio interactive environment

CO2: Explore and understand how to use the R documentation

CO3: learn and implement the various data structures of R

CO4: Implement the control statements and loop constructs in R

CO5: Compute basic summary statistics & produce data visualizations

Subject: Object Oriented Programming Lab
Course Code: BTCOL409

CO1: Familiarize the students with language environment and use of OOPs concepts.

CO2: Solve real world problems using OOP techniques.

CO3: Implement programs using C++ features such as composition of objects, overloading, inheritance, Polymorphism etc.

CO4: Create own Packages and Interface in java.

CO5: Develop and understand exception handling, multithreaded applications with synchronization.

Subject: Operating System Lab
Course Code: BTCOL410

CO1: Study and implement Unix Operating System Commands

CO2: Implement the different algorithms for CPU Scheduling.

CO3: Implement algorithms for handling synchronization.

CO4: Implement algorithms for memory management.

Semester V

Subject: Theory of Computations
Course Code: BTCOC502

CO1: Acquire fundamental understanding of the core concepts in automata theory and formal languages.

CO2: Design grammars and automata (recognizers) for different language classes.

CO3: Model, compare & analyze different computational models and identify their capabilities and limitations.

CO4: Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO5: Model various kinds of real-time problems such as designing the compilers.

Subject: Machine Learning
Course Code: BTCOC503

CO1: Explain fundamentals and importance of machine learning

CO2: Compare supervised, unsupervised machine learning

CO3: Use collaborative filtering based learning and Bayes learning

CO4: Define and Apply regression, classification and clustering techniques of Machine learning.

CO5: Discover basics of Deep Learning, specialized field of machine learning.

CO6: Discuss computational learning.

Subject: Cyber Laws (Elective-III)
Course Code: BTCOE504(B)

CO1: Utilize knowledge of cyberspace, jurisdiction and basic concepts of Cyber Law

CO2: Explore the legal and policy developments in various countries to regulate Cyberspace

CO3: Acquire in-depth knowledge of Information Technology Act and legal framework of right to privacy, data security and data protection.

CO4: Prepare learner conversant with Intellectual Property issues emerging from Cyberspace

CO5: Identify knowledge of Penalties, Compensation and Offenses under the Cyberspace and Internet in India

Subject: Economics and Management (Elective-IV)
Course Code: BTCOE505(A)

CO1: Analyze the basic concepts of demand, supply and equilibrium and their determinants.

CO2: Apply the basic concepts of managerial economics in the economic goals of the firms and optimal decision making.

CO3: Identify different depreciation methods, evolution of management thoughts and generic functions of management.

CO4: Make use of basic mathematical-statistical methods and tools applying them to economic and financial problems and to the assessment and management of business activities.

CO5: Demonstrate knowledge about the characteristics & role of an entrepreneur to start and operate small business in the modern economy.

Subject: Competitive Programming-I
Course code: BTCOC506

CO1: Discuss the concepts of online Judges, feedback and the standard input output to solve the programming challenges.

CO2: Design and implement the basic programs of Arrays, Linked list, Strings etc on Hackerrank, Codechef nwebsites.

C03: Use the guidelines for designing the test cases for the various programs.

CO4: Participate in the programming challenges in competitive platforms like codechef.com, uva.onlinejudge.com.

CO5: Practice the challenging problems to succeed in the programming challenges of reputed recruiting organization like TCS, INFOSYS.

Subject: Database System Lab
Course code: BTCOL507

CO1: Discuss the basics of SQL and construct queries using SQL. CO1

CO2: Identify the sound design principles for logical design of databases, including the E-R method and normalization approach.CO2

CO3: Implement Basic DDL, DML , DCL commands, Understand Data selection and operators used in queries and restrict data retrieval and control the display order.CO3

CO4: Use Aggregate and group functions to summarize data, join multiple tables using different types of joins. CO4

CO5: Demonstrate the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc.CO5

Subject: Machine Learning Lab
Course code: BTCOL508

CO1: Read and examine the real-world dataset.

CO2: Apply Machine Learning techniques of Regression, Classification and Clustering

CO3: Analyze the results of Machine Learning technique.

CO4: Predict answer for given value from learned model or technique

Subject: Seminar
Course code: BTCOS509

CO1: To study research papers for understanding of a new field, in the absence of a textbook, to summarize and review them.

CO2: To identify promising new directions of various cutting edge technologies.

CO3: To impart skills in preparing detailed report describing the project and results

CO4: To effectively communicate by making an oral presentation before an evaluation committee

Semester VI

Subject: Computer Network
Course code: BTCOE602

CO1 Demonstrate the functions of each layer/ protocols , headers in OSI, TCP/IP model and LAN Technologies

CO2 Compare LAN Technologies such as ATM, Ethernet (802.3), FDDI, Token Rings, Wireless LANs: Wi-Fi (802.11), Wireless: Wi-MAX (802.16), Bluetooth (802.15.1), RFID.

CO3 Evaluate error correcting codes, error detecting codes, routing paths

CO4 Analyze Network Layer and Congestion Control policies

CO5 Apply the knowledge of Application Layer Protocols such as DNS, SMTP, POP, FTP, HTTP. to design the Socket

CO6 Identify Various Network security principles such as Authentication, firewalls

Subject: Artificial Intelligence (Elective-V)
Course code: BTCOE603(B)

CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

CO2: Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners.

CO3: Design good evaluation functions and strategies for game playing.

CO4: Implement and execute by hand alpha-beta search.

CO5: Carry out proofs in first order and propositional logic using techniques such as resolution, unification, backward and forward chaining.

CO6: Discuss the core concepts and algorithms of advanced AI, including informed searching, CSP, logic, uncertain knowledge and reasoning, dynamic Bayesian networks and so on.

Subject: Object Oriented Analysis and Design (Elective-V)
Course code: BTCOE603(C)

CO1: Use the knowledge of object oriented concepts for solving system modeling and design problems.

CO2: Illustrate UML constructs for software modeling and design solution

CO3: Design and develop object oriented models using appropriate UML notations.

CO4: Analyze different approaches of object orientated system

CO5: Use the concept of design patterns for constructing software architectures

CO6: Implement from Design using programming Style, object oriented languages and databases

Subject: Internet of Things (Elective-VI)
Course code: BTCOE604(C)

CO1: Apply the concepts of IOT.

CO2: Identify the different technology.

CO3: Apply IOT to different applications.

CO4: Analysis and evaluate protocols used in IOT.

CO5: Design and develop applications in IOT.

CO6: Analyze and evaluate the data received through sensors in IoT.

Subject: Development Engineering (Elective-VII)
Course Code: BTCOE605

CO1: Demonstrate basics of Engineering and classify the concept of development engineering in detail.

CO2: Analyze and illustrate the concept of poverty, and define the role of engineers in culture, global competence.

CO3: Explain and Define social justice engineering in religious, secular perspectives.

CO4: Use and apply different development strategies for society, economics, health and educational perspectives.

CO5: Define the engineering for sustainable community and humanitarian education.

CO6: Select and apply modern engineering tools like ICT, AI, Blockchain for social development

Subject: Competitive Programming-II
Course code: BTCOC606

CO1: Discuss the concepts of online Judges, feedback and the standard input output to solve the programming challenges.

CO2: Design and implement the advanced programs of Arrays, Linked list, Strings, Dynamic Programming, Greedy method, Graph Algorithm etc on Hackerrank, Codechef websites.

CO3: Use the guidelines for designing the test cases for the various programs.

C04: Participate in the programming challenges in competitive platforms like codechef.com, uva.onlinejudge.com.

CO5: Practice the challenging problems to succeed in the programming challenges of reputed recruiting organization like TCS, INFOSYS.

Subject: Computer Network LaB
Course code: BTCOE608

CO1 Execute Network and debugging commands in Unix/Linux

CO2 Analyze various networking protocols using packet sniffers (tcpdump and wireshark)

Install and practice various tcpdump utilities.

CO3 Develop a networking application using UDP/TCP socket programming in C and Java.

Semester VII

Subject: Software Engineering
Course code: BTCOC701

CO1 Comprehend software development life cycle

 CO2 Prepare SRS document for a project

CO3 Apply software design and development techniques

CO4 Identify verification and validation methods in a software engineering project

CO5 Implement testing methods at each phase of SDLC

CO6 Analyze and Apply project management techniques for a case study

Subject: Big Data Analytics (Elective-VIII)
Course code: BTCOC702(A)

CO1: Identify the key issues in big data management and its associated applications in intelligent business and scientific computing.

CO2: Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.

CO3: Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.

CO4: Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc

Subject: Cloud Computing (Elective-VIII)
Course code: BTCOE703(A)

CO1: Implement the concept of virtualization and how this has enabled the development of Cloud Computing.

CO2: Know the fundamentals of cloud; cloud Architectures and types of services in cloud.

CO3: Understand scaling, cloud security and disaster management.

CO4: Design different Applications in cloud.

CO5: Explore some important cloud computing driven commercial systems.

Subject: Blockchain Technology
Course code: BTCOE704 (A)

CO1: Discuss and overview the concepts of crypto-currency, bitcoin and blockchain technology

CO2: Study and apply basic crypto primitives such as Hash function, Public key cryptography and digital signatures.

CO3: Use Permissioned model and its use cases in blockchain technology and discuss the design issues for Permissioned blockchain and contracts execution.

CO4: Design and implement Enterprise applications of Blockchain such as cross border payment, KYC, food security etc

CO5: Develop Blockchain Application Development Hyperledger Fabric- Architecture.

Subject: Computer Graphics
Course code: BTCOE704 (B)

CO1 Identify and Understand the core concepts of computer graphics

CO2 Illustrate and discover a selection of classic raster algorithms

CO3 Apply linear affine transformations such as scaling, translation, and rotation to points in two- and three dimensional space and analyze the effects

CO4 Analyze and Define and perform the perspective and orthographic projections on points and scenes in three-dimensional space and to solve graphics programming issues

CO5 Define the fundamentals of animation and use of graphics tool

Subject: Full Stack Development
Course code: BTCOL705

CO1: Use and apply the basic concepts of HTML and CSSto design and implement static web sites.

CO2: Design a responsive web site using HTML5 and CSS3 and JavaScripts.

CO3: Create PHP programs that uses various PHP library functions, and that manipulate files and directories.

CO4: Create PHP Programs to connect, access, and update a MySQL database.

CO5: Design and develop the web based applications using a combination of client-side (JavaScript, HTML) and server-side technologies (PHP).

Subject: System Administration
Course code: BTCOL706

CO1: Understand the role and responsibilities of a Unix system administrator

CO2: Demonstrate the Installation and configuration of Linux operating system

CO3: Perform the file and directory sharing using FTP Server and Samba Server

CO4: Perform the remote desktop login using Telnet Server and SSH Server

CO5: Host their personal websites on Local Network or on Internet using HTTP Server Configuration

CO6: Do the Installation and Configuration of Squid Server (Proxy Server) for Internet sharing, filtering traffic, security, DNS lookups.

Project phase - I

CO1: Undertake problem identification, formulation and solution.

CO2: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

CO3: Demonstrate a sound technical knowledge of their selected project topic.

CO4: Develop a software application or solution to complex engineering problem using modern tools.

CO5: Communicate with engineers and the community at large in written an oral forms.

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION

Course Objectives and Course Outcomes

Class: SE (ECT) CGPA

Course Offers

Sr. No. SEM-I	Name of Course (Theory+ Practical)
1.	Engineering Mathematic-III
2.	Electronic Devices and Circuits-I
3.	Network Theory
4.	Digital Logic Design
5.	Professional Communication
6.	Numerical Analysis and Computation
7.	Electronic Devices and Circuits-I Laboratory
8.	Numerical Analysis and Computation Laboratory
9.	Professional Communication Practice
10.	Digital Logic Design Laboratory
11.	Electronics workshop Laboratory

Sr. No. SEM-II	Name of Course (Theory+ Practical)
12.	Engineering Mathematics-IV
13.	Electronic Devices and Circuits-II
14.	Analog Communication System
15.	Signals and System
16.	Microprocessor and interfacing
17.	Object oriented Programming
18.	Electronic Devices and Circuits-II Laboratory
19.	Analog Communication System Laboratory
20.	Programming Skill Laboratory
21.	Microprocessor and interfacing Laboratory

1. Course: Engineering Mathematic-III

Course Objectives

1. To build the strong foundation in Mathematics of students needed for the field of electronics and Telecommunication Engineering
2. To provide students with mathematics fundamentals necessary to formulate, solve and analyses complex engineering problems.
3. To prepare student to apply reasoning informed by the contextual knowledge to engineering practice.
4. To prepare students to work as part of teams on multi-disciplinary projects.
5. Linear differential equations of higher order using analytical methods and numerical methods applicable to Control systems and Network analysis.
6. Vector differentiation and integration required in Electro-Magnetics and Wave theory.
7. To prepare students for basic curve tracing.

Course Outcomes (CO's)

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

1. Students will demonstrate basic knowledge of Laplace Transform., Vector differentiation and differentiation Integration.
2. Students will demonstrate an ability to identify and Model the problems of the field of Electronics and Telecommunication and solve it.
3. Students will be able to apply the application of Mathematics in Telecommunication Engineering
4. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
5. Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.

6. Use Vector differentiation and integration required in Electro-Magnetics and Wave theory.

7. To find symmetry, asymptote and nature of different type of curves.

2. Course: Electronic Devices and Circuits-I

Course Objectives

1. To provide a comprehensive understanding of electronic devices and circuits and.

2. To understand the working diode and transistor.

3. To study basic circuits using diodes and transistors.

4. To know the concept of feedback and design feedback amplifier.

5. To study oscillators and power amplifiers using transistor.

Course Outcomes (CO's)

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

1.   Know the characteristics of diodes and transistors

2. Design simple circuits and mini projects.

3. know the benefits of feedback in amplifier

4. Compare and classify oscillators.

3. Course: Network Theory

Course Objectives

1. To analyze the Circuits in time and frequency domain
2. To study network Topology, network Functions, two port network.
3. To synthesize passive network by various methods.

