JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in
An Autonomous Institute, with NAAC "A" Grade
Department of Basic Science & Humanities

Vision	Mission
To lay a robust foundation for the Institute to reach its Zenith.	▪ Achieving academic excellence through rigorous teaching, learning and evaluation practices. ▪ To develop an ability to apply knowledge of basic science and Mathematics to excel in the field of Engineering. ▪ To provide salutary environment for the betterment of faculty and the students.

Course outcome-2021-22

Course Title : Engineering Mathematics-1 **Semester : I**

Course Code : MA1T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematics **L – T – P : 3 – 1– 0**

Stream : Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe rank, Bernoulli's theorem, Taylor's and Maclaurin's theorems for functions of two variables, – Euler's Theorem for functions containing two and three variables, Lagrange's theorem
2. Illustrate the examples of ordinary differential equation, partial differential equation, matrices.
3. Solve questions related to ordinary differential equation, partial differential equation, matrices and their applications.
4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, and their applications to real world problems.
5. Interpret the results of matrices, ordinary differential equation, partial differential equation and their applications.
6. Design a method or modal on matrices, ordinary differential equation, and partial differential equation.

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Course Title : Introduction To Computer Programming **Semester : I**

Course Code : HU1T002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 2 – 0– 0**

Stream : Theory subject **Credits : 2**

Course Objectives:

1. To understand the importance of Programming
2. To understand the application of C Programming.
3. To investigate the key concepts of C Programming.
4. To enable students build a applications based on C programming.

Course Outcome:

CO1: Define the algorithms, flowcharts, array , pointer, structure ,function , python.

CO2: Discuss and differentiate between variables , operators ,statements , loops, array dimensions.

CO3:Demonstrate working programs using functions, loops ,conditional statements ,array ,pointer, structure and files in C and python language .

CO4:Distinguish between different steps of programming and prioritize levels of programming.

CO5:Find errors and predict outcome in C and python programming.

CO6:Compose and develop any application using C and python programming.

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Course Title : Engineering Physics **Semester : II**

Course Code : AI1T005 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Physics **L – T – P : 3 – 1– 2**

Stream : Core **Credits : 4**

Objectives:-

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2. To understand and study the Physics principles behind the developments of engineering materials.
3. To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

Outcomes

1. Acquire fundamental understanding of concepts specifically concern to Ultrasonic, Dielectrics, Laser, optical fibre, Electron Optics, Quantum Mechanics, Crystal Structure, Electrodynamics, Magnetics and SemiconductingMaterials and their engineering applications.
2. Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering Physics.
3. To develop a systematic, logical approach to problem – solving that can be applied to problems in physics and to problems in general.

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Course Title : Energy and Environment Engineering **Semester : I**

Course Code : AI1T006 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Environment **L – T – P : 3 – 0– 0**

Stream : Theory subject **Credits : 3**

COURSE OBJECTIVES

1. To understand the importance of Energy and Environment
2. To understand the application of energy saving tool in real life.
3. To investigate the key concepts of Energy and Environment

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.
2. Understand the importance of ecosystem for human beings..
3. Discover innovative method of power generation.
4. Correlate the cost of various method of power generation.
5. Judge the quality of air.

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Course Title : Introduction To Computer Programming (LAB) **Semester : I**

Course Code : HU1L002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 0 – 0– 4**

Stream :Theory subject **Credits : 2**

Course Objective

1. To introduce students to the basic knowledge of programming fundamentals of C language.
2. To impart writing skill of C programming to the students and solving problems.
3. To impart the concepts like looping, array, functions, pointers, file, structure

COURSE OUTCOME

After completing this lab course you will be able to:

1. Understand the logic for a given problem.
2. Write the algorithm of a given problem.
3. Draw a flow chart of a given problem.
4. Recognize and understand the syntax and construction of C programming code..
5. Make use of different data-structures like arrays, pointers, structures and files.
6. Know the alternative ways of providing solution to a given problem.

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Course Title : Workshop Practices **Semester : I**

Course Code : WS1L001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of workshop **L – T – P : 0 – 0– 4**

Stream : Practical subject **Credits : 2**

Instructions to the student:

Each student is required to maintain a „workshop journal" consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job.

Contents:

a) **Carpentry:** Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.

b) **Welding:** Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.

c) **Fitting:** Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation.

e) Machine shop: Lathe machine, types of lathes, major parts, cutting tool, turning operations (Demo), safety precautions

List of Practical:

1. Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.

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Course Title : Engineering Physics-Lab **Semester : I**

Course Code : AI1L005 **Course Type : Compulsory**

Pre-requisite : Basics of Physics Practical **L – T – P : 0 – 0– 2**

Stream :Core subject **Credits : 1**

Course Objective:

Students will be able to

1. Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques and graphical analysis to the experimental data
5. Develop the skills to identify various parts of the apparatus used in the experiment in laboratory.
6. Design and apply the practical knowledge of engineering physics in daily life

Course Outcome:

Students will be able to

1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber and electric and magnetic field.
2. Understand the working principles of Semiconducting devices and their application.
3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and optical systems
4. Analyze the different crystal structure with the help of crystal models.
5. Construct the various devices based on optical phenomenon.
6. Design the frame work of various electronic circuitries based on semiconducting materials.

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Course Title : Introduction to A I & Its Application **Semester : I**

Course Code : AI1T008 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematical Logic **L – T – P : 2 – 0– 0**

Stream : Theory subject **Credits : Audit**

COURSE OBJECTIVES

1. To understand the importance of AI and use of AI tools
2. To understand the application of AI in engineering and in real life.
3. To investigate the key concepts of knowledge representation and different notations.
4. To enable students to analyze a problem so that appropriate problem solving techniques may be applied.

COURSE OUTCOMES

Upon successful completion of this course student will able :

1. To understand the basics of Artificial Intelligence , Intelligent Agents and its structure
2. To Apply various searching techniques of Problem solving
3. To Acquire theoretical knowledge about principles for logic-based representation and reasoning
4. To Participate in the design of systems that act intelligently and learn from experience
5. To Understand the relation between AI & various domains

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Course Title : Communication Skills **Semester : I**

Course Code : HU2T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of English **L – T – P : 2 – 0– 0**

Stream :Theory subject **Credits : 2**

Course Objectives:

The main objective of the subject is to enhance the employability skills of engineering studentsas well as communication skills at work place.