Course Outcomes (CO's)

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

1. Apply their knowledge in analyzing Circuits by using network theorems.
2. Apply the time and frequency method of analysis.
3. Find the various parameters of two port network.
4. Apply network topology for analyzing the circuit.

5. Synthesize the network using passive elements

4. Course: Digital Logic Design

Course Objectives

1. To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables.
2. To lay the foundation for further studies in areas such as communication, VLSI, computer, microprocessor.

Course Outcomes (CO's)

On completion of the course, student will be able to:
1. Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
2. Design combinational and sequential circuits.
3. Design and implement hardware circuit to test performance and application.
4. Understand the architecture and use of microcontrollers for the basic operations and simulate using simulation software.

5. Course: Professional Communication

Course Objectives

1. To hone Communication Skills by giving adequate exposure in reading, writing, listening and speaking
2. To help learners to acquire proficiency, both in spoken and written English.
3. To build up the learners confidence through interpersonal communication by reinforcing the basics of pronunciation
4. To help the learners to acquire behavioral skills (Time management, Stress management and Positive thinking)

Course Outcomes (CO's)

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

1. Understand and practice Oral and Writing Skills
2. Develop proficiency in English speaking and writing
3. Understand the concept of Phonetics
4. Practice behavioral skills in their professional and social life

6. Course: Numerical Analysis and Computation

Course Objectives

1. To Understand Accuracy and precision with examples.
2. To locating roots of the equations using Graphical method, Bisection method and false Position method.
3. Understand one point iterative method to find True roots.
4. To Know the Open method like Newton Rapson's Method, Multiple Roots and Secant method.
5. To find unknowns using Gauss Elimination method, Gauss Jordan method and Gauss Seidel method.
6. Understand the concept of regression method like Linear Regression, Polynomial Regression and Multiple Regression method to fit curve into straight line.
7. To find inverse matrix using LU Decomposition method.
8. To Learn Spline types like Linear, quadratic and cubical Spline.

Course Outcomes (CO's)

1. Learned the difference between Accuracy and Precision and types of errors.
2. Finding roots using Graphical method, Bisection method and False position method.
3. Solve a fixed point iteration method to obtained true roots.
4. Evaluate the True roots using Open method: Newton's Rapson method, secant method and multiple Newton Rapson method.
5. To understand the pitfalls of Gauss Elimination Method.
6. Solve a Linear System of equation using Gauss Jordan and Gauss Seidel method.
7. Solve a regression methods fit a curves using linear regression, polynomial regression and Multiple regression method.

8. To solved Linear spline, quadratic and cubical spline.

7. Course: Electronic Devices and Circuits-I Laboratory

Course Objectives

1. To identify and test various electronic components

2. To use DSO for various measurements

3. To plot the characteristics of diode and transistor

4. To design and implement feedback amplifier circuits.

5. To measure the frequency of oscillators.

Course Outcomes (CO's)

At the end of the laboratory course the students are able to:
1. Understand the diode and transistor characteristics.
2. Verify the rectifier circuits using diodes and implement them using hardware.
3. Design the biasing circuits like self biasing.
4. Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses
5. Analyze the concepts of SCR and observe its characteristics.
6. Remember the concepts of unipolar junction transistor and observe its characteristics.
7. Understand the construction, operation and characteristics of JFET and MOSFET, which can be used in the design of amplifiers.
8. Understand the need and requirements to obtain frequency response from a transistors that Design of RF amplifiers and other high frequency amplifiers is feasible.

8. Course: Numerical Analysis and Computation Laboratory

Course Objectives

1. Perform an error analysis for various numerical methods.

2. Develop numerical methods to approximate a function using Bisection Method and False Position Method.

3. Develop numerical methods to approximate a function using one point iteration method and Secant method.

4. Develop numerical methods to approximate a function using Newton Rapson's method Multiple and Modified Newton Rapson's Method.

5. Derive appropriate numerical methods to solve a linear system of equations using Gauss Elimination method to find N unknowns.

6. Derive appropriate numerical methods to solve a linear system of equations using Gauss Jordan method to find unknowns.

7. Derive appropriate numerical methods to solve a linear system of equations Gauss Seidal method.

8. Implement linear Regression method.

9. Implement Newton's Cote Divided Difference interpolation polynomial method.

10. Code various numerical methods in a modern computer language

Course Outcomes (CO's)

Upon successful completion of this course, one should be able to:

1. Use the bisection method, false position, Newton's, Secant method to estimate the number of iterations in the algorithm to achieve desired accuracy with the given tolerance;

2. Use polynomial interpolations including the Lagrange polynomial, Newton's cotes ,cubic spline functions, for curve fitting method to evaluate the interpolations;

3. Programming Skills: write numerical programs, such as C Language programs, to solve the above problems;

9. Course: Professional Communication Practice Laboratory

Course Objectives

The language lab focuses computer-aided multi-media instructions and language acquisition to achieve the following targets:

1. To improve the students' confidence and fluency, through Situational talks, Role plays and Audio-visuals
2. To hone Group Discussions Skills, Interviews Skills and Presentation Skills
3. To improve Listening, Reading, Writing and Speaking Skills
4. To develop Pronunciation Skills

Course Outcomes (CO's)

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

1. Improve interpersonal communication
2. Overcome stage fright and enhance confidence
3. Participate in GDs
4. Master presentation Skills and Interview Skills
5. Learn and practice Listening, Reading, Writing and Speaking Skills

10. Course: Digital Logic Design Laboratory

Course Objectives

Provide hands-on experience in digital circuits, which can be constructed by using standard integrated circuits (ICs). Investigate the operation of several digital circuits combinational and sequential.

Course Outcomes (CO's)

Upon completion of this course the students will be able to:

1. Describe and explain the operation of fundamental digital gates
2. Analyze the operation of medium complexity standard combinational circuits like the encoder, decoder, multiplexer, demultiplexer, adder .
3. Analyze the operation of a flip-flop and examine relevant timing diagrams
4. Analyze the operation of counters and shift registers
5. Design operate practical digital logic circuits

1. Course: Electronics workshop Laboratory

Course Objectives

This course gives students deep knowledge in Core Electronic components and their specifications and creates interest in Hardware Technology.

1. To focuses the fundamental concepts of software's to be used for Hardware Simulation.
2. To enhance the knowledge of component applications in Software.
3. To understand the basic concept of Layout Creation.
4. To understand Auto routing.

Course Outcomes (CO's)

Upon completion of EWS the students will be able to:

1. Able to build and Simulate Core Electronic Circuits based on syllabus.
2. Able to design and implement different Applications on Software.
3. Able to analyze the circuit and troubleshoot errors if any.
4. Build core hardware projects.

2. Course: Engineering Mathematics-IV

Course Objectives

1. To build the strong foundation in Mathematics of students needed for the field of Electronics and Telecommunication Engineering
2. To provide students with mathematics fundamentals necessary to formulate, solve and analyses complex engineering problems.
3. To prepare student to apply reasoning informed by the contextual knowledge to engineering practice.
4. To prepare students to work as part of teams on multi-disciplinary projects.
5. Complex functions, conformal mappings, contour integration applicable to Electrostatics, Digital filters, Signal and Image processing.
6. Transforms such as Z-transform and applications to Communication systems and Signal processing

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Demonstrate basic knowledge of Calculus of variation, Vector Spaces, Matrix Theory, Random Variables, Probability Distributions, Correlation and Complex Integration.
2. Demonstrate an ability to identify and Model the problems in the field of Electronics and Telecommunication and solve it.
3. Apply the application of Mathematics in Telecommunication Engineering.
4. Transforms such as Z-transform and applications to Communication systems and Signal processing.
5. Complex functions, conformal mappings, contour integration applicable to Electrostatics, Digital filters, Signal and Image processing.

13. Course: Electronic Devices and Circuits-II

Course Objectives

1. To understand the working of transistor at high frequency
2. To know the working of transistorized and IC based multivibrator circuits
3. To study op. amp. working and its analysis
4. To design simple linear and nonlinear circuits using op. amp.
5. To design fixed and variable voltage, voltage regulators

Course Outcomes (CO's)

On completion of the course, student will be able to:
1. Design and analyze the basic operations of MOSFET.
2. Know about the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.
3. Know about different power amplifier circuits, their design and use in electronics and communication circuits.
4. Know the concept of feedback amplifier and their characteristics.

5. Design the different oscillator circuits for various frequencies

6. Know the transistor high frequency working and its frequency response

7. Design simple circuits using voltage regulators and IC 555

8. Compare ideal op. amp and practical op. amp.

9. Distinguish between JFET and BJT.

14. Course: Analog Communication System

Course Objectives

The students are expected to demonstrate the ability to:

1. Describe and analyze the mathematical techniques of generation, transmission and reception of amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) signals.

2. Evaluate the performance levels (Signal-to-Noise Ratio) of AM, FM and PM systems in the presence of additive white noise.

3. Convert analog signals to digital format and describe Pulse and digital Modulation techniques.

Course Outcomes (CO's)

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

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

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

3. Describe analog pulse modulation techniques and digital modulation technique.

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

15. Course: Signals and System

Course Objectives

1. To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields.
2. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain.
3. To understand the mathematical description of continuous and discrete time signals and systems
4. To classify signals into different categories.
5. To Analyze Linear Time Invariant (LTI) systems in time transform domains.
6. To build basics for understanding of courses such as signal processing, control system and communication.

Course Outcomes (CO's)

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

1. Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them,
2. Understand use of transforms in analysis of signals and system in continuous and discrete time domain.
3. Observe the effect of various properties and operations of signals and systems.
4. Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behavior of electronic circuits and communication systems.
5. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
6. Understand and resolve the signals in frequency domain using Fourier series , Fourier transforms and Laplace transform.

16. Course: Microprocessor and interfacing

Course Objectives

1. To understand the applications of Microprocessors.

2. To understand need of Microprocessors in computer system.

3. To understand architecture and features of typical Microprocessors.

4. To learn interfacing of real world input and output devices.

5. To study various hardware & software tools for developing applications.

Course Outcomes (CO's)

Upon completion of this course, the students shall be able to:

1. Learn importance of Microprocessors in designing real time applications

2. Describe the 8085,8086 & 80386 Microprocessors architectures and its feature.

3. Develop interfacing to real world devices.

4. Learn use of hardware & software tools.

17. Course: Object oriented Programming

Course Objectives

1. Make the students familiar with basic concepts and techniques of object oriented programming in C++.

2. Develop an ability to write programs in C++ for problem solving.

3. Develop types of inheritance like single, multiple, multilevel hierarchical and hybrid inheritance.

4. Develop operator overloading with unary and binary operator overloading.

5. Develop program to use of constructor and destructor with its types.

Course Outcomes (CO's)

After Completing the course students will be able to:

1. Describe the principles of object oriented programming.

2. Apply the concepts of data encapsulation, inheritance in C++.

3. Understand basic program constructs in C++.

4. Apply the concepts of classes, methods and inheritance to write C++ programs.
5. Use arrays, vectors and strings concepts and interfaces to write C++ programs.
6. Describe and use the concepts in OOPs to develop user friendly program.

18. Course: Electronic Devices and Circuits-II Laboratory

Course Objectives

1. To understand the importance of op-amp in various applications like Precision Rectifiers, Filters, and DAC.
2. To design the non-linear application of op-amp such as Schmitt circuit.
3. To study and design the application of 555 timer like mono-stable Multivibrator.
4. Familiarize the conversion of data from Analog to Digital and Digital to Analog.
5. Design and construct waveform generation circuits using op-amp.

Course Outcomes (CO's)

Upon completion of this course, the students shall be able to:
1. Understand the various applications of linear IC's like 741 and 555 timer.
2. Define significance of Op Amps and their importance.
3. Build circuits using Analog IC's.
4. In-depth knowledge of applying the concepts in real time applications.
5. Ability to use OP Amp as Summation, Subtractor.
6. Able to use OP Amp to generate sine, square and triangular wave forms.
7. Able to use OP Amp as analog to digital and digital to analog converter.

19. Course: Analog Communication System Laboratory

Course Objectives

The course consist analog communications lab in practice, time domain and the frequency domain. We will cover the basic types of analog modulation (AM, FM, and phase modulation…) from both Simulink and equipment based.

Course Outcomes (CO's)

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

1. Able to identify and describe different analog modulation techniques.

2. Able to analyze AM radio receiver.

3. Able to use the any AM techniques in MATLAB simulink.

20. Course: Programming Skill Laboratory

Course Objectives

1. To familiarize students with object-oriented concepts and their implementation in C++.

2. To facilitate students with the skills required to solve problems using object oriented concepts

Course Outcomes (CO's)

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

1. Understand the process of writing, compiling and executing programs in C++ using appropriate predefined functions in C++.

2. Implement the object oriented concepts in developing application using C++.

3. Developing applications in C++ using the understanding of Inheritance and polymorphism.

4. Understand and use exception handling while developing a C++ application.

5. Understand stream I/O, Files and usage of the available classes to handle stream objects in C++ language.

6. Develop complex applications by identifying the appropriate features of object oriented programming to solve real world problems using C++.

7. Student will understand procedure-oriented and object oriented programming concepts. He/she will be capable of writing C and C++ programs efficiently.

21. Course: Microprocessor and interfacing Laboratory

Course Objectives

On completion of this course, the students shall be able to:

1. To provide practical exposure to the students on microprocessors, design and coding knowledge on 80x86 family.
2. To give the knowledge and practical exposure on connectivity and execute of interfacing devices with 8086 kit like LED displays, Keyboards, DAC/ADC, and various other devices.