The sub-objectives are:

1) To develop students' reading skills and pronunciation.
2) To develop technical communication skills through drafting, letter writing, and précis writing.
3) To develop literary skills through essay writing.
4) To develop public speaking skills of the students.
5) To expose the students to the ethics of English language by teaching grammar

Course Outcomes:

At the end of the course students will be able to

1) to better reading comprehension, pronunciation, and functional English grammar.
2) to write letters and resumes
3) to organize their thoughts for effective presentation and writing.
4) to learn skills to present themselves well in an interview, and handle a Group Discussion

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Course Title : Engineering Chemistry **Semester : II**

Course Code : AI2T002 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Chemistry
2. To understand the application of Chemistry in engineering and in real life.
3. To investigate the key concepts of Chemistry knowledge
4. To enable students to analyze a Chemistry problem so that appropriate problem solving techniques maybe applied.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe various properties of water, nanomateral, transition metal ions and their magnetic properties, Debye-Hückel theory, Quinonoid theory, various electrode, spectro photometric techniqes .
2. Illustrate the various types of water, carbon nano tubes, Molecular orbital theory,Transport number by Moving Boundary method, Ostwald's theory of acid-base indicator, various batteries, UV and NMR
3. Analyze the question on water characteristics, electrochemistry and various types of instrumental titration,various unknown sample by UV and NMR spectroscopy .
4. Apply the Knowledge of zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept, spectroscopic techniques.
5. Develop a Modal on softening of water, standardization of acid and base by various instruments, doping on band structure, spectroscopic techniques.
6. Organize water as per quality, carbon nano tubes, electrodes, Energy level diagramsof diatomic molecules, various elements as per their spectroscopic techniques.

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Course Title : Engineering Graphics **Semester : I**

Course Code : AI2T003 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Graphics **L – T – P : 1 – 0– 0**

Stream :Practical subject **Credits : 1**

COURSE OBJECTIVES

1. To understand the concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient

2. To understand theory of projection and simple machine parts in first and third angle of projection systems.

3. To understand the key concepts CAD software.

4. To enable students to analyze a 2-dimensional & 3-dimensional problem.

COURSE OUTCOMES:

1. Define various concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient.

2. Interpret drawings of simple machine component in first and third angle of projection systems

3. Apply theory of projections in projection of lines, projection of planes and projection of solid.

4. Classify solid geometry in different positions.

5. Assess the two dimensional and three dimensional drawing in CAD software.

6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title : Engineering Chemistry-Lab **Semester : I**

Course Code : HU2L001 **Course Type : Compulsory**

Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

Course Objective:

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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Course Title : Engineering Chemistry-Lab **Semester : I**

Course Code : AI2L002 **Course Type : Compulsory**

Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

Course Objective:

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
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Course Title : Engineering Graphics-Lab **Semester : I**

Course Code : AI2L003 **Course Type : Compulsory**

Pre-requisite : Basics of Graphics Lab **L – T – P : 0 – 0– 4**

Stream :Practical subject **Credits : 2**

COURSE OBJECTIVES:

The objective of the course is to enable students to

1. Provide basic foundation in CAD software.
2. Understand the fundamentals used to create and manipulate geometric models.
3. Get acquainted with the basic CAD software for to design geometric modeling.

COURSE OUTCOMES:

1. Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices

   and display devices to become professionally efficient to operate CAD software.
2. Explain drawing of simple machine component in CAD software.
3. Acquire the knowledge of geometric modeling in CAD software.
4. Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title	**Introduction to Drones**	**Semester**	**II**
Course Code	**AI2T009**	**Course Type**	**Compulsory**
Pre-requisite	**Nil**	**L – T – P**	**2 – 0– 0**
Stream	**Theory subject**	**Credits**	**Audit**

Course Objectives

The main aim of this course is to understand the basics of Drones and its various applications. The course will also impart the knowledge of how to fly a drone by considering the rules and regulations to the specific country. Further the students will be introduced to the safety measures to be taken during flight.

Course Outcomes:

Student will be able to

CO1: To introduce the various types of frame design used for the UAV and to accommodate the electronics over the frame to fly UAV.

CO2: To make the students understand the basic working principal behind the electronic components used and its specification to build a drone from scratch.

CO3: To enable the students to identify and understand various functional modules of the controller using a preprogrammed controller used in the UAV.

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Course Title : Basic Civil and Mechanical Engineering **Semester : I**
Course Code : ME1T004 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Graphics **L – T – P : 2 – 0– 0Stream : Theory subject** **Credits : 0 (Audit)**

COURSE OBJECTIVES :

1. To understand the basic stream of Mechanical Engineering and Civil Engineering.
2. To understand the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. To have basic knowledge of Casting, Machining, Designing, Manufacturing, differentmaterials for building construction and surveying.

COURSE OUTCOMES:

Students would be able to

1. Define basic stream of Mechanical & Civil Engineering.
2. Explain the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. Apply Basic knowledge of Casting, Machining, Designing, Manufacturing & CivilConstruction technique.
4. Analyzed the different mechanical system and properties of construction & surveyingmaterial.
5. Interpret the problem in mechanical system and civil structure.
6. Solve the problem in mechanical system and civil structure.

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Course Title : Basics of Electrical and Electronics Engineering **Semester** : II

Course Code : ME2T007 **Course Type** :

Compulsory Pre-requisite : Basic knowledge of Electrical and Electronic **L – T – P**

: 2-0-0Stream : Theory

Subject **Credits** : 0 (Audit)

COURSE OBJECTIVES

1. To provide a basic information and use of electrical and electronics components.
2. To understand and study the materials used for the preparation of electrical and electronics components.
3. To provide basic knowledge of operation and functionality of electrical and electronicscomponents.

COURSE OUTCOMES:

1. Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics.
2. Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode.
3. Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices.
4. Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations.
5. Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.
6. Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gate.

BoS Chairman

Chairman
(Basic Science & Humanities)
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VISION	MISSION
❖ To shape professional Leaders of Global Standards in Civil Engineering.	❖ To provide quality Education and Excellent Learning Environment for the overall development of students. ❖ Making sustainable efforts for integrating academics with industry.

COURSE OUTCOMES

Course Code: CE3T001
Course Name: Civil Engineering - Societal & Global Impact

CO1. Outline the role of Civil engineering in evolution and revolution of mankind and globally present status of development in India.