Course Outcomes (CO's)

The expected outcomes of the course:

1. Learn importance of Microprocessors 8086 in designing real time applications

2. Develop interfacing to real world devices like LED displays, Keyboards, DAC/ADC, and various other devices.

3. Learn use of hardware & software tools

Class: TE (ECT) CGPA

Course Offers

Sr. No. SEM-I	Name of Course (Theory+ Practical)
1.	Data Structures and Computer algorithms
2.	Digital Signal Processing
3.	Control Systems
4.	Stochastic Processes
5.	Embedded System Design

6.	**Professional Ethics**
7.	**Embedded System Design Lab**
8.	**Data Structure and Computer Algorithm Lab**
9.	**Digital Signal Processing Lab**
10.	**Control System Lab**
11.	**Mini Project-I**
Sr. No. SEM-II	**Name of Course (Theory+ Practical)**
12.	**Digital Communication Systems**
13.	**Digital System Design using HDL**
14.	**Electromagnetic Engineering**
15.	**Power Electronics**
16.	**Electronic Instruments & Measurements**
17.	**Professional Aptitude & Logical Reasoning**
18.	**Power Electronics Lab**
19.	**Digital Communication System Lab**
20.	**Digital System Design using HDL**

21.	Electronic Instruments & Measurements Lab
22.	Mini- Project-II

1. Course: Data Structure and Computer Algorithms

Course Objectives

Students who complete this course will be able to:

1. Write programs that use data structures such as: arrays, linked lists, stacks, queues, trees, hash tables, and graphs.
2. Compare and contrast the cost and benefits of dynamic and static structure implementations.
3. Choose the appropriate data structure for modeling a given problem.
4. Describe the concept of recursion and give examples of its use, identifying the base case and the general   case of a recursively defined problem.
5. Compare iterative and recursive solutions for elementary problems.
6. Determine when a recursive solution is appropriate for a problem.
7. Determine the time and space complexity of simple algorithms and recursively defined algorithms.
8. Implement both a greedy and a divide-and-conquer algorithm to solve problems.
9. Implement the most common sorting algorithms.
10. Solve problems using the fundamental graph algorithms, including depth-first and breadth first search, topological sort, minimum spanning tree algorithm, and single-source shortest path.

Course Outcomes (CO's)

1. Understand the concepts of data structure, data type and array data structure.
2. Analyze algorithms and determine their time complexity.
3. Implement linked list data structure to solve various problems.
4. Understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-programming language.
5. Implement and know when to apply standard algorithms for searching and sorting.
6. Effectively choose the data structure that efficiently model the information in a problem

1. Course: Digital Signal Processing

Course Objectives

1. Understand fundamentals of Digital Signal Processing.
2. Analyze & compare different signal processing strategies.
3. Become aware of some applications of DSP.

Course Outcomes (CO's)

1. Understand the Discrete Time Signals analytically & Visualize them in the time and frequency domain.
2. Able to Understand the Transform domain & its significance & problems related to computational complexity.
3. Be able to specify & design any digital filters.

3. Course: Control Systems

Course Objectives

1. To teach the fundamental concepts of Control systems and mathematical modeling of the system

2. To study the concept of time response and frequency response of the system

3. To teach the basics of stability analysis of the system

Course Outcomes (CO's)

1. Represent the mathematical model of a system

2. Determine the response of different order systems for various step inputs

3. Analyze the stability of the system

4. Course: Stochastic Processes

Course Objectives

1. To provide necessary basic concepts in statistical signal analysis.

2. To study about random processes and its properties

3. Apply the basic concepts to various elementary applications.

Course Outcomes (CO's)

1. Have a fundamental knowledge of the basic probability concepts

2. Have a good knowledge of standard distributions and density function which can describe real life phenomena.

3. Acquire skills in handling situations involving several random variable and functions of random variables.

4. Understand and characterize phenomena which evolve with respect to time in probabilistic manner.

5. Course: Embedded System Design

Course Objectives

1. To understand the need and applications of Microcontrollers and ARM Processors in embedded system.

2. To understand architecture and features of typical Microcontroller.

3. To understand architecture and features of ARM7 Processor.

4. To learn interfacing of real world input and output devices

5. To study various hardware and software tools for developing applications

Course Outcomes (CO's)

1. After successfully completing the course students will be able to describe the microcontroller and ARM Processor Architecture and its Features.
2. Learn importance of microcontroller and ARM Processor in designing embedded applications.
3. Learn use of hardware and software tools.
4. Develop interfacing to real world devices.

6. Course: Professional Ethics

Course Objectives

1. To create awareness on Engineering Ethics and Human Values.
2. To understand social responsibility of an engineer.
3. To appreciate ethical dilemma while discharging duties in professional life.

Course Outcomes (CO's)

At the end of the course, students should:

1. Be able to distinguish among morals, values, ethics, and the law and to explore how they impact professional practice;
2. Have an increased personal understanding of issues related to ethics and the law;
3. Have examined one's own ethical decision-making processes and develop guidelines for enhancing one's ability to generate ethical behavior and solutions to conflicts arising in the practice.

7. Course: Embedded Systems Design Lab

Course Objectives

1. Demonstrate the sensing of different physical parameters.
2. Explain the calibration of parameters measured and displayed.
3. Demonstrate PLC based control on simulation module.

4. Evaluate the data transfer.

Course Outcomes (CO's)

1. Define the arithmetical and logical assembly language for microcontroller AT89C51.

2. Know the downloading procedure on hardware into flash ROM of AT89C51 and show the testing data on defined port wish board.

3. Competent to evaluate the data transfer response ofXC9572CPL and Spartan3 .

8. Course: Data Structures and Computer Algorithms Lab

Course Objectives

1. Familiarized Students with good programming Design methods, particularly TopDown Design and Bottomup Design.
2. Develop algorithms for manipulating stacks, queues, linked lists, trees, and graphs.
3. Develop the data structures for implementing the above algorithms.
4. Develop recursive algorithms as they apply to trees and graphs.
5. Demonstrate understanding of various sorting algorithms, including bubble sort, selection sort, quick sort, merge sort, heap sort, and distribution sort.
6. Familiarize the student with the issues of Time complexity and examine various algorithms from this perspective.

Course Outcomes (CO's)

Students who complete this course will be able to:

1. Understand the structure and abstract data types, and their basic usability in different application through different programming language.
2. Analyze and differentiate different algorithms based on their time complexity.
3. Understand the linked implementation, and its uses both in linear and non-linear Data structure.

4. Understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.

5. Implement various kinds of searching and sorting techniques, and know when to choose which technique.

6. Decide a suitable data structure and algorithm to solve a real world problem.

9. Course: Digital Signal Processing Lab

Course Objectives

1. To generate the elementary signals/ waveforms.

2. To Calculate and Plot DFT / IDFT of given DT signal and prove it theoretical.

3. To plot frequency response of a given LTI system.

4. To Implement FFT of a given sequence.

5. To determine and plot the Power Spectrum of a given signal(s).

6. To Plot Magnitude and Phase of LP FIR filter for any given sequence.

7. To Plot Magnitude and Phase of HP FIR filter for a given sequence.

8. Plot Magnitude and Phase of LP IIR filter for a given sequence.

9. To Plot Magnitude and Phase of HP IIR filter for a given sequence.

10. To generate Sinusoidal signal through filtering.

11. To generate DTMF signals.

Course Outcomes (CO's)

1. Able to generate elementary signals/ waveforms and perform arithmetic operations on signals.

2. Able to Calculate and Plot DFT / IDFT of given DT signal.

3. Able to plot frequency response of a given system and verify the properties of LTI system.

4. Able to Implement FFT of given sequence and identify the reduction of computations using FFT.

5. Able to Implement LP FIR filter for a given sequence and calculate the filter coefficients.

6. Able to Implement HP FIR filter for a given sequence and plot the response of the same.

7. Able to Implement and design LP IIR filter for a given sequence.

8. Able to Implement HP IIR filter for a given sequence.

9. Able to Implement Decimation Process and vary (decrease) the sampling rate.

10. Able to Implement Interpolation Process and vary (increase) the sampling rate.

10. Course: Control System Lab

Course Objectives

After Completing the course students will be able to:

1. Will have a strong knowledge on MATLAB software.

2. They get the Basic knowledge on practical control system and PLC application.

3. They get the knowledge on application of machines and electronics devices with control system.

Course Outcomes (CO's)

Upon completion of this course the students will be able to:

1. Will have a strong knowledge of MATALB software.
2. Will be able to various engineering projects.
3. Ability to formulate transfer function for the given control system problem.
4. Ability to find time response of the given control system model.
5. Plot Root Locus and Bode plots for the given control system model.
6. Ability to design Lead, Lag, Lead-Lag system in control system.
7. Ability to design PID controllers for the given control system model.

11. Course: Mini- Project-I Lab

Course Objectives

1. To be able to apply some of the techniques/principles you have been taught
2. To carry out budget and time planning for the project.
3. To inculcate electronic hardware implementation skills by learning PCB artwork design using an appropriate EDA tool.
4. To follow correct grounding and shielding practices
5. To do effective trouble-shooting of the mini project.

6. To develop effective communication skill by delivering a seminar based on mini project

Course Outcomes (CO's)

Upon completion of mini project the students will be able to:

1. Demonstrate a through and systematic understanding of project contents.
2. Understand methodologies and professional way of documentation and communication.
3. Know the key stages in development of the project.
4. Extend or use the idea in mini project for major project.

12. Course: Digital Communication Systems

Course Objectives

1. To understand the building blocks of digital commutation system.
2. To analyze error performance of a digital communication system in presence of noise and other interferences.
3. To understand information theoretic behavior of a communication system.
4. To understand various source coding and channel coding techniques.
5. To understand Multiple Access and Spread Spectrum Techniques.

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Perform the time and frequency domain analysis of the signals in digital communication systems.
2. Design a suitable source and channel coding scheme for a communication system.
3. Analyze Performance of Multiple Access and Spread Spectrum Techniques

13. Course: Digital System Design using HDL

Course Objectives

1. Learn the IEEE Standard 1076 Hardware Description Language (VHDL)

2. Be able to model complex digital systems at several level of abstractions; behavioral and structural, synthesis and rapid system prototyping.

3. Be able to develop and simulate register-level models of hierarchical digital systems

4. Develop a formal test bench from informal system requirements

5. Be able to design and model complex digital system independently or in a team

Course Outcomes (CO's)

After the successful completion of the course student should be able to:
1. Students learn modeling using the IEEE Standard 1076 VHDL

2. Students are exposed to the industrial standards of modeling complex digital systems.

3. The course uses state-of-the-art industrial strength CAD tools and is strongly influenced by industry practice.

14. Course: Electromagnetic Engineering

Course Objectives

1. To provide the basics skills required to understand develop, design, various engineering applications involving electrostatic and electromagnetic fields.

2. To lay the foundations of electromagnetism & its practice in modern communications such as wireless, guided wave principles such as fiber optics & electromagnetic structures.

Course Outcomes (CO's)

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

1. Apply vector calculus to static electric-magnetic fields in different engineering situations.

2. Analyze Maxwell's equations in different forms (differential & integral) & apply them to engineering problems.

3. Examine the phenomena of wave propagation in different media & its interfaces & in applications of microwave engineering.

4. Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.

15. Course: Power Electronics

Course Objectives

1. To teach fundamental principles of thyristor family.
2. To develop an overall approach for students from construction of control rectifier , inverter, choppers, study its specification, the functionality, design and practical applications
3. To become familiar with power devices and their application in various fields
4. Learners are expected to understand various controllers , converters , inverters and choppers

Course Outcomes (CO's)

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

1. Demonstrate an understanding of fundamentals of thyristor family.
2. Analyze the various applications and circuits based on thyristor .
3. Build and test circuits using power devices such as SCR, IGBT and MOSFET.
4. Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters, how to analyze these inverters and some basic application examples.

16. Course: Electronic Instruments & Measurements

Course Objectives

1. To understand scientific measurement principles and concepts behind modern electronic instrumentation
2. To understand the principle of various types of transducers
3. To know the construction and working of frequently used equipment's like CRO, Signal generator, spectrum analyzer etc.

Course Outcomes (CO's)

Upon completion of this course, the students shall be able to:

1. To identify various errors in measurement system and correct them.
2. To know the fundamentals of measuring systems including the particular limitations and capabilities Of a number of measuring devices (pressure transducers, strain gages, thermocouples, etc.) and Equipment's (oscilloscope, spectrum analyzer, etc.).
3. To be familiar with various computer controlled test systems

17. Course: Professional Aptitude and Logical Reasoning

Course Objectives

1. Study team management training from mind tools
2. Study General vocational aptitude
3. Study Professional Aptitude, role attitude and aptitude in success
4. Aptitude based career planning
5. To develop right skills for a position , scientific about evaluating people
6. Encourage individual, increase students confidence in their career practice and their confidence to take risk..

Course Outcomes (CO's)

After Completing the course students will be able to:

1. Knowledge of the wider sector, governmental and legislative contexts and impact of these on your professional practices.

2. Knowledge of ways of thinking and practicing that are specific to the discipline.

3. Strong foundation in aptitude basics.

18. Course: Power Electronics Lab

Course Objectives

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics
2. To analyze different converters and control with their applications.
3. To study advanced converters and switching techniques implemented in recent technology

Course Outcomes (CO's)

Upon completion of this course, the students shall be able to:

1. Articulate the basics of power electronic devices.
2. Express the design and control of rectifiers, inverters.
3. Design of power electronic converters in power control applications.
4. Ability to express characteristics of SCR, BJT, MOSFET and IGBT.
5. Ability to express communication methods.
6. Ability design AC voltage controller and Cyclo Converter.
7. Ability to design Chopper circuits.

19. Course: Digital Communication System Lab

Course Objectives
This course gives students deep knowledge in digital communication systems at the practical level.

1. To focuses the fundamental concepts on TDM, Pulse modulations, digital modulation techniques.
2. To enhance the knowledge of source coding techniquesand Error-control coding techniques.
3. To understand the basic concept of digital commutation system.
4. To understand Multiple Access and Spread Spectrum Techniques for mobile and cellular communication system.