CO2. Identify the resources utilization for present and future infrastructural projects using various tools

CO3. Distinguish the necessities of different conventional as well as futuristic infrastructural projects.

CO4. Incorporate the goal of sustainable development to minimize the potential impacts on the global environment.

CO5. Apply various measures for enhancing the building environment, thereby improving quality of life of the occupants.

CO6. Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

Course Code: CE3T002
Course Name: Engineering Mathematics-III

CO1. Describe Matrices, properties of Laplace transform and Z Transform, partial differential equation, Function of Complex Variables.

CO2. Illustrate the examples using Matrices, Laplace and Z Transform, Partial differential equation, Function of Complex Variables.

CO3. Apply the knowledge of Matrices, Laplace transform, Z Transform, Partial differential equation, Function of Complex Variables to real world problems.

CO4. Analyze the question on Matrices, Laplace transform, Z Transform, Partial differential equation, Function of Complex Variables

CO5. Synthesize the knowledge of Matrices, Laplace transform, Z Transform, Partial differential equation, Function of Complex Variables to solve engineering problem.

Course Code: CE3T003
Course Name: Building Drawing and Drafting

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CO1. State the basic components of building as per IS 962-1967, Building planning, and drawing parameters as per relevant IS codes.

CO2. Classify the principles of different types building planning and drawing as per relevant IS code and general specifications.

CO3. Interpret the information of component of building, planning with respect to all parameters prescribed by I.S.

CO4. Examine the different types of planning of methods and suggest suitable one as per building byelaws.

CO5. Justify methodology for development of building planning.

CO6. Create the building plan and drafting with all consideration of Indian standards to fulfill client need.

Course Code: CE3T004
Course Name: Mechanics of Rigid Bodies

CO1. State the fundamentals of resultant in coplanar force system, friction, structural analysis, rectilinear motion, Work energy and impulse momentum principle for particle to solve the basic engineering problems.

CO2. Explain the concept of force system, equilibrium, Moment of inertia,Basic theorems to solve civil engineering problems.

CO3. Use concepts and parameters of mechanics to solve real time problem in engineering.

CO4. Examine the force systems and determine the forces in various structural members for safe design.

CO5. Select the suitable methods to designvarious engineering component as per the analysis CO6.Design various structural members, also correlate basic knowledge of engineering mechanics in broader way in field of Structural designing.

Course Code: CE3T005
Course Name: Energy Science and Engineering

CO1. List and generally explain the main sources of energy and their primary applications nationally and internationally

CO2. Acquire the knowledge of energy sources and scientific concepts/principles behind them.

CO3 Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.

CO4 List and describe the primary renewable energy resources and technologies.

CO5 Quantify energy demands and makes comparisons among energy uses, resources, and technologies.

CO6 Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.

Course Code: CE3T006
Course Name: Basic Geology and Geotechnical Engineering

CO1. Define geology, Index properties of soil, stress distribution, earth pressure theory, sub soil investigation, and types of foundation as per suitability of soil characteristics.

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CO2. Describe the soil behavior under different types of loading for effective foundation design. CO3. Choose the relevant foundation for various soil properties and strength parameters to reduce the uncertainties in design.

CO4. Analyze the compaction, consolidation and stress distribution parameters.

CO5. Judge the modes of failure of foundation with respect to the stability of slopes for different types of soil. C

O6. Develop the knowledge of foundation engineering for designing various types of foundation.

Course Code: CE3T007
Course Name: Universal Human Values

1. Students are expected to become more aware of their surroundings, society, social problems and their sustainable solutions, while keeping human relationships and human nature in mind.

2. They would have better critical ability.

. They would also become sensitive to their commitment towards what they believe in (humane values. Humane relationships and humane society).

4. They would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

5. Evaluate the reasons for Conflicts;

6. Create sustainable efforts towards a better World

Course Code: CE4T001
Course Name: Life Science.

CO1. Acquire the knowledge of Plant Physiology, Transpiration, Population Dynamics, Environmental Management, biotechnology covering and Biostatistics covering.

CO2. Explain Community ecology, Ecosystem structure, Population ecology, Policies and legal aspects in environmental management and Plant & Animal tissue culture.

CO3. Figure out the terms used in biostatics and the data analysis of biostatics.

CO4. Classify the Ecosystem structure, methods of Plant & Animal tissue culture and measures of Central Tendencies in biostatics.

CO5. Analyze the biostatics data parameters.

CO6. Summarize the life science in respect of Plant Physiology, Population Dynamics, Environmental Management, Biotechnology and Biostatics.

Course Code: CE4T002

Course Name: Hydrology & Water Resource Engineering.

CO1. Acquire the knowledge to design irrigation projects and understand its importance with respect to necessity and its effect.

CO2. Describe the methods of irrigation and distinguish the stages of reservoir planning.

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CO3. Compute the reservoir capacity considering the crop water requirement to construct the dam and distribution system.

CO4. Categorize the type of dam and the design parameter according to the type of dam along with development of irrigation system by provision of diversion head works, canals and canal head works.

CO5. Evaluate the forces acting on dam and stability condition of dam.

CO6. Design the Dam, Spillway, Canal and Canal Head Work

Course Code: CE4T003
Course Name: Concrete Technology and Design of RCC Building Elements

CO1.Memorize the ingredients of concrete, its physical and chemical properties with the testing on concrete in fresh and hardened state, different philosophies and aspects of reinforced concrete as per the relevant IS Codes.

CO2. Describe the materials and admixtures to be used in concrete and the application of limit state method and working state method.

CO3. Demonstrate the tests on different ingredient of concrete and the results obtained from the testing to appraise it‟s properties in fresh and hardened state

CO4 Apply the knowledge & skills in practical analysis and design of various RCC members like Beams, Columns, stair case, slab, footings etc.

CO5. Assemble the construction materials to produce homogenous mixture and Design a RCC element like beam, slab, column and footings by limit state and working stress method as per IS456-2000 and IS 456-1978 6.

CO6 Recommend appropriate and conventional method as well as code of analysis and design for particular RCC Structure.

Course Code: CE4T004
Course Name: Solid Mechanics

CO1. Acquire the concepts of stresses, strain, columns and elastic failure theory.

CO2. Identify the critical section to resist deformation for safe design against external loading for suitable design.

CO3. Calculate the stresses in beams, shafts, columns and springs.