Course Outcomes (CO's)

On completion of this lab course the students will be able to:

1. Able to understand basic theories of Digital communication system in practical.
2. Able to design and implement different modulation and demodulation techniques.
3. Able to analyze digital modulation techniques by using MATLAB tools.
4. Able to identify and describe different techniques in modern digital communications, in particular in source coding using MAT Lab tools.
5. *Able to perform channel coding.*

20. Course: Digital System Design using HDL Lab

<u>Course Objectives</u>

1. Learn the IEEE Standard 1076 Hardware Description Language (VHDL)
2. Be able to model complex digital systems at several level of abstractions; behavioral and structural, synthesis and rapid system prototyping.
3. Be able to develop and simulate register-level models of hierarchical digital systems
4. Develop a formal test bench from informal system requirements
5. Be able to design and model complex digital system independently or in a team

<u>Course Outcomes (CO's)</u>

1. Students learn modeling using the IEEE Standard 1076 VHDL
2. Students are exposed to the industrial standards of modeling complex digital systems.
3. The course uses state-of-the-art industrial strength CAD tools and is strongly influenced by industry practice.

21. Course: Electronics Instruments & Measurements Lab

<u>Course Objectives</u>

On completion of this course, the students shall be able to:

1. To introduce students to monitor, analyze and control any physical system
2. To understand students how different type of meters work and their construction

3. To provide a student a knowledge to design and create novel products and solutions for real life problems.

4. To introduce students a knowledge to use modern tools necessary for electrical projects.

Course Outcomes (CO's)

The expected outcomes of the course:

1. To use the techniques and skills for electrical projects.
2. Design a system, component or process to meet desired needs in electrical engineering.
3. Measurement of R,L,C, Voltage, Current, Power Factor, Power, Energy
4. Ability to measure frequency, phase with Oscilloscope
5. Ability to use Digital voltmeters
6. Ability to use Digital Multimeter and different types of transducer .

22. Course: Mini- Project-II Lab

Course Objectives

1. To be able to apply some of the techniques/principles you have been taught
2. To carry out budget and time planning for the project.
3. To inculcate electronic hardware implementation skills by learning PCB artwork design using an appropriate EDA tool.
4. To follow correct grounding and shielding practices
5. To do effective trouble-shooting of the mini project.
6. To develop effective communication skill by delivering a seminar based on mini project.

Course Outcomes (CO's)

Upon Completion of mini project the students will be able to:

1. Demonstrate a through and systematic understanding of project contents.
2. Understand methodologies and professional way of documentation and communication.
3. Know the key stages in development of the project.
4. Extend or use the idea in mini project for major project.

Class: BE (ECT) CGPA

Course Offers

Sr. No. SEM-I & II	Name of Course(Theory + Practical)
1.	Digital VLSI Design
2.	RF antenna & Microwave Engineering
3.	Elective-I a) Satellite Communication & Radar Engineering
	Elective-I b) Micro Electronics
	Elective-I c) Real Time Operating System
	Elective-I d) System Software & Operating System
4.	Elective-II a) Wireless & Mobile Communication
	Elective-II b) Artificial Neural Network
	Elective-II c) Mechatronics
	Elective-II d) Digital Images Processing
5.	DVLSI Laboratory
6.	RAFM Laboratory
7.	Project Laboratory-I

08.	**Computer Network**
09.	**Optical Fiber Communication**
10.	**Elective-III a) Audio Video Engineering**
	Elective-III b) Electronics Product Design
	Elective-III c) IOT & Sensor Network
	Elective-III d) Cloud Computing
11.	**Elective-IV a) Multi Carrier Communication**
	Elective-IV b) Analog & Mixed Signal VLSI Design
	Elective-IV c) Biomedical Engineering
	Elective-IV d) Industrial Organization & Project Management
12.	**Computer Network Laboratory**
13.	**Optical Fiber Communication Laboratory**
14.	**Project-II Laboratory**

1. Course: Digital VLSI Design

Course Objectives

1. To understand fundamental steps in digital VLSI design.
2. To learn various techniques of CMOS design.
3. To study the data path design.

Course Outcomes (CO's)

1. Model digital circuit with, simulate, synthesis in Micro wind.
2. Understand chip level issues and need of testability.
3. Design digital CMOS circuits for specified applications.

2. Course: RF Antenna & Microwave Engineering

Course Objectives

Study the operation of Microwave semiconductor devices:

1. Study Microwave Communication System
2. Understand the basic concept of RF antenna and its application

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Ability to understand the basic operation and working of Microwave Tubes
2. Identify the state of art microwave tubes and semiconductors and their real use in real life
3. Application of microwave and RF antenna for industrial and scientific purpose

3 a) Course: Elective-I: Satellite Communication & Radar Engineering

Course Objectives

1. To provide an in-depth understanding of different concepts used in a satellite communication system.
2. To explain the tools necessary for the calculation of basic parameters in a satellite communication system.
3. To get knowledge of every aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access system towards a satellite.
4. To get a complete knowledge about the earth and space subsystems
5. To gain knowledge about the Satellite Access schemes
6. To gain knowledge about the Satellite system and mobile services provided
7. To get the basic concepts, operation, and applications of modern radar systems.

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Understand fundamental underlying principles of satellite communication
2. Describe complete knowledge about the earth and space subsystems
3. Have a basic knowledge of the use of Satellite system and mobile services provided.
4. Explain the basics of satellite communication
5. Explain and analyzes link budget of satellite signal for proper communication
6. Use the different application of satellite communication.

3 b) Course: Elective-I: Microelectronics

Course Objectives

As part of this course, students:

1. Will understand the physical, electrical, and optical properties of semiconductor materials and their use in microelectronic.

2. Relate the atomic and physical properties of semiconductor materials to device and circuit performance issues.

3. Develop an understanding of the connection between device-level and circuit-level performance of microelectronic systems.

Course Outcomes (CO's)

After successfully completing the course students will be able to upon successful completion of this course, students should be able to:

1. Compute carrier concentrations for semiconductor materials under a variety of doping conditions.
2. Compute conductivity and resistivity of semiconductor materials under a variety of condition.
3. Silicon wafer processing and formation of P N junction using diffusion and Ion Implantation technique
4. Wet and Dry oxidation process required for photolithography process.
5. Manufacturing process for P N junction, BJT, MOS, and IC fabrication.

3 c) Course: Elective-I: Real Time Operating System

Course Objectives

1. To introduce students to the fundamental problems, concepts, and approaches in the design and analysis of real-time systems.
2. To study issues related to the design and analysis of systems with real-time constraints.
3. To understand Different types of operating systems.
4. To understand different real time case studies.

Course Outcomes (CO's)

1. An ability to analyze, design and implement a real-time system.
2. Characterize and debug a real-time system.
3. Apply formal methods for scheduling real-time systems.

3 d) Course: Elective-I: System Software & Operating System

Course Objectives

1. To familiarize the students with:
2. The introduction to software systems with an emphasis on operating system design and implementation.
3. Key aspect of computer architecture and system software interaction with process management, threading, synchronization, deadlock, scheduling, security and distributed systems.

Course Outcomes (CO's)

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

1. Understand Operating System Structure, Operations and Services, Process Concept, thread , deadlock, Process Scheduling and Synchronization.
2. Understand concepts of Memory Management with memory allocation and File Systems with security.

4 a) Course: Elective-II: Wireless & Mobile Communication

Course Objectives

1. The objective of the course is to introduce the Concepts of basic wireless and mobile communication systems.

2. To learn and understand the basic principles of Telecommunication switching, traffic and networks.
3. To learn and understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network.
4. To learn and understand architecture of GSM and CDMA system.
5. To understand mobile management, voice signal processing and coding in GSM and CDMA system

Course Outcomes (CO's)

1. Explain and apply the concepts of telecommunication switching, traffic and networks.
2. Analyze the telecommunication traffic.
3. Analyze radio channel and cellular capacity

4 b) Course: Elective-II: Artificial Neural Network

Course Objectives

1. To learn basic learning rules
2. To learn different classifiers
3. To understand multilayer feed forward networks
4. To understand single-layer feedback networks and associative memories
5. To give introduction to fuzzy logic

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Use neural networks for practical applications such as character recognition and control systems
2. Apply Fuzzy logic for practical application.

4 c) Course: Elective-II: Mechatronics

Course Objectives

1. To understand the different sensors and measuring instruments..
2. To learn the different considerations of mechanical and electronic designs.
3. To understand different control systems and their designs.

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Understand various stages of electronics, mechanical control and design
2. Special design considerations and importance of different controller modes and discrete

4 d) Course: Elective-II: Digital Image Processing

Course Objectives

1. To understand fundamental steps in digital image processing.
2. To learn various techniques of image enhancement.
3. To study the techniques of image compression.

Course Outcomes (CO's)

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

1. Enhance a poor quality image.
2. Develop and implement algorithms for digital image processing.
3. Explore the novel application of image processing.

5. Course: DVLSI Laboratory

Course Objectives

1. To Teach fundaments of circuit design and implantation using circuit simulators.
2. To highlight the circuit design issues in the context of VLSI technology.
3. To Teach fundaments of circuit design and implantation using layout editors (Microwind).
4. To teach the complexity in wiring issues in design.

Course Outcomes (CO's)

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

1. Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
2. Design MOSFET based logical circuit.
3. Draw layout of a given logical circuit.
4. Realize logic circuit with different design style.
5. Demonstrate an understanding of working principal of operation of different types of memories.
6. Demonstrate an understanding of working principles of clocking, power reduction and distribution.

6. Course: RF Antenna & Microwave Engineering Laboratory

Course Objectives
The objective of this course is to introduce the theory and concept of radio frequency integrated system

1. Practical Radio Frequency Test and Measurement
2. How to generate a radio wave.
3. How do a RF transmitter and receiver work?

Course Outcomes (CO's)

After completing the course students will be able to:

1. Understand radio-frequency systems and their applications
2. Analyze the performance parameters of radio frequency circuits
3. Analyze the performance parameters of radio frequency circuits and identify design trade-off of radio frequency communication systems.

8. Course: Computer Network

Course Objectives

The student should be made to:

1. Understand the division of network functionalities into layers.
2. Be familiar with the components required to build different of network
3. Be exposed to the required function at each layer
4. Learn the flow control and congestion control algorithms

Course Outcomes (CO's)

At the end of the course, the students should be able to:

1. Identify the components required to build different types of network
2. Choose the required functionality at each layer for given application identify solution for each function at each layer
3. Trace the flow of information from one to another node in the network

9. Course: Optical Fiber Communication

Course Objectives

1. To understand basic elements of optical fiber communication link.
2. To know different kind of losses in optical fiber.
3. To design a fiber optic communication link and carry out power budget analysis.

Course Outcomes (CO's)

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

1. Estimate various losses in optical fiber.
2. Design fiber optic communication link.
3. Find out the necessity of optical amplifier.

10 a) Course: Elective-III: Audio Video Engineering

Course Objectives

1. It is to provide students with a strong understanding of the fundamental principle and practical application of audio and video with latest updates.

Course Outcomes (CO's)

1. Understand the concept of basic television signal processing.
2. Identify globally accepted color TV standards.
3. Demonstrate the need of audio and video compression techniques in real life.
4. Acquire knowledge of latest digital TV systems and applications.
5. Describe the attributes of acoustics, sound engineering and storage media.

10 b) Course: Elective-III: Electronic Product Design

Course Objectives

1. To understand the stages of product (hardware/ software) design and development.
2. To learn the different considerations of analog, digital and mixed circuit design.
3. To be acquainted with methods of PCB design & different tools used for PCB design.
4. To understand the importance of testing in product design cycle.
5. To understand the processes and importance of documentation.

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Understand various stages of hardware, software and PCB design.
2. Importance of product test & test specifications.
3. Special design consideration and importance of documentation.

10 c) Course: Elective-III: Internet of Things & Sensor

Course Objectives

1. Vision and Introduction to IoT.
2. Understand IoT Market perspective.
3. Data and Knowledge Management and use of Devices in IoT Technology.
4. Understand State of the Art – IoT Architecture.
5. Real World IoT Design Constraints, Industrial Automation and Commercial Building
6. Automation in IoT.

Course Outcomes (CO's)

After successfully completing the course students will be able to:

1. Explain in a concise manner how the general Internet as well as Internet of Things work.
2. Analyze trade-offs in interconnected wireless embedded sensor networks.
3. Understand the vision of IoT from a global context.
4. Determine the Market perspective of IoT.
5. Building state of the art architecture in IoT.
6. Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

10 d) Course: Elective-III: Cloud Computing

Course Objectives

1. Discuss, with confidence, what is cloud computing and what are key security and control considerations within cloud computing environments.
2. Identify various cloud services.
3. Assess cloud characteristics and service attributes, for compliance with enterprise objectives.

4. Explain the four primary cloud category types.

5. Evaluate various cloud delivery models.

6. Contrast the risks and benefits of implementing cloud computing.

7. Specify security threat exposure within a cloud computing infrastructure.

8. Recognize steps and processes used to perform an audit assessment of a cloud computing environment.

9. Summarize specific environments that would benefit from implementing cloud computing, Contrasted against those environments that might not benefit.

10. Weight the impact of improperly controlled cloud computing environments on organizational sustainability.

Course Outcomes (CO's)

1. To impart fundamental concepts in the area of cloud computing.

2. To impart knowledge in applications of cloud computing.

3. Understanding the systems, protocols and mechanisms to support cloud computing.

4. Develop applications for cloud computing.

5. Understanding the hardware necessary for cloud computing.

6. Design and implement a novel cloud computing application.

11 a) Course: Elective-IV: Multi Carrier Communication

Course Objectives

1. Understand the basic concept of OFDM system with its advantages, disadvantages and limitations.

2. Understand the limits on CDMA & OFDM systems

3. Understand basic principles of OFDM systems

4. Perform analysis of OFDM systems

5. Be familiar with other modern communication systems.

Course Outcomes (CO's)

1. Able to distinguish between different modern communications systems.
2. Able to overcome the limitations of different multicarrier system.
3. Knows the importance of channel estimation.
4. Be able to design OFDM system.