CO4. Analyze the thick and thin cylinders, columns using Euler‟s and Rankin‟s theory.

CO5. Draw bending moment, shear force and Bending stress diagram under different loading conditions.

CO6. Justify the various types of stresses, moments and forces developed in structural members for designing purpose. .

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Course Code: CE4T005
Course Name: Surveying and Geomatics

CO1. Acquire the knowledge of basic surveying equipment used in basic and advanced surveying techniques.

CO2. Identify the various concepts involved in surveying to observe horizontal, vertical and angular measurements on the field using the latest surveying technology.

CO3. Evaluate Reduced Levels, Horizontal Distances, Vertical Distances, Offset for curve plotting and Parameters of Photogrammetry.

CO4. Analyze the data obtained from Compass Surveying, Leveling, Theodolite Survey, Tacheometry Survey, Plane Table Survey and Photogrammetry Survey.

CO5. Judge suitable method for a various surveying map and data required for further purpose in civil engineering projects.

CO6. Develop various types of Survey maps and suggest suitable method according to the requirement of client and field conditions.

Course Code: CE4T006

Course Name: Materials, Testing & Evaluation

CO1: Acquire the knowledge of engineering materials and testing on it.

CO2: Understand the different characteristics of at material.

CO3: Measure the tension or compression behavior of material.

CO4: Analyze the stresses develop in the material after loading during testing.

CO5: Describe the fracture mechanics.

CO6: Identify modes of failure.

Course Code: CE4T007

Course Name: Innovation and Entrepreneurship Development

This subject aims at giving practical exposure to students and to provide opportunities for acquiring knowledge regarding manufacturing and service industries/organizations and to acquaint them with industrial culture. Upon completion of this course, students will be able to describe the usage of different technologies/tools/concepts related to Design process, operation of various machines, mechanical drives, manufacturing processes, machining processes, various process equipment, production techniques, quality control, maintenance practices, automation in industries, management etc. At the end of the course students will be able to

1. Identify and validate of ideas.
2. Remember Patent registration of Innovation.
3. Understand roles and responsibilities of Entrepreneurship

Course Code: CE5T001

Course Name: Professional Practice, Law & Ethics

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CO1. Know about the fundamentals of professional practice, ethics, building laws, Intellectual Property Rights and Patents.

CO2. Understand the contracts management in civil engineering, Arbitration, Conciliation and Alternative Dispute Resolution system.

CO3. Identify the various stakeholders and their role,

CO4. Infer about the professional ethics to be carried, different laws and arbitration, and Patent.

CO5. Justify the types of roles they are expected to play in the society as practitioners of the civil engineering profession

CO6. Develop good ideas of the legal and practical aspects in the profession.

Course Code: CE5T002

Course Name: Fluid Mechanics

CO1. Define the physical properties of fluid, its types and fundamental concepts of fluid mechanics along with the equilibrium conditions of stability.

CO2. Explain the terms in hydraulics and estimate the forces acting on immersed bodies in fluid statics and measure the pressure force acting on fluid in motion.

CO3. Apply the Bernoulli‟s Equation for the discharge and velocity measurements.

CO4. Analyze flow through the pipes, Pipe networks and boundary layer theories.

CO5. Evaluate the energy losses and pressure differences in laminar and turbulent flow.

CO6. Analyze the dimensional analysis and visualize fluid flow phenomenon in civil engineering applications.

Course Code: CE5T003

Course Name: Structural Analysis

CO1. Recall the concepts involved in various methods of structural analysis.

CO2. Compare the applications of analysis methods and their respective theorems.

CO3. Build the Shear force and Bending Moment diagrams and fixed end moments for various methods

CO4. Analyse the frame structures, trusses, arches etc. subjected to various loading conditions.

CO5. Evaluate the moments produced due to external loading.

CO6. Compile the results of analysis and predict the behaviour of structure subjected to loading.

Course Code: CE5T004

Course Name: Transportation Engineering

CO1. Choose the relevant mode of transportation.

CO2. Explain different objectives and requirements of Highway Development and Planning, Alignments and Tests on Highway materials.

CO3. Organize the utility of construction materials and conduction of traffic signaling.

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CO4. Illustrate and evaluate the parameters of Transportation Engineering

CO5. Appraise the components of transportation modes.

CO6. Design various Geometric Features of Highways.

Course Code: CE5P001

Course Name: Mini Project & Seminar

Student shall choose a topic of his interest in consultation with faculty in the department. The topic for community project may be related to Civil Engineering area and/or interdisciplinary area. Student shall attempt to collect necessary information and present a summary indicating comprehension of the topic and acquired depth of knowledge. It is desirable to obtain industry or community sponsorship. Simplified tools or devices may be presented in form of working model and a brief report stating development. A power point presentation shall also be submitted.

Course Code: CE5F002

Course Name: Field Visit III

Student shall visit to ongoing construction sites in field to witness and collect necessary information from works of execution of superstructure of buildings or other. It is desirable to collect basic information on components of superstructure, tools and plants, construction machinery, etc. Intention of the work is to introduce the student to the chronological order of execution of works and generate data on vocabulary of terms in field.

Course Code: CE5T005
Course Name: Consumer Affairs

Course Objectives: This paper seeks to familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms‟ interface with consumers and the consumer related regulatory and business environment.

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Course Code: CE6T001
Course Name: Design of Steel Structures

CO1. Understand the fundamentals of steel structures, fasteners and connections, concept of balanced section, under reinforced and over reinforced section.

CO2. Explain Plastic theory, Plastic hinge concept, Plastic collapse load, Types of tension members, behavior of tension members.

CO3. Apply knowledge of Welding, Types and Properties of Welds, Types of joints, Weld symbols, Weld specifications, Effective areas of welds, Design of welds.

CO4. Analyse the tension and compression members, Elastic buckling of slender compression members, Sections used for compression members.

CO5. Solve numerical on simple slab base and gusseted bases Beam types, simple and built-up beams in bending (without vertical stiffeners).

CO6. Build steel structure elements with Limit State Method of design, by using Codes, Specifications and section classification.

Course Code: CE6T002
Course Name: Environmental Engineering

CO1. Define the importance and necessity of water supply and waste water treatment scheme.

CO2. Understand the various unit operations and unit processes in water & waste water treatment and flow sheet of conventional municipal water & waste water treatment plant.

CO3. Compare various units of conventional water & waste water treatment plant.

CO4. Apply advance treatment process to treat water and waste water.

CO5. Estimate an ecofriendly system for reuse and recycling of waste water.

CO6. Design and develop safe, effective and efficient water supply and waste water disposal system.

Course Code: CE6TE01A
Course Name: Urban Transportation Systems Planning

CO1. Remember the issues & challenges in the Urban Transportation Sector.

CO2. Explain the characteristic of urban transportation, structure of urban transportation and classification of urban roads.

CO3. Develop skills required for Transport planning & formulation.

CO4. Analyze the processes for Transport project execution and control.

CO5. Choose the contracting process as applied in Urban Transport projects.

CO6. Elaborate the use of intelligent Transport System and need to accommodate non-motorized transports

Course Code: CE6TE01B
Course Name: Building Construction Practices

CO1. Acquire the knowledge about building construction, stone work, brick work, timbering, floors and brick.

CO2. Understand the basic components of building and fundamental parameters in stonework, brickwork and timbering.

CO3. Utilize the knowledge on the site during building construction.

CO4. Distinguish the properties different materials used in building construction.

CO5. Choose the material and method of work for the appropriate construction of building.

CO6. Construct the building using the knowledge gained.

Course Code: CE6TE01C
Course Name: Rural Water Supply and Onsite Sanitation Systems

CO1. Know the problems pertaining to rural water supply and sanitation.

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CO2. Understand the engineering knowledge and principals of appropriate technology to develop cost effective technique for rural water supply and sanitation.

CO3. Develop water supply and sanitation system for rural community.

CO4. Discover low cost waste management systems for rural areas.

CO5. Evaluate high quality solid waste composting system to convert solid waste into good quality manure.

CO6. Plan and design an effluent and solid waste disposal mechanism.

Course Code: CE6ET01D
Course Name: Introduction to Earthquake Engineering

CO1. Define basics of introduction to earthquakes, behavior of plates, effects and importance of Earthquake Engineering

CO2. Demonstrate history of earthquakes in India and abroad, case studies of effects of earthquakes, causes and sources of earthquake damage.

CO3. Solve numerical of magnitude of earthquake, epicenter, epicenter distances, by using IS codes. CO4. Analyze the behavior of load bearing structures, masonry structures behave under earthquake in seismic zoning of India (IS 1893:2002 Part I), irregularities in buildings.

CO5 Conclude the application of design method for earthquake resistance structures.

CO6. Adapt the preventive measures to avoid critical damages due to natural disasters.

Course Code: CE6ET01E
Course Name: Foundation Engineering

CO1. Predict soil behavior under the application of loads.

CO2. Describe and illustrate the soil properties by various field and lab analysis.

CO3. Calculate bearing capacity and depth of foundation for different field conditions.

CO4. Analysis of shallow and deep foundation and it"s settlement.

CO5. Judge the concept of foundation for the different field conditions.

CO6: Develop the knowledge of foundation engineering for effective designing.

Course Code: CE6TE01F
Course Name: Irrigation Engineering

CO1. Acquire the knowledge about irrigation engineering.

CO2. Describe the different structures involved in irrigation projects.

CO3. Compute the necessary data required to design the irrigation project.

CO4. Differentiate the hydraulic structures according to their functions and requirement.

CO5. Evaluate stability condition of Dam.

CO6. Design the hydraulic structures.

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Course Code: CE6TE02A
Course Name: Geometric Design of Highway

CO1. Define the elements of vertical alignment, including being able to design and set out vertical curves.

CO2. Demonstrate the geometric design controls and criteria.

CO3. Choose the elements of horizontal alignment, including being able to design and set out circular curve elements and circular and transition curves.

CO4. Distinguish the geometrical designs of local roads and streets, collector roads and streets, rural and urban arterials, and freeways.

CO5. Evaluate the elements of cross-section elements of pavement.

CO6. Design the geometric parameters of Highway.

Course Code: CE6TE02B
Course Name: Project Planning and Cost Analysis

CO1. Acquire the fundamental knowledge in project planning.

CO2. Understand the process involved for project planning, modern construction techniques used for planning.

CO3. Develop the planning including all the resources with safety measures.

CO4. Assume the required resources during planning for cost analysis of project.

CO5. Choose the method for project planning and resource allocation.

CO6. Apply the knowledge in the modern techniques used for planning.

Course Code: CE6TE02C
Course Name: Water and Air Quality Modeling

CO1. Acquire scientific and technological understanding on the physico-chemical operations and processes used in the treatment of water and wastewater.

CO2. Understand the water/wastewater characterization and the treatment units‟ monitoring required for their design, operation and control, and acquiring the related monitoring and analysis skills.

CO3. Plan control the routinely used physico-chemical water and wastewater treatment units. CO4. Analyze cost effective, high efficiency water and air quality model.

CO5. Explain learning of the techniques employed in the monitoring of particulates and gaseous pollutants in ambient air and stack gas.

CO6. Formulate the modelling of air quality through the use of different software‟s.

Course Code: CE6TE02D
Course Name: Design of Precast and Pre-stressed Elements

CO1. Demonstrate the concepts & methods for pre stressing systems for different materials principles according codal provisions.

CO2. Find stresses, losses in prestress, strength of prestressed structures.

CO3. Utilize stress distribution in anchorages, end block by limit state design.

CO4. Interpret Principles of Precast and Pre-Engineered buildings.

CO5. Compare Economy of prefabrication coordination and planning.

CO6. Estimate strength of prestress structures Pre-Engineered buildings

Course Code: CE6TE02E
Course Name: Geotechnical Design

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CO1. Understand concept of stable foundation.

CO2. Describe various geotechnical methods for foundation selection.

CO3. Calculate the bearing values from the field test for foundation design for different field conditions.

CO4. Analyzethe settlement of foundation under the application of load.

CO5. Evaluate the design parameters for foundation design for the different field conditions.

CO6. Developtheknowledge ofground improvementand foundation designing.

Course Code: CE6TE02F
Course Name: Railway Engineering

CO1. Define the various component of railway track.

CO2. Explain the terminology used in planning of rails and tunnels.

CO3. Analyze the cause the reactions between the track and locomotives.

CO4. Classify the types of the various technical terms used in railway stations.

CO5. Decide the construction and maintenance steps of railway.