11 b) Course: Elective-IV: Analog and Mixed Signal VLSI

Course Objectives

1. To understand fundamental steps in analog VLSI design.
2. To learn various techniques ADC and DAC design.
3. To study the OP-AMP design.

Course Outcomes (CO's)

1. Model analog circuit with, simulate, synthesis in Micro wind.
2. Understand chip level issues and need of testability.
3. Design OP-AMP circuits for specified applications.

11 c) Course: Elective-IV: Biomedical Electronics

Course Objectives

1. To develop skills enabling Biomedical Engineers to serve Hospitals, National and International Industries and Government Agencies
2. To understand the basic principle, working and design of various automated diagnostic equipment's.
3. To develop core competency in the field of Biomedical Engineering to gain technical expertise in biology and medicine for effective contribution in the development and improvement of health care solutions.

Course Outcomes (CO's)

1. Demonstrate the principles of electronics used in designing various diagnostic equipment and provide a better technical support with exposure to the hospitals.

2. Exhibit competency in suggesting, designing and offering the reliable and optimum solution after understanding customer's requirement completely.

3. Demonstrate ability of correlating theoretical concepts with their practical implementation while performing laboratory exercises and project work.

4. Use modern methodologies, multidisciplinary skill set and knowledge while working on real time projects that demand convergence of engineering, science and technology.

11 d) Course: Elective-IV: Industrial Organization & Project Management

Course Objectives

1. To understand Organizational Structure.
2. To understand the role of private sector in industry growth.
3. To handle complex task of time estimation & project scheduling including PERT & CPM.
4. To understand behavior & psychology of the industry.
5. To appreciate & understand the use of computers in project management.

Course Outcomes (CO's)

1. Students will able to follow types of industries.
2. Students can evaluate time estimation of the project used in industry.
3. Students will able to understand software evaluation used with industry.

12. Course: Computer Network Laboratory

Course Objectives

1. Analyze the different layers in networks.
2. Define, use, and differentiate such concepts as OSI-ISO,TCP/IP.
3. How to send bits from physical layer to data link layer
4. Sending frames from data link layer to Network layer
5. Different algorithms in Network layer
6. Analyze the presentation layer, application layer
7. They can understand how the data transferred from source to destination
8. They can come to know that how the routing algorithms worked out in network layer

Course Outcomes (CO's)

After successfully completing the course students will be able to:
1. Understand fundaments underlying principles of computer networking.
2. Understanding details and functionality of layered network architecture.
3. Apply mathematical foundation to solve computational problems in networking.
4. Analyze performance of various communication protocols.
5. Compare routing algorithms.
6. Practice packet/file transmission between nodes.

13. Course: Optical Fiber Communication Laboratory

Course Objectives

1. To understand the basic block diagram of optical fiber communication
2. To study various types of light sources, photodetectors, amplifiers in optical communication
3. To know methods of coupling and connecting techniques of optical fibers
4. To study different types of losses in optical fibers.
5. To know applications of optical fibers.

Course Outcomes (CO's)

After completing the course students will be able to :

1. Explain the types and propagation of light through optical fiber
2. Design a simple optical communication link.
3. Comment on losses in optical fibers
4. Compare the optical fibers and their losses

Second Year Program in Information Technology

CI201 Engineering Mathematics-III

Course Objective

1. To develop logical understanding of the subject.
2. To create the ability to model, solve and interpret physical and engineering problems.
3. To provide an overview of functions of complex variable which helps in solving many engineering problems.

Course Outcomes : By the end of the course students will be able to

1. Interpret the mathematical results in physical and other forms.

2. Identify, formulate and solve the Linear Differential Equations.

3. Classify and solve the contour integration of complex functions.

CI202 DISCRETE MATHEMATICS

Course Objectives:
1. This course is a foundation for the development of more advanced mathematical concepts.
2. To use appropriate set, function, or relation models for analysis of practical examples and interpretation of the associated operations and terminology in context.
3. To formulate problems precisely, solve the problems, apply formal proof techniques, and explain their reasoning clearly.

Outcomes: By the end of the course students will be able to
1. Understand a number of substantive and diverse topics covered in this course.
2. Develop an important new skill, the ability to write a mathematical proof, which is an excellent training for writing good computer programs.

CI203 DATA STRUCTURES

Course Objectives:
1. To understand the fundamentals of data structures and data representations.
2. To define high level of abstraction of various linear and nonlinear data structures.
3. To study the representation, implementation and applications of linear and nonlinear data structures.

Outcomes: By the end of the course students will be able to
1. Choose the appropriate data structure for modeling a given problem.
2. Understand and implement various data structures along with their application.

CI204 DIGITAL SYSTEMS

Course Objectives:

1. This course covers all basic concepts required for the design of a digital system.
2. To provide the student working knowledge of different methods for logic representation, manipulation, and optimization, for both combinational and sequential logic.
3. To understand the basics of Verilog Hardware Description Language.

Outcomes: By the end of the course students will be able to
1. Understand several fundamental concepts that can be applied to a wide variety of digital design problems.
2. Apply knowledge of Hardware Description Language in designing.

CI205 ECONOMICS FOR ENGINEERS

Course Objectives:
1. To understand various aspects of engineering economics.
2. To evaluate systematically the cost and benefit associated with different projects.
3. To understand different methods of depreciation, taxes and cost analysis.

Outcomes : By the end of the course students will be able to
1. Understand various concepts of economics.
2. Economically plan for their own project.
3. Get accustomed to the tax structure prevalent in the Indian economy.

CI206 PROGRAMMING LAB – I

Course Objectives:
1. To provide a comprehensive study of the C programming language.
2. To identify problems that requires programmed solution.
3. To study, analyze and implement pointers, memory allocation, data handling through files and graphics in 'C'.

Outcomes: By the end of the course students will be able to
1. Write programs using advance concepts of C- language.
2. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
3. Design graphics programs using C.

CI207 PROFESSIONAL COMMUNICATION SKILLS

Course Objectives:
1. To understand the concept, process and importance of Professional Communication.
2. To enable students to acquire English Speaking and Writing Skills.
3. To hone Presentation Skills.

Outcomes: By the end of the course students will be able to
1. Understand the concept, process and importance of Professional Communication
2. Acquire English Speaking and Writing Skills
3. Develop Presentation Skills

CI208 MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:
1. To learn the architecture and programming of Microprocessors and microcontroller.
2. To acquire the assembly language programming skills of 8086 and 8051.
3. To learn peripherals and their interfacing with Microprocessor and microcontroller.

Outcomes: By the end of the course students will be able to
1. Understand microprocessor, microcontroller and ARM architectures.
2. Write assembly language and C programs for microprocessors and microcontrollers.
3. Perform Hands-on with various interfaces: LCD, Keyboard, ADC, DAC, and other peripherals using 8051.

CI209 COMPUTER ALGORITHMS

Course Objectives:
1. To learn how to analyze an algorithm theoretically.
2. To study basic methods of problem solving and algorithms in modern computing.

Outcomes: By the end of the course students will be able to
1. Analyze any algorithms and able to calculate their theoretical complexity.
2. Understand the problem solving methods such as recurrences, dynamic programming and greedy method.
3. Understand Np-Hard and Np-complete concepts.

CI210 SYSTEM PROGRAMMING

Course Objectives:
1. To introduce student the fundamental model of the processing of high level language programs for execution on computer system.
2. To explain the basic operations that are performed from the time a computer is turned on until a user is able to execute programs.
3. To understand and implement Assembler, Loader, Linkers, Macros & Compilers.
4. To introduce students the process management and information management via different software tools.

Outcomes: By the end of the course students will be able to
1. Understand different components of system software.
2. Understand intermediate code generation in context of language designing.
3. Recognize operating system functions such as memory management as pertaining to run time storage management.

CI211 OBJECT ORIENTED PROGRAMMING WITH C++

Course Objectives:
1. To know different programming paradigms.
2. To study and understand the object oriented programming concepts and methodology.
3. To implement object oriented programming concepts in C++.

Outcomes: By the end of the course students will be able to
1. Understand key features of the object-oriented programming language such as encapsulation (abstraction), inheritance, and polymorphism.
2. Design and implement object-oriented applications.
3. Analyze problems and implement simple C++ applications using an object-oriented software engineering approach.

CI212 NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING

Course Objectives:
1. To learn the techniques for finding the solutions numerically, with reliable and specified accuracy.
2. To introduce students to the mostly used numerical methods in the different engineering fields.
3. To apply numerical methods and probability distribution to obtain approximate solutions to mathematical problems.

Outcomes : At the end of this course, the students will be able to
1. Understand the mathematical background for the different numerical methods and probability distributions introduced in the course.
2. Learn the different numerical methods to solve the algebraic equations and to solve system of
linear and non linear equations.
3. Understand the different numerical methods for interpolation, differentiation, integration and
solving set of ordinary differential equations.

CI 213 PROGRAMMING LAB-II

Course Objectives
To study and implement programming assignments of the subject System Programming and
Computer Algorithm using gcc compiler in UNIX/LINUX environment.

Third Year Program in Information Technology

IT301: OPERATING SYSTEMS

Course Objectives:

1. To understand the basics of computer architecture and operating system.
2. To study resource management activities operating system.
3. To acquire knowledge about OS design issues.
4. To learn and understand operating system policies and mechanisms.

Outcomes:

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

1. Describe the general architecture of computers.
2. Describe process management, scheduling and synchronizations.
3. Understand and analyze theory and implementation of processes, memory management, physical and virtual memory, scheduling, file management and security.

IT302: AUTOMATA THEORY

Course Objectives:

1. To understand the concepts of Finite Automata.
2. Students should be able to design Turing machine.
3. Students should be able to design and analyze finite state machine.

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

1. Understand the concepts of automata, formal grammars and languages.
2. Identify the capabilities and limitations of computing machine.
3. Model various kinds of real-time problems.

IT303: DATABASE MANAGEMENT SYSTEMS

Course Objectives:

1. To understand the different issues involved in the design and implementation of a database system.

2. To study the physical and logical database designs, database modeling, and relational models.
3. To understand and use SQL to query, update, and manage a database.
4. To develop an understanding of essential DBMS concepts such as: transaction processing,
    integrity, concurrency, and recovery in databases.
5. To design and build a simple database system and demonstrate competence with the   fundamental
    tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

1. Demonstrate an understanding of the relational data model.
2. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.
3. Formulate, using relational algebra, solutions to a broad range of query problems.
4. Formulate, using SQL, solutions to a broad range of query and data update problems.

IT 304: DATA COMMUNICATION & NETWORKS

Course Objectives:

1. To study about the concepts of Data communication and different transmission media.
2. To know about Error detection and Correction codes and understand about Network architecture & reference model.
3. To study and understand Physical & Data link layer (DLL) and multiple access & IEEE 802.3 (Ethernet/Wired LAN).
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Outcomes:

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

4. Independently understand basic computer networks technology and understand the concepts data communications system and its components.
5. Explain Transmission media signal modulation techniques and enumerate the layers of the OSI model and TCP/I.
6. Understand Error Detection & Correction codes and multiple access & IEEE 802.3.

IT305: ELECTIVE-I: JAVA PROGRAMMING

Course Objectives:

1. To understand object oriented features of java and implementing it in java programming.
2. To learn and understand inheritance, interfaces, multithreading and exception handling.
3. To understand different input/output objects (input vs. output, character vs. byte, data vs. processing, object) and methods and the structure of the java.io package.
4. To learn and understand the use of applets and file handling.

Outcomes:

1. Student should know the model of object oriented programming and fundamental features of an object oriented language.

2. Student should know how to test, document and prepare a professional looking package
   for each business project.
3. Student have the ability to write a computer program to solve specified problems and to use the Java SDK environment to create, debug and run simple Java programs.
4. Student will be able to explain and develop programs for inheritance, multithreading, applets, exception handling and file handling.

IT306: ELECTIVE-I: DIGITAL SIGNAL PROCESSING

Course Objectives:

1. To study about the concepts of Digital signals and systems.
2. To understand Frequency Domain of LTI systems.
3. To understand Digital Filter Structures and Digital Filter Design.

Outcomes:

After completion of this course the student must be able to:

1. Describe the basic concepts of digital signals and systems.
2. Understand Frequency Domain Analysis of LTI Systems and Digital Filter Structures and digital filter design.
3. Formulate engineering problems in terms of DSP tasks and apply engineering problem solving strategies to DSP problems.
4. Design and test DSP algorithms and analyze digital and analog signals and systems.

IT307: ELECTIVE-I: INFORMATION THEORY AND CODING

Course Objectives:

1. To understand basic concepts of coding theory.
2. To learn about basic source coding and channel coding techniques.
3. To understand the concepts of entropy and information communication.

Outcomes:

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

1. Understand various source coding techniques.
2. Implement entropy and Mark-off statistical model.
3. Various error detecting codes.

IT308: WEB TECHNOLOGY LAB-I

Objectives:

1. To study designing the web pages.
2. To study formatting and validating web pages.
3. To study designing web sites and deploying web sites on web servers.

Outcomes:

Students will be able to

1. Design web pages.
2. Format and validate web pages.
3. Design web sites and deploy it on web servers.

IT309: SOFTWARE ENGINEERING

Course Objectives:

1. To introduce the students with basic principles of Software Engineering

2. To learn the Software Engineering concepts, methodologies and best practices

3. To train the students on Software Engineering principles and approach used in Industry.

Outcomes:-At the end of the course, students will be able to

1. Learn basic principles of Software Engineering.
2. Understand Software Engineering concepts, methodologies and best practices.
3. Learn Software Engineering principles and approach used in industry.

IT310: COMPILER DESIGN

Course Objectives:

1. To understand, design and implement various phases of compiler.
2. To extend the knowledge of parser by parsing LL parser and LR parser.
3. To understand optimization of codes and runtime environment.

Outcomes:

1. To acquire the knowledge of modern compiler & its features.

2. To learn & use the new tools and technologies used for designing a compiler.

3. To use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of data mining.

IT311: COMPUTER NETWORKS

Course Objectives:

1. To understand the services offered by Network, Transport and Application Layers of TCP/IP.
2. To learn addressing schemes of TCP/IP protocol.
3. To study different protocols of TCP/IP model.
4. To learn to build TCP/IP based networks.
5. To familiarize with recent trends in networking and multimedia networking.

Course Outcomes:

1. Demonstrate an understanding of the TCP/IP model.
2. To be able to understand and configure IP addresses.
3. Should be able to do the analysis of data traffic on TCP/IP networks.
4. To be able to apply knowledge of TCP/IP in building LAN.

IT312: UNIX OPERATING SYSTEM

Course Objectives:

1. To understand the basic concepts, design and structure of the UNIX operating system.
2. To implement various system calls.
3. To acquire skills in UNIX Shell programming.
4. To learn basics of UNIX system administration.

Outcomes: By the end of this course, students will be able to:

1. Learn UNIX structure, commands, and utilities.

2. Describe and understand the UNIX file system.

3. Write shell scripts in order to perform shell programming.

4. Acquire knowledge about text processing utilities, process management and system operation of UNIX.

IT313: ELECTIVE-II PYTHON PROGRAMMING

Course Objectives:

1. To learn and understand Python programming basics and paradigm.
2. To learn and understand python looping, control statements and string manipulations.
3. Students should be made familiar with the concepts of GUI controls and designing GUI applications.
4. To learn and know the concepts of file handling, exception handling and database connectivity.

Outcomes:

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

1. Define and demonstrate the use of built-in data structures "lists" and "dictionary".
2. Design and implement a program to solve a real world problem.
3. Design and implement GUI application and how to handle exceptions and files.
4. Make database connectivity in python programming language.

IT314: ELECTIVE- II: ADVANCED DATABASE MANAGEMENT SYSTEMS

Course Objectives:

1. To understand the different issues involved in the design and implementation of a   distributed   and object oriented database systems.
2. To model database using UML.
3. To understand and use XML for designing database systems.
4. To familiarize with security concepts in databases.

Course Outcomes:

1. Demonstrate an understanding of the object oriented and distributed data models.
2. Create database systems using xml.
3. Demonstrate ability to prepare UML diagrams for information systems.
4. Formulate, using SQL, solutions to a broad range of query and data update problems.

IT314: ELECTIVE-II: ADVANCED DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives:

1. To elaborate concepts of Processors and Memory Hierarchy.
2. To assess computer performance and understand I/O and properties of ISA.
3. To introduce enhancement of processing using pipelining.
4. To put some light on Advanced Architecture Concepts.

Outcomes:

1. To have understanding with clarity and completely, the nature and characteristics of modern-day computer organization
2. To gain knowledge for contemporary architectures like Intel's Core I-7, ARM and ATmega series

IT316: PROFESSIONAL APTITUDE AND LOGICAL REASONING

Course Objectives:

The students should

1. Develop a deep sense of analysis towards solving a problem
2. Supplement his/her problem solving skills
3. Develop critical thinking
4. Boost his/her ability to work with numbers
5. Augment a student's attention to detail
6. Enhance their spoken and written English Language

Outcomes: By the end of the course the student should be able to:

1. Identify, construct and compute numerical situations by work with numbers
2. Conceive and develop a methodology for analyzing and solving a problem
3. Analyze and interpret data
4. Develop and modify attention to detail
5. Define, modify and apply critical thinking to real time situations
6. Construct and design a structured approach to solving a given analytical situation

IT317. WEB TECHNOLOGY LAB-II

Course Objectives:

1. To design and deploy web application using servlets.
2. To design and deploy web application using JSPs.
3. To design and deploy web application using PHP.

Outcomes:

Students will be able to

1. Design and deploy web application using servlets.
2. Design and deploy web application using JSPs.
3. Design and deploy web application using PHP.

IT318: SEMINAR

Objectives

1. To develop soft skill.
2. To study and understand current trends in Information Technology and prepare presentation material.
3. To improve oral communication skills through presentation.
4. To prepare original technical write up on the presentation.

Outcomes

1. Improvement in proficiency in English
2. Improvement in presentation skill
3. Improvement in analytical and reasoning ability
4. Improvement in technical writing

Final Year Program in Information Technology

IT401: INFORMATION AND NETWORK SECURITY

Course Objectives:
1. To understand the principle of encryption algorithms, conventional and public key cryptography.
2. To have detailed knowledge about authentication, hash functions and application level
security mechanisms.
3. To know the network security tools and applications and to understand the system level
security used.

Outcomes:
After completion of this course the student will be able to:
1. Understand the principle of encryption algorithms; conventional and public key cryptography.
2. Have detailed knowledge about authentication, hash functions and application level security mechanisms.
3. Know the network security tools and applications and to understand the system level security used.

IT 402: DATA MINING & DATA WAREHOUSING

Course Objectives:
1. To introduce the basic concepts of Data Warehouse and Data Mining techniques.
2. To examine the types of the data to be mined and apply pre-processing methods on raw data.
3. To learn the designing of Data Warehousing schema for applications.
4. To discover interesting patterns, analyze supervised and unsupervised models and estimate
the accuracy of the algorithms.
5. To understand various tools of Data Mining and their techniques to solve the real time
problems.
6. To develop ability to design various algorithms based on data mining tools.

Outcomes:
Students who complete this course should be able to
1. Design schema for real time data warehousing applications.
2. Process raw data to make it suitable for various data mining algorithms.
3. Discover and measure interesting patterns from different kinds of databases.
4. Apply the techniques of clustering, classification, association finding, feature selection and

visualization to real world data.
5. Use various data mining tools such as weka, etc.

IT 403. ELECTIVE III EMBEDDED SYSTEM

Course Objectives:
1. Understanding embedded system, processor & distributed embedded systems architecture.
2. The goal of this course is to learn ARM7TDMI processor and its internal functioning.
3. Provide an in-depth understanding of the system control and peripherals communication.
4. To get familiar with features of raspberry pi.

Outcomes:
1. Understand the embedded system with Processors and IC technologies.
2. Understand ARM7TDMI, its registers and their internal functions.
3. Good understanding and issues to be handled in using any processor, software tools chain
for embedded software solution development.
4. Understand interactive interface with pi and peripheral devices.
5. Understand peripherals with hands-on circuits and python programming.

IT 404. ELECTIVE-III DIGITAL IMAGE PROCESSING

Course Objectives:
The student should be made to:
1. Learn digital image fundamentals.
2. Be exposed to simple image processing techniques.
3. Be familiar with image compression and segmentation techniques.

Outcomes:
1. Discuss digital image fundamentals.
2. Apply image enhancement and restoration techniques.
3. Use image compression and segmentation Techniques.

IT 405. ELECTIVE-III PERL PROGRAMMING

Course Objectives:
This course is designed to provide
1. Basic introduction to programming using Perl.
2. Knowledge of CGI scripts.
3. Basic Object Oriented Concepts and database connectivity in Perl.

Outcomes:
After completion of this course students should be able to
1. Understand basics of Perl .
2. Understand list arrays and hash.
3. Understand modules.

4. Understand CGI scripts.
5. Understand database connectivity.

IT 406. ELECTIVE-III GREEN IT – PRINCIPLES AND PRACTICES

Course Objectives:
1. To understand what Green IT is and How it can help improve environmental Sustainability
2. To understand the principles and practices of Green IT.
3. To understand how Green IT is adopted or deployed in enterprises.

Outcomes :
1. Students will be able to create awareness among stakeholders and promote green agenda and green initiatives in their working environments leading to green movement.
2. This green movement will create new career opportunities for IT professionals, auditors and others with special skills such as energy efficiency, ethical IT assets disposal, carbon footprint estimation, reporting and development of green products, applications and services.

IT 407. ELECTIVE-IV SOFTWARE TESTING AND QUALITY ASSURANCE

Course Objective:
1. To improve understanding of software testing skills- it's purpose, nature, issues and constraints.
2. To learn various software testing techniques through case studies.
3. To understand the essential characteristics of various automation tools used for testing.

Outcomes:
1. Apply modern software testing processes in relation to software development and project
management.
2. Create test strategies and plans, design test cases, prioritize and execute them.
3. Manage incidents and risks within a project.

IT 408. ELECTIVE-IV UNIFIED MODELING LANGUAGE

Course Objectives:
1. To understand various concepts of Unified Modeling Language.
2. To learn and implement UML views, static views, design views etc.
3. To understand deployment view, model management views.

Outcomes: Students will be able to
1. Create models for software applications.
2. Use the different UML notations for designing software.

IT 409. ELECTIVE-IV MOBILE APPLICATION DEVELOPMENT

Course Objectives:
1. To introduce student with new technology for mobile application.
2. To design the GUI of application and connect with backend.
3. To use location based services, to develop android services and publish android apps.

Outcomes:
1. Understanding Android as new technology for developing mobile application.
2. Understanding design of GUI, database and provide connection.
3. Understanding android services and publishing the android application on market.

IT 410. ELECTIVE-IV MANAGEMENT INFORMATION SYSTEMS

Course Objectives:
1. To learn different types of information systems in an organization
2. To understand various MIS operating in functional areas of an organization and explain
its relationship with the various activities of the organization.
3. To know how MIS is developed and implemented for various levels in an organization.

Outcomes:
1. Understand information systems and their uses.
2. Use computerized management information systems.
3. In-depth analysis and decision making.
4. Aware of security issues related to information systems.

IT 412. INDUSTRIAL INTERNSHIP / CERTIFIED COURSE / TECHNICAL TRAINING

Course Objectives:
1. Gain practical experience of the corporate environment.
2. Apply knowledge and skills learned in the classroom to solve real life problems.
3. Understand career options in IT industry.
4. Learn professional and corporate behavior and ethics.
5. Enhance soft skills required for the industry.
6. Identify areas for future learning and skill development.
7. To learn project management skills.
8. To study the industry profile, background, Vision, Mission, Quality policy,
Product/service profile
9. Detailed study of various departments and the product life cycle.

IT 414. MOBILE COMMUNICATION

Course Objectives:
1. To understand the various terminology, principles, devices, schemes, concepts, generations, and different methodologies used in Mobile and Wireless Communication Networks.

2. To introduce the student to the major concepts involved in Wireless LAN (IEEE 802.11),
and Bluetooth.
3. To study the operation of basic cellular system and performance criterion, handoff mechanism, etc.
4. To expose students to emerging technologies and their potential impact.

Course Outcomes:
After completing this course, students will
1. Have the understanding of different generations, terminologies, systems, operations and
design of wireless and mobile communications.
2. Acquire sufficient knowledge about IEEE 802.11 and Bluetooth standards.
3. Be able appreciate the contribution of Mobile and Wireless Communication networks to
overall technological growth
4. Understand the concepts and technology involved in 3G, 4G and 5G Networks.

IT 415. INFORMATION TECHNOLOGY PROJECT MANAGEMENT

Course Objectives:
1. To get introduced to the IT project management needs and methodologies.
2. To be able to understand and learn managerial skills.
3. To have the detailed knowledge of implementation of IT project management.
Outcomes:
1. Understanding necessity of management.
2. Understanding the difference between management and leadership.
3. Understanding the steps of IT project management.

IT 416. ELECTIVE-V CLOUD COMPUTING

Course Objective:
This course will help the students to get familiar with
1. Cloud computing fundamentals and architecture.
2. Cloud computing services and implementation.
3. Cloud computing implementation and deployment techniques.

Outcomes:
After completion of the course the learner should be able to:
1. Differentiate different computing techniques.
2. Compare various cloud computing providers/ Software.
3. Understand risks involved in cloud computing.

IT 417. ELECTIVE-V DISTRIBUTED SYSTEM

Course Objectives:
1. This course provides an introduction to the fundamentals of distributed computing systems, assuming the availability of facilities for data transmission.

2. To learn the principles, architectures, algorithms and programming models used in distributed systems.
3. The structure of distributed systems using multiple levels of software is emphasized. Specific topics include: distributed algorithms, distributed file systems, distributed databases, security and protection distributed services such as the world-wide web.

Outcomes: By the end of the course students will be able to
1. Understand key features of the Distributed Systems such as Communications, Processes,
Synchronization, Fault Tolerance, Consistency and Replications.
2. Use and apply important methods in distributed systems to support scalability and fault
Tolerance.
3. Design and implement distributed applications of Distributed Systems.

IT 418. ELECTIVE-V INTERNET OF THINGS

Course Objectives:
1. To learn physical design, logical design and enabling technologies of internet of things.
2. To acquire knowledge about IoT platforms design methodology.
3. To learn about IoT physical servers and cloud offerings.
4. To study IoT case studies using python.

Course outcomes:
1. Understand principles, concepts, and technologies for internet of things.
2. Able to build physical and logical design of IoT systems.
3. Understand cloud platforms for IoT.

IT 419. ELECTIVE-V ADVANCED COMPUTER ARCHITECTURE

Course Objectives:
1. To provide a comprehensive knowledge of scalable and parallel computer architectures.
2. To understand how to achieve better performance with increased system resources.
3. To learn how system resources are scaled by the number of processors used, the memory
capacity enlarged, the access latency tolerated, the I/O bandwidth required, the performance
level desired.

Outcomes:
1. Understand different processor architectures and system-level design processes.
2. Understand the principles of I/O in computer systems, including viable mechanisms for
I/O and secondary storage organization.
3. Understand different processor architectures and system-level design processes

IT 420: ELECTIVE VI CYBER SECURITY

Course Objectives:
1. To make students familiar with the fundamental concepts of computer ethics.
2. To know the linkage between computer, professional, philosophical ethics and decision
making.
3. To develop the concepts in computer forensics.
4. To give emphasis on how cyber security operations are carried out.
5. To introduce the linkage between technology, law and ethics and IT Act.