CO6. Build the various geometric features of railway track

Course Code: CE6L003
Course Name: Campus Recruitment Training (CRT)

1. Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.

2. Analyze the Problems logically and approach the problems in a different manner.

3. Students will be able to apply mathematical analysis of data to make connections, draw conclusions and solve problems.

4. Students will learn a series of techniques through practical activities to develop presenting skills and enhance confidence to expand the potential of the individual.

5. Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.

6. Students demonstrate an ability to target the resume to the presenting purpose 7. Demonstrate professional behavior(s) including preparedness, professional attire, and respectful presentation during interviews.

Course Code: CE6F004
Course Name: Field Visit

Student shall visit to ongoing construction sites in field to witness and collect necessary information from works of execution of superstructure of buildings or other. It is desirable to collect basic information on components of superstructure, tools and plants, construction machinery, etc. Intention of the work is to introduce the student to the chronological order of execution of works and generate data on vocabulary of terms in field.

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Course Code: CE6P005
Course Name: Mini Project & Seminar

Term work shall consist of detailed report for chosen topic and final working proposed in next semester. Report shall summarize the literature survey; spell out the scope of work, proposed methodology and expected results. It is desirable to have a topic sponsored by Industry or research organization or community.

Course Code: CE6T003
Course Name: Research Methodology

CO1. Remember the basic framework of research process.
CO2. Demonstrate various sources of information for research.
CO3. Develop an understanding of various research design and techniques.
CO4. Compare various sources of information for literature review and data collection.
CO5. Interpret the fundamental functions and working of analytical instruments used in research.
CO6.Discuss different methodologies and techniques used in research work**.**

VII Semester

BTCVC701: Design of Concrete Structures – II

Course Outcomes: On completion of the course, the students will be;

CO1: Able to identify the behavior, analyze and design of the beam sections subjected to torsion.

CO2: Able to analyze and design of axially and eccentrically loaded column and construct the interaction diagram for them.

CO3: Understand various concepts, systems and losses in pre-stressing.

CO4: Able to analyze and design the rectangular and symmetrical I-section pre-stressed beam/girders.

BTCVC702: Infrastructure Engineering

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

CO1: Know about the basics and design of various components of railway engineering

CO2: Understand the types and functions of tracks, junctions and railway stations.

CO3: Know about the aircraft characteristics, planning and components of airport

CO4: Understand the types and components of docks and harbors.

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BTCVC703: Water Resources Engineering

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

CO1: Understand need of Irrigation in India and water requirement as per farming practice in India.

CO2: Understand various irrigation structures and schemes.

CO3: Develop basis for design of irrigation schemes.

BTCVC704: Professional Practices

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

CO1: Understand the importance of preparing the types of estimates under different conditions for various structures.

CO2: Know about the rate analysis and bill preparations and to study about the specification writing.

CO3: Know the various types of contract, accounts in PWD, methods for initiating the works in PWD and tendering.

CO4: Understand the valuation of land and buildings, various methods and factors affecting valuation.

BTCVE705A: Construction Techniques

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

1. Understand the planning of new project with site accessibility and services required.

2. Comprehend the various civil construction equipment's.

3. Familiar with layout of RMC plant, production, capacity and operation process.

4. Recognize various aspect of road construction, construction of diaphragm walls, railway track construction etc.

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BTCVE705B: Engineering Economics

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

CO1: Adopt as per principles of economics and financing

CO2: Analyze available alternatives and propose best suitable among them

CO3: Apply various models of financial management and accounting

BTCVE705C: Finite Element Method

Course Outcomes: Upon completion of the course the students will be able to:

CO1. Understand the different energy methods in structural analysis and basic concepts of finite element method.

CO2. Analyze 1-D problems related to structural analysis like Bars, Trusses, Beams and Frames using finite element approach.

CO3. Find solution to problems using direct approach methods like Rayleigh – Ritz or Galerkin's Method.

CO4. Solve 2-D problems using knowledge of theory of elasticity.

CO5. Students will be able to implement the knowledge of numerical methods in FEM to find the solution to the various problems in statics and dynamics.

CO6. Analyze 1D, 2D, and 3D structures using different software packages based on FEM.

BTCVE705D: Limit State Design of Steel Structures

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

CO1: Identify and compute the design loads and the stresses developed in the steel member.

CO2: Analyze and design the various connections and identify the potential failure modes.

CO3: Analyze and design various tension, compression and flexural members.

CO4: Understand provisions in relevant BIS Codes.

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BTCVE705E: Plastic Analysis and Design

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

CO1: Understand modes of structural collapse

CO2: Perform the plastic analysis and design of various determinant and in-determinant structures.

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CO3: Adapt plastic theory of design for various structures

BTCVE705F: Water Power Engineering

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

CO1: Identify potential energy sources and adapt as per the requirement

CO2: inculcate basics of electricity generation and power plants

CO3: propose suitable energy source for running a project optimistically.

BTCVOE706B: Air Pollution Control

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

CO1: Identify the sources of air pollutants and their effect on human, plants and materials.

CO2: Apply knowledge of meteorology for controlling air pollution

CO3: Design air pollution controlling equipment.

CO4: Apply knowledge of legislation for prevention and control of air pollution.

BTCVOE706C: Bridge Engineering

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

1. Understand components of bridges and its various types.

2. Understand site selection criteria and comprehend various forces acting on bridges.

3. Analyze bridge structures using different analysis techniques.

4. Understand the importance of different types of bridge bearings.

BTCVOE706D: Introduction to Earthquake Engineering

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

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CO1 Capture complexities in earthquake resistant design of structures

CO2 Grasp Nature of earthquake vibration and associated forces on structures

CO3 Understand importance of designing the building to targeted seismic performance.

BTCVOE706E: Town and Urban Planning

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

CO1. Understand town and Urban planning and their essential attributes

CO2. Identify elements of planning and regulations of the same

CO3. Implement guidelines provided by standard authorities

BTCVOE706F: Tunneling and Underground Excavations

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

CO1: Understand types of tunnels and tunneling methods conforming to site conditions

CO2: Investigate various tunneling operations and relevant machinery required

CO3: Understand methods and operations of excavating large and deep tunnels

CO4: Propose suitable tunneling and excavations methods to optimize the same.

BTCVL707: Design Drawing of RC & Steel Structures

Course Outcomes: On completion of the course, student will be able to simulate a practical design requirement in to a theoretical statement to solve mathematically to arrive at a safe economical and realistic feasible solution that can be executed.

BTCVT709: Field Training /Internship/Industrial

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Students are expected to undergo industrial training for at least four weeks at factory / construction site / design offices or in combination of these after VI semester. Training session shall be guided and certified by qualified engineer / architect / contractor in civil engineering. A neat detailed report on activities carried out during training is expected. Students should undergo training in Summer Vacation after Semester VI and appear at examination in Semester VII. A brief report of field training shall be submitted. Evaluation shall be based on report and power point presentation.

BTCVS710: Seminar

Student shall choose a topic of his/her interest in consultation with faculty in the department. The topic for seminar may be related to Recent Developments in Civil Engineering area and/or interdisciplinary area. Student shall attempt to collect necessary information and present a summary indicating comprehension of the topic and acquired depth of knowledge. A brief report on topic of seminar shall be submitted. Evaluation shall be based on report and power point presentation.

BTCVP711: Project Stage I

Term work shall consist of detailed report for chosen topic and output of final working proposed. Report shall summaries the literature survey. Spell out the scope of work, methodology and results. Viva-voce Examination shall be based on work carried out by the student. In case of students opting for Internship in the eighth semester, the Project must be industry-based.

HOD, Civil

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(An Autonomous Institute, with NAAC "A" Grade)
Affiliated to DBATU, RTMNU
Department of Computer Science & Engineering
"A Place to Learn, A Chance to Grow"
Session: 2021-22

VISION	MISSION
To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

BRANCH CODE: All

Course Outcome-2021-22

Course Title : Engineering Mathematics-1
Course Code : MAT001
Pre-requisite : Basic knowledge of Mathematics
Stream :Core subject

Semester : I
Course Type : Compulsory
L – T – P : 3 – 1– 0
Credits : 4

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe rank, Bernoulli's theorem, Taylor's and Maclaurin's theorems for functions of two variables, – Euler's Theorem for functions containing two and three variables, Lagrange's theorem

2. Illustrate the examples of ordinary differential equation, partial differential equation, matrices.

3. Solve questions related to ordinary differential equation, partial differential equation, matrices and their applications.

4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, and their applications to real world problems.

5. interpret the results of matrices, ordinary differential equation, partial differential equation and their applications.

6. Design a method or modal on matrices, ordinary differential equation, partial differential equation

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Course Title : Engineering Physics **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI/1T/2T005 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Physics **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1.To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2.To understand and study the Physics principles behind the developments of Engineering materials.
3.To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

COURSE OUTCOMES

At the end of the course students will be able to

1.Acquire fundamental understanding of concepts specifically concern to semiconducting materials, Optics, Fibre optics, Ultrasonics, Dielectric Materials, Electron optics, Quantum Mechanics, Crystal structure and Nano-science, and their engineering applications.
2.Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering Physics.
3.To develop a systematic, logical approach to problem – solving that can be applied to problems in physics and to problems in general.

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Course Title : Engineering Physics-Lab **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI1L/2L005 **Course Type : Compulsory**

Pre-requisite : Basics of Physics Practical **L – T – P : 0 – 0– 2**

Stream :Core subject **Credits : 1**

COURSE OBJECTIVE

Students will be able to

1. Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques and graphical analysis to the experimental data
5. Develop the skills to identify various parts of the apparatus used in the experiment in laboratory.
6. Design and apply the practical knowledge of engineering physics in daily life

COURSE OUTCOME

Students will be able to

1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber and electric and magnetic field.
2. Understand the working principles of Semiconducting devices and their application.
3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and optical systems
4. Analyze the different crystal structure with the help of crystal models.
5. Construct the various devices based on optical phenomenon.
6. Design the frame work of various electronic circuitries based on semiconducting materials

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Course Title : Energy and Environment Engineering **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI1T/2T006 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Environment **L – T – P : 3 – 0– 0**

Stream :Theory subject **Credits : 3**

COURSE OBJECTIVES

1. To understand the importance of Energy and Environment
2. To understand the application of energy saving tool in real life.
3. To investigate the key concepts of Energy and Environment.

COURSE OUTCOMES

At the end of the course students will be able to

1) Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.

2) Understand the importance of ecosystem for human beings..

3) Discover innovative method of power generation.

4) Correlate the cost of various method of power generation.

5) Judge the quality of air.

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Course Title : Introduction To Computer Programming **Semester : I**

Course Code : HU1T002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 2 – 0– 0**

Stream :Theory subject **Credits : 2**

COURSE OBJECTIVES

1. To understand the importance of Programming
2. To understand the application of C Programming.
3. To investigate the key concepts of C Programming.
4. To enable students build a applications based on C programming

COURSE OUTCOMES

CO1: Define the algorithms, flowcharts, array , pointer, structure ,function , python.

CO2: Discuss and differentiate between variables , operators ,statements , loops, array dimensions.

CO3:Demonstrate working programs using functions, loops ,conditional statements ,array ,pointer, structure and files in C and python language .

CO4:Distinguish between different steps of programming and prioritize levels of programming.

CO5:Find errors and predict outcome in C and python programming.

CO6:Compose and develop any application using C and python programming.

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Course Title : Introduction To Computer Programming (LAB) **Semester : I**

Course Code : HU1L002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 0 – 0– 4**

Stream : Theory subject **Credits : 2**

COURSE OBJECTIVES

1. To introduce students to the basic knowledge of programming fundamentals of C language.

2. To impart writing skill of C programming to the students and solving problems.

3. To impart the concepts like looping, array, functions, pointers, file, structure

COURSE OUTCOME

After completing this lab course you will be able to:

1. Understand the logic for a given problem.

2. Write the algorithm of a given problem.

3. Draw a flow chart of a given problem.

4. Recognize and understand the syntax and construction of C programming code..

5. Make use of different data-structures like arrays, pointers, structures and files.

6. Know the alternative ways of providing solution to a given problem.

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Course Title : Workshop Practices **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI 1L/2L001 **Course Type : Compulsory**

Pre-requisite : Basic Knowledge Of Workshop **L – T – P :0 – 0– 4**

Stream :Practical subject **Credits : 2**

Instructions to the student:

Each student is required to maintain a „workshop journal" consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job.