Outcomes:
After completion of this course the student will be able to:
1. Understand the fundamental concepts of computer ethics.
2. Know the linkage between computers, professional, philosophical ethics and decision
making.
3. Develop the concepts in computer forensics.
4. Understand how cyber security operations are carried out.
5. Understand the linkage between technology, law and ethics and IT Act.

IT 421: ELECTIVE VI E-COMMERCE

Course Objectives:
1. To understand various concepts of E-commerce and their types.
2. To learn and understand about client side, server side programming and database
connectivity to do business on the web.
3. To provide security to different applications on the web.

Outcomes:
1. Design and implement an e-commerce application with a shopping cart..
2. Integrate user-centered design guidelines in developing user-friendly websites.
3. Analyze real business cases regarding their e-business strategies and transformation
processes and choices.

IT 422: ELECTIVE VI WIRELESS SENSOR NETWORKS
Course Objectives:
1. To understand the concepts of sensor networks, study the architecture and
applications of
WSN.
2. To discuss the challenges in designing MAC and routing protocols for wireless sensor
networks.
3. To study Challenges of Security in Wireless Sensor Networks and Future trends for
Security

Outcomes: Students will be able
1. To understand and study the functionalities, applications and architecture of WSN.
2. To describe the challenges in designing various protocols for wireless sensor
networks.

3. To understand the current technology trends for the implementation and deployment of
wireless sensor networks.
4. To gain an understanding of WSN Standards and future trends in WSN.
5. To understand security aspects like Privacy issues, attacks and countermeasures

IT 423: ELECTIVE VI BIG DATA ANALYTICS

Course Objectives:
1. To familiarize with the basic concepts of big data.
2. To learn how big data helps in analysis of application data.
3. To learn concept of Hadoop, Map Reduce, NoSQL, MongoDB, Cassandra, Hive, and Pig.
4. Develop ability to analyze and process Big Data.
5. Build necessary skills to write Map Reduce programs for analyzing Big Data problems.

Outcomes: Student will be able
1. To identify need for Big Data analysis.
2. To understand concepts of Hadoop, MapReduce, NoSQL, MongoDB, Cassandra, Hive, and Pig
3. To analyze and identify Big data processing technology for analyzing the Big data.
4. To write Map Reduce programs to process Big Data by identifying the use case.

IT 424. WEB TECHNOLOGY LAB III

Course Objectives:
1. To learn programming in C# and dot NET framework.
2. To develop web applications using C# and dot NET framework.

Course Outcomes:
After completion of this course student should be able to
1. Design console application and windows application.
2. Design web application.

M-201 – Engineering Mathematics - III

Course Objective

 i) To develop logical understanding of the subject.

 ii) To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.

 iii) To make aware students about the importance and symbiosis between Mathematics and Engineering.

Course Outcomes

 i) Student will demonstrate basic knowledge of L.D.E.,P.D.E.,Vector & F.T.

 ii) Student will show the understanding of impact of Engg.Mathematics on Mech.
 iii) Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by
 (a) using the internal connections between geometry, algebra, and numerical computation,
 (b) applying the connections between theory and applications, or
 (c) distinguishing between a formal proof and a less formal arguments and understanding

 the different roles these play in mathematics.

M-202 – Engineering Thermodynamics

Course Objective

1. To understand the concept of quantity and quality of energy

2.To understand use of steam for power generation and process heating

3.To prepare the student to effectively use thermodynamics, in the practice of engineering.

4.To lay the ground work for subsequent studies in such fields as fluid mechanics, heat transfer etc.

Course outcomes:

At the end of course, the student will able to

1. Apply fundamental concepts of thermodynamic to solve real life engineering problems
2. Identify problems & analyse power producing and consuming devices.

3. To apply fundamentals of engineering thermodynamics to compressors .

M-203 – ENGINEERING METALLURGY

Course Objectives:

The syllabus of Engineering Metallurgy is designed with a view of providing the following to the students:

1. The basic structure of metals:- Their atomic arrangement, Crystalline Morphology, Defects in the Crystal, Effects of Dislocations

2. Effects of Alloying and Heat Treatment on the Mechanical properties of metals.

3. Surface Treatments for selective surface hardening and Advanced Metallurgical processes like powder metallurgy.

4. Composite materials, Polymers and Super Alloys.

Course outcomes:

At the end of course, the student will able to

1. Apply fundamental concepts of Metallurgy to solve real life engineering problems.

2. Identify problems and suggest suitable material/ heat treatment to get the requisite mechanical properties for a given application.

3. To apply advanced Metallurgical techniques to solve numerous engineering problems

M-204 –
MECHANICAL MEASUREMENTS AND METROLOGY

Course Objectives:-
- To understand the basic principles, construction and working of engineering mechanical measurement science.
- To acquire proficiency in using, calibrating various measurement systems.
- To understand the problems in measurement system and develop the competency to resolve the problems.
- To know all the measuring instruments and to measure different parameters in day-today-work.
- **Course Outcomes:**
- After going through basic study of generalized measurement system, students will be able to understand the stepwise working of all instruments and will be able to find out the output factors.
- They will be able to know the importance of all factors affecting on output of instruments i.e. errors.

- They can suggest some points in the design & working of instruments after studying the basics if metrology.
  - Students will be able to differentiate between all types of measurements i.e. Direct & indirect type, contact & non-contact type as well as they can design the components with provisions of tolerance in manufacturing through the concepts of metrology.

M-205 – Strength of Materials

Course Objectives:
- To establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior.
- Mechanical behavior of the body by determining the stresses, strains and deflections produced by the loads up to the elastic limit.
- Fundamental concepts related to deformation, strain energy, moment of inertia, load carrying capacity, slope an deflection of beams, shear forces, bending moments, torsional moments, column and struts, principal stresses and strains and theories of failure.
- To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.

Course Outcomes:
Student will be able to understand the concepts of various stresses and their significant effects in context with engineering applications.
- Student will be able to effectively use the concepts of shear force and bending moment diagrams in design of machine elements.
- Will be able to compute the principal stresses and Strains by analytical and graphical methods (Mohr's circle of stress 2-D.
- Able to use expressions for estimation of deformation in axially loaded members under gradual, sudden and impact loads.
- Able to estimate the Slope and Deflection in determinate beams.
- This subject enables the student to understand the important concepts of stress and strain, their significance in concept with engineering applications and is useful while studying the subjects like, Machine Design, Theory of machines, Dynamics of Machines.

M-206 –
Engineering Mathematics - IV

Course Objective

i)To develop logical understanding of the subject.

ii)To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.

iii)To make aware students about the importance and symbiosis between Mathematics and Engineering.

Course Outcomes

i)Student will demonstrate basic knowledge of Functions of Complex Variable & Numerical Technique.

ii)Student will show the understanding of impact of Engg.Mathematics on Mech.

iii)   Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or

(c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

M-207- Theory of Machines

COURSE OBJECTIVES:

Mechanical devices are characterized by the fact that they have mobility and must move to function. This differentiates mechanical engineering from other fields of engineering such as civil engineering, in which structures are generally immobile, and electrical engineering, in which one is concerned with the motion of electrons and not structures. The study of kinematics and dynamics of machinery is an applied field of mechanical engineering that is concerned with understanding the relationship between the geometry and the motions of the parts of a machine and the forces that produce this motion. The overall objective of this course is to learn how to analyze the motions of mechanisms, design mechanisms to have given motions, and analyze forces in machines. This includes relative motion analysis and design of gears, gear trains, cams, and linkages, simultaneous graphical and analytical analysis of position, velocity, and acceleration, considering static and inertial forces.

COURSE OUTCOMES:

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

1. Identify the basic relations between distance, time, velocity, and acceleration.

2. Apply vector mechanics as a tool for problem solving techniques.

3. Distinguish the basics of kinematics and kinetics of motion.

4. Develop familiarity with application of kinematics theories to real-world machines.

5. Understand analytical linkage analysis.

6. Determine cam profiles.

7. Understand gear trains.

8. Use the techniques to study the motions of machines and their components.
9. Use the techniques, skills, and modern engineering tools necessary for engineering practice.

M-208 –
Manufacturing Technology – I

Objectives:-

- To understand the primary manufacturing process classification and use in mechanical engineering.

- To acquire the knowledge of casting, metal forming and metal joining processes from the point of view of tools and equipments required, materials processed ,process parameters

- To get the practical exposure of utilization of manufacturing techniques for product making through practical and industry visit

Outcome:

- Ability to classify and apply the knowledge gained for applicability of processes for different product manufacturing.
- To compare and select best suitable manufacturing process based on requirements, advantages, limitations and applications

M-209 – Fluid Mechanics & Hydraulics Machines

COURSE OBJECTIVES :

1. To understand the properties of fluids and their variations with respect to temperature and pressure.

2. To understand the principles of fluid mechanics governing the behaviour of fluids at rest and in motion.

3. To understand the working principles of hydraulic turbines and pumps.
4. .To understand the physics of fluid flow and its applications.
5. To know the losses in flowing fluids in pipes.

COURSE OUTCOMES :

At the end of this course, the student will have

1. An ability to identify, formulate and solve problems related to fluids at rest and in motion.
2. Knowledge to design pipeline systems, floating bodies and hydraulic gates.
3. Knowledge to design hydraulic turbines and pumps.

M-210 - Machine Drawing and CAD

Course Objectives:
1.   To visualize an object & convert it into a drawing.
2.   To gain knowledge of conventional representation of various machining & mechanical details.
3.   To become conversant with 2-D & 3-D drafting.
4.   To impart solid modeling ability in to students.
5.   To interpret & apply technique for making assembly from the detail/.components.

Course Outcomes:
At the end of this course, the student will be:
1.   Able to create drawings as per BIS standards.
2.   Visualize & prepare detail drawing of a given object.
3.   Read & interpret a given drawing.
4.   Able to create assembly models of simple machine.

M-211 - PROFESSIONAL COMMUNICATION SKILLS

Course Objectives:

1. To understand the concept, process and importance of Professional Communication
2. To enable students to acquire English Speaking and Writing Skills
3. To enable students to develop Presentation Skills

Outcomes:

1. Students would understand the concept, process and importance of Professional Communication
2. Students would acquire English Speaking and Writing Skills
3. Students would develop Presentation Skills

Manufacturing Technology – II

Course Objectives:

iv) To understand process of cutting shaping.
v) To understand working principles for various machining processes.
vi) To understand construction, working and applications of various machine tools.
vii) To learn basic set up, working and applications of a few important non conventional machining processes to get hand on experience on various machine tools.

Course Outcomes:

iv) The students will be able to understand the details about machines used in production.
v) The students will be able to understand the mechanics behind metal cutting.
vi) The students will be able to understand the finishing and super finishing processes.
vii) The students will be able to understand the Physics of material removal behind the various non-conventional machining processes.

Machine Design- I

COURSE OBJECTIVE:

1. To familiarize the various steps involved in the Design process

2. To understand the principles involved in evaluating the shape and dimensions of a complete to satisfy function and strength requirements.

3. Students shall gain a thorough understanding of the different types of failure modes and criteria. They will be conversant with various failure theories and be able to judge which criterion is to be applied for a particular situation.

4. Student shall gain design knowledge of the different types of elements used in the machine design process, for e.g. fasteners, shafts, couplings etc. and will be able to design these elements for each application.

COURSE OUTCOMES:

1. Ability to analyze the stress and strain of mechanical components and understand, identify and quantify failure modes for mechanical part.

2. Ability to decide optimum design parameters for mechanical systems.

3. Ability to design mechanical system for fluctuating loads.

4. Acquire skill in preparing production drawing pertaining to various designs.

Heat Transfer

Course Objectives:
1. Study and analysis of heat transfer concepts applicable for steady state with and without heat generation and transient conditions.
2. To Train the students to identify, formulate and solve problems involving forced convection & natural convection heat transfer.
3. Students should learn the phenomena of heat transfer during phase change (boiling and condensation heat transfer)
4. The course provides practical exposure to the students in heat transfer equipments like heat exchanger, heat pipes, fins etc.

COURSE OUTCOMES:
1. Understand the modes of heat transfer and basic laws of heat transfer.
2. Analyze the problems involving steady state heat conduction with and without internal heat generation.
3. Develop solutions for transient heat conduction.
4. Understand and Evaluate heat transfer coefficients for natural and forced convection.
5. Analyze the heat exchanger and fins performance.
6. Calculate radiation heat transfer between black body and gray body surfaces.

MECHATRONICS – I

COURSE OBJECTIVES:
1. Understand the key elements of Mechatronic system, representation into block diagram.
2. Understand principles of Sensors, their characteristics.
3. Understand Mathematical modeling of systems.
4. Study various actuators applicable to Mechatronic systems.
5. Study of Interfacing of different electronicand electro - mechanical devices.

COURSE OUTCOMES:
1. Develop the skill to identify the suitable sensor and actuator for a Mechatronic system.
2. Develop the skill required for interfacing the electronicand electro-mechanical systems.
3. Develop the skill to indigenously design and develop a Mechatronic system.
4. Develop the skill to model a complete automated electro-mechanical system.
5. Understand the working and use of hydraulic and pneumatic actuators
   .

CAD/CAM
CAD

Course Objectives

i) To introduce field of Intelligent CAD/CAM with particular focus on engineering product design and manufacturing.

ii) To develop a holistic view of initial competency in engineering design by modern computational methods.

iii)To understand concepts of geometric modeling.

iv)Provide theoretical background of CAD/CAM.

v) Introduce Rapid Prototyping techniques.

Course Outcome: A learner will be able to….

1. Identify proper computer graphics techniques for geometric modeling.
2. Transform, manipulate objects, store and manage data.
3. Prepare computer assisted part program and post process.
4. Prepare part programming applicable to CNC machines.
5. Use rapid prototyping and tooling concepts in any real life applications.

TOOL ENGINEERING

Course Objectives:

➢ To introduce students to the design of dies for presswork.

➢ To introduce students the importance of using Jigs and Fixtures in manufacturing.

➢ To introduce students to the design practices of Jigs & Fixtures

Course outcomes:

After Studying the subject students will be able to know:

➢ Selection of a die for a given component

➢ Classify and explain various press tools and press tools operations

➢ Selection of locating and clamping devices for given component.

➢ Select and design jig and fixture for given component.

MACHINE DESIGN - II

COURSE OBJECTIVE:
1. To familiarize the various steps involved in the design process of mechanical drives such as belt, chain, rope and gear.
2. To understand the procedure of selection of machine elements from manufacturers catalogue.
3. To get knowledge of different types of bearings and their selection for a particular application.
4. Student shall apply design knowledge of the different types of elements used in the machine design process, for a design project.

COURSE OUTCOMES:

1. Design and analyze belts, brakes, clutches.
2. Understand gear drives and their applications; design procedure and introduction to gear design standard practices.
3. The construction, working, important features and selection process from manufacturers catalogue for rolling contact bearings
4. Analyze the pressure distribution and design of journal bearings.

Power Developing Devices

Course Objectives:

4. To understand the basic working of SI and CI Engines and Air Standard cycles.

5. To understand the Fuel Supply system for SI and CI Engines.

6. To understand the Testing and Performance of SI and CI Engines.

7. To understand the Combustion Phenomenon of SI and CI Engines.

8. To understand the Performance and Analysis of Gas Turbine.

Course Outcomes:

The Learner is able to ---

3. Differentiate between SI and CI Engines.

4. Understand and explain Combustion of SI and CI Engines.

5. Plot and analyze Performance Characteristics of SI and CI Engines.

6. Explain Gas Turbine and its performance.

MECHATRONICS – II

COURSE OBJECTIVES:
1. Understand key elements of industrial Pneumatic systems principal and components and circuit design
2. Understand key elements of industrial hydraulic systems principal and components and circuit design.
3. Understanding Electrical ,Mechanical Actuations and components Like switches relays etc. Also basis of application and selection of drives for various applications.
4. Understand the concept of PLC system and its ladder programming, and significance of PLC systems in industrial application.
5. Understand Advance control in Mechatronics and Robotics.

COURSE OUTCOMES:
1. Student shall understand Basic component and design of pneumatic systems.
2. Student shall understand Basic component and design of HYDRULIC systems.
3. Student To understand the signal conditioning phenomenon, necessity, and outline.
4. Student to understand concept of PLC its industrial use, application to Mechatronics.
5. Student shall Development of PLC ladder programming and implementation of

   real life system Hydraulics+Pneumatics + Electrical Electronics   +Plc .

El.-I (01) Dynamics of Machines

Course Objectives:
1. To understand the concept of balancing of rotating and reciprocating masses.
2. To understand the force analysis of reciprocating engine.
3. To study different types of gear trains.
4. To understand the concept of vibrations, single degree of freedom systems and the forced vibrations.
5. To study different types of Governors and its functions.

Course Outcome:-
   After completion of the course, the student will be able to:
1. Apply mathematical principles to perform dynamic force analysis on machine components.
2. Establish methods for balancing of machine components.
3. Analyze free vibration of various systems.
4. Analyze forced vibration of various systems.

5.

EL-I (02) <u>Power Plant Engineering</u>

Course Objectives:

1. To develop an ability to apply knowledge of Mathematics and Thermal Sciences
2. To develop an ability to design a system component and processes to meet the desired needs of Power Plant.

Course Outcomes:

1. Ability to have adequacy with design, erection and development of Power Plant.
2. Optimization of Power Plants with respect to available resources.

EL-I (03) Industrial Engineering

Course Objectives:

To introduce students:

1. The concept of integration of various resources.
2. To acquire the knowledge of complex processes or system required to accomplish the tasks.
3. To acquaint various ways to eliminate waste of time, money, material and energy that do not generate the value.
4. The various cost accounting systems.
5. The various mental fatigue at work place.

Course Outcomes:

After studying the subject students will be able to:

1. Identify the specific areas for a particular job execution in manufacturing business organization.
2. Know the key areas having chance of waste occurrence and its reduction possibilities.
3. Optimize resource utilization.
4. Carryout cost estimation and analysis.
5. Find their convenience to do the job.

EL-I (05) MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)

Course Objectives

The syllabus of MEMS is designed with a view of providing the following to the students:

1. Basics of MEMS technology.

2. Fundamental Devices and Processes for MEMS, Transducers and Actuators.

3. Micro fluidic devices and materials like Bio MEMS and Biomaterials.

4. MEMS Packaging and Assembly, MEMS device simulation.

Course Outcomes

At the end of course, the student will able to

1. Apply fundamental concepts of MEMS to solve real life engineering problems.

2. Identify problems and suggest suitable MEMS material/ Devices/Process to get the

   . Requisite Solution for a given application.

3. Apply advanced MEMS techniques to solve future engineering problems.

B. E. (Mechanical) Part - I
Refrigeration and Air Conditioning

Course Objectives:

The major Power Consuming devices are refrigerators and Air Conditioners. The main objective of this course is to understand the working principle of Refrigerator and Air conditioning and to operate them with minimum consumption of power in minimum time.

The student should understand how to operate the Refrigerator and Air conditioner, their working principle, various operating cycles such as vapor compression cycle, Air compression cycle, multi compression system, Vapor absorption cycle with numerical calculations.

He/she should know the psychrometry and various properties of air, GSHF, RSHF, humidification, Dehumidification, various components and their types for air conditioners and Refrigerators such as compressors, condensers, evaporators, throttle device and temperature and pressure controllers.

Except understanding of working principle, he should know various types of Refrigerants and how to choose them in a system to operate it smoothly with minimum cost and minimum maintenance.

Course Outcomes:

In order to assess the students progress in the subject towards achieving knowledge and learning. He/She is assessed by conducting three tests in the semester , He/She is assigned minimum five assignments, home work problems, Solving University Question papers to grasp knowledge in the subject.

The various experiments were performed during practical hours to understand the basic concept and working of the Refrigeration cycle. A local cold storage plant is visited to understand the cycle of Refrigeration and Air conditioning. Finally the student is examined by conducting Practical/Oral Examination based on Term Work, Test performance and finally theory paper of University level, based on the syllabus.

The student is expected to use his subject knowledge to design the Refrigeration or Air Conditioning plant and to optimize the performance of the same. .

Finite Element Methods

Course Objectives:

1. To acquaint with applications of numerical techniques for solving problems.

2. To introduce the concepts of Mathematical Modeling of Engineering Problems.

3.   To study the applicability of FEM to a range of Engineering Problems.

Course Outcomes:

1. Develop the finite element equations to model engineering problems

2. Apply the basic finite element formulation techniques to solve engineering problems.

3. Use commercial FEA software, to solve problems related to mechanical engineering

Advanced Machining & Manufacturing

Course Objectives:

5. To introduce the students to Advanced Manufacturing Processes.
6. To introduce the students to Modern Measurement Techniques for Micro Machining.
7. To introduce the students to

Course Outcomes:

1. Selection of appropriate manufacturing process for Advance components.
2. Characterization of work piece materials.

Operations Research Techniques

Course Objectives:

4. To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.
5. To familiarize the students with various tools of optimization, probability, statistics and simulation, as applicable in particular scenarios in industry for better management of various resources.
6. Apply the various models of operation research such as assignment model, transportation model, Linear programming model, Network Model and Sequencing Model.

Course Outcomes:

1. Upon successful completion of this course, the student will be able to.....
2. Illustrate the need to optimally utilize the resources in various types of industries.
3. Apply and analyze mathematical optimization functions to various applications.
4. Demonstrate cost effective strategies in various applications in industry.

EL-II-Tribology

Course Objectives:

1. This course is designed to understand the basic concepts of Tribology.
2. To understand the recent advances in the field of Tribology.

Course Outcomes:

1. Students will be able to explain various wear mechanisms.

2. Students will be able to predict theoretically as well as experimentally the life of Bearings and the components subjected to rolling and sliding friction.

EL-II-Renewable Energy

Course Objectives

7. Introduce to the technology of renewable source of energy

8. Learn about the solar radiation, its applications and radiation measuring instruments.

9. Learn about the various types of geothermal resources and its applications.

10. Study the biomass energy resources.

11. Learn methods of energy extraction from the wind and oceans.

12. Learn to the technology of direct energy conversion methods.

1. Apply the technology to capture the energy from the renewable source like Sun, Wind, Ocean, Biomass and Geothermal.

2. Apply the direct energy conversion methods.

EL-II-Micro & Nano Manufacturing

Course objective:

➢ To understand the scope of micro and nano technology:

➢ To understand the concepts and Applications of micro- and nanofabrication

➢ To understand Nano technology in India

➢ To understand the scope for Microfabrication

➢ To understand commercialization Issues of Micro-Nano Technology

Course outcome:

Students will have a complete understanding of scope, concepts and applications of micro and nano technology in the field of manufacturing.

EL-II-Industrial Product Design

Course objective:

1.To understand the structure of Industrial product design processes

2. To understand the contributions and role of multiple functions   for creating a new product

3. To apply engineering knowledge for the design of new style innovative and market acceptable products.

4. To develop an ability to coordinate multiple, interdisciplinary tasks in order to achieve the mission and goals of the product design.

Course outcome:

1.   Acquire the skills in understanding the Industrial Product Design.

2.   Acquire the skill in style, colors, lines & forms while design the new product.

3.   Develop skills in understanding various techniques of data collection, brain storming, Anthropometric & Aesthetic in product design.

Course objective:

1.   Establishing industry partnerships that guide, support, and validate PLM research and education activities.

2.   Assisting with the integration of PLM .

3.   Serving as a knowledge base for the PLM discipline.

Course out comes:

1.   Identify the need of PLM

2.   Interpret the Product development process.

3.   Creat and document the product data.

4.   dicuss the advantage of software tools in plm.

Automobile Engineering

Course Objectives:

i)   This course is designed to understand the basic concepts of Automobile and its components.

ii)   To understand the recent advances in the Automobile Technology.

Course Outcomes:

1. Students will be able to demonstrate and explain various automobile systems.

2. Students will be able to explain the importance of various important systems like differential, steering, Brakes, Suspensions etc.

3. Students will be able to explain principle of operation, construction and application of latest sensor Technology used in automobiles.

Production Planning & Control

Course Objectives:

1. To introduce the students to the types of productions in the industries as well as they should be familiar with the functions of PPC used in the shop floor of the industry.

2. To introduce the students to the design and development of the product as well as importance of product characteristic for the design and development of product.

3. To familiarize the students with the batch production of the shop floor for optimization for the cost or profit .

4. To introduce the students by using the multi activity chart for calculation of machine cycle efficiency also familiarize with line balancing problems of shop floor.

5. To introduce with calculation of cost of the product as well as replacing the machine after its life time.

6. To introduce the students the necessity of maintaining the inventory.

Course Outcomes:

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

1. Illustrate the types of production and use of functions of PPC on the shop floor.

2. Illustrate the design and development of the product on the shop floor.

3. Illustrate the optimization technique used in batch production.

4. To calculate the idle time and machine cycle efficiency to improve the productivity.

5. To develop the balanced line of production with minimum idle time.

6. To understand how to maintain the inventory for shop floor.

Quality Engineering

Course Objectives: After learning the subject students will be able to:

     (i) Identify job requirement.

     (ii) Identify job responsibility.

     (iii) Create work culture towards organizational excellence.

     (iv) Develop and strengthen quality view point.

Course Outcomes: After studying the subject students will become experts in applying the various tools and able to operate the skill in taking sharp decisions in business.

EL-II-Computation Fluid Dynamics

Course Objectives:

1. Equip students with the knowledge base essential for application of computational fluid dynamics to engineering flow problems.

2. Provide the essential numerical background for solving the partial differential Equations governing the fluid flow

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

1. Understand both flow physics and mathematical properties of governing Navier-Stokes equations and define proper boundary conditions for solution.

2. Learn how to formulate and solve computational problems arising in the flow of fluids.

EL-III-Cryogenic Engineering

Course Objectives

1. Learn about low temperature applications in engineering

2. Learn to the technology of gas liquefaction, separation and purification.

3. Study of measurement system at low temperature.

4. Learn to stored Cryogenic fluids.

Course Outcomes:

1. Ability to understand various gas liquefaction, gas separation and purification systems.

2. Ability to evaluate the performance of different Cryogenic systems

3. Apply to analyze low temperature systems for various applications.

EL-III-Automation & Robotics

Objectives

    1. To familiarize the students with the significance of Automation & Robotic system in agile and automated manufacturing processes.

    2. To prepare the students to be conversant with robotic elements/ peripherals, their selection and interface with manufacturing equipments.

    3. To familiarize the students with the basics of robot kinematics.

Outcomes: Learner will be able to.

    1. Acquire the skills in understanding Automation in Industry & Robot programming Language.

    2. Acquire the skill in robot task planning for problem solving.

    3. Develop skills in understanding various sensors, robot peripherals and their use.

    4. Develop skills in identifying areas in manufacturing, where robotics can be deployed for enhancing productivity.

EL-III-Modern Management Techniques

Objectives

1. To familiarize the students with the significance of Modern Management Techniques in Manufacturing,

2. To prepare the students to be aware about Kaizen, Just in Time, SMED Poka-Yoke in manufacturing systems.

Outcomes:

    1. Acquire the skills in understanding Modern Management Techniques in Manufacturing,

    2. Acquire the skill in FMS & Group Technology and SMED.

EL-III – Entrepreneurship Development

Course Objective:

To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

Course outcomes: Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.