Contents:

a**) Carpentry:** Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.

b) Welding: Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.

c) Fitting: Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation.

e) Machine shop: Lathe machine, types of lathes, major parts, cutting tool, turning operations (Demo), safety precautions

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Course Title : Introduction to A I & Its Application **Semester : I**

Course Code : AI1T008 **Course Type: Compulsory**

Pre-requisite : Basic knowledge of Mathematical Logic **L – T – P :2 – 0– 0**

Stream :Theory subject **Credits : Audit**

COURSE OBJECTIVES

1. To understand the importance of AI and use of AI tools
2. To understand the application of AI in engineering and in real life.
3. To investigate the key concepts of knowledge representation and different notations.
4. To enable students to analyze a problem so that appropriate problem solving techniques may be applied.

COURSE OUTCOMES

Upon successful completion of this course student will able :

1. To understand the basics of Artificial Intelligence , Intelligent Agents and its structure
2. To Apply various searching techniques of Problem solving
3. To Acquire theoretical knowledge about principles for logic-based representation and reasoning
4. To Participate in the design of systems that act intelligently and learn from experience
5. To Understand the relation between AI & various domains

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Course Title : Engineering Mathematics-II **Semester : II**

Course Code : MA2T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematics **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus.
2. Illustrate the concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus by using examples.
3. Apply the knowledge of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.
4. Analyze the problems and results of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.
5. Evaluate the problems by using complex numbers, integral calculus & multiple integrals, Fourier series &transform, vector differential calculus, vector integral calculus to solve the engineering problems.

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Course Title : Engineering Chemistry **Semester : I/ II**

Course Code : ME/CE/EE/ET/IT/CS/AI/1T/2T002 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Chemistry
2. To understand the application of Chemistry in engineering and in real life.
3. To investigate the key concepts of Chemistry knowledge
4. To enable students to analyze a Chemistry problem so that appropriate problem solving techniques may be applied.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe various properties of water, nano-materal, transition metal ions and their magnetic properties, Debye-Hückel theory, Quinonoid theory, various electrode, spectro-photometric techniques.
2. Illustrate the various types of water, carbon nanotubes, Molecular orbital theory, Transport number by Moving Boundary method, Ostwald's theory of acid-base indicator, various batteries, UV and NMR spectroscopy.
3. Analyze the question on water characteristics, electrochemistry and various types of instrumental titration, various unknown sample by UV and NMR spectroscopy .
4. Apply the Knowledge of zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept, spectroscopic techniques.
5. Develop a Modal on softening of water, standardization of acid and base by various instruments, doping on band structure, spectroscopic techniques.
6. Organize water as per quality, carbon nanotubes, electrodes, Energy level diagrams of diatomic molecules, various elements as per their spectroscopic techniques.

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Course Title : Engineering Chemistry Practical **Semester : II**

Course Code : ME/CE/EE/ET/IT/CS 1L/2L002 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

COURSE OBJECTIVES

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

COURSE OUTCOMES

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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Course Title : Engineering Graphics **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS1T/2T003 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Graphics **L – T – P : 1 – 0– 0**

Stream :Practical subject **Credits : 1**

COURSE OBJECTIVES

1. To understand the concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient
2. To understand theory of projection and simple machine parts in first and third angle of projection systems.
3. To understand the key concepts CAD software.
4. To enable students to analyze a 2-dimensional & 3-dimensional problem.

COURSE OUTCOMES

1. Define various concepts like dimensioning, conventions and standards related to engineering graphics
   in order to become professionally efficient.
2. Interpret drawings of simple machine component in first and third angle of projection systems
3. Apply theory of projections in projection of lines, projection of planes and projection of solid.
4. Classify solid geometry in different positions.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using
   CAD software

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Course Title : Engineering Graphics-Lab **Semester : II**

Course Code : ME/CE/EE/ET/IT/CS/2L003 **Course Type : Compulsory**

Pre-requisite : Basics of Graphics Lab **L – T – P : 0 – 0– 4**

Stream :Practical subject **Credits : 2**

COURSE OBJECTIVES:

The objective of the course is to enable students to

1. Provide basic foundation in CAD software.
2. Understand the fundamentals used to create and manipulate geometric models.
3. Get acquainted with the basic CAD software for to design geometric modeling.

COURSE OUTCOMES:

1. Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices and display devices to become professionally efficient to operate CAD software.
2. Explain drawing of simple machine component in CAD software.
3. Acquire the knowledge of geometric modeling in CAD software.
4. Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title : Communication Skills **Semester : I/II**

Course Code : HU1T/2T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of English **L – T – P : 2 – 0– 0**

Stream :Theory subject **Credits : 2**

Course Objectives:

The main objective of the subject is to enhance the employability skills of engineering studentsas well as communication skills at work place.

The sub-objectives are:

1) To develop students' reading skills and pronunciation.
2) To develop technical communication skills through drafting, letter writing, and précis writing.
3) To develop literary skills through essay writing.
4) To develop public speaking skills of the students.

Course Outcomes:

At the end of the course students will be able to

1) to better reading comprehension, pronunciation, and functional English grammar.
2) to write letters and resumes
3) to organize their thoughts for effective presentation and writing.
4) to learn skills to present themselves well in an interview, and handle a Group Discussion

To expose the students to the ethics of English language by teaching grammar

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Course Title : Communication Skills-Lab **Semester : II**

Course Code : HU2L001 **Course Type : Compulsory**

Pre-requisite : Basics of English grammar **L – T – P : 0 – 0– 4**

Stream :Theory subject **Credits : 2**

COURSE OBJECTIVES:

1. Apply appropriate communication skills. Students are able to enhance their employability skills as well as communication skills at work place.
2. Demonstrate knowledge of communication theory and application. Students have better reading comprehension, pronunciation, and functional English grammar.
3. Practice critical thinking to develop innovative and well-founded perspectives related to the students' emphases.
4. Build and maintain healthy and effective relationships. Students are able to write letters and resumes.
5. Use technology to communicate effectively in various settings and contexts. Students are able to organize their thoughts for effective presentation and writing.
6. Demonstrate appropriate and professional ethical behavior. Students are able to learn skills to present themselves well in an interview, and handle a Group Discussion

COURSE OUTCOMES

Students will be able to

CO1. Remember Communication Skills by giving adequate exposure in reading, writing, listening and speaking.
CO2. Understand the communication process by identifying, explaining, and applying current communication theories as they relate to a variety of contexts.
CO3. Apply proficiency, both in spoken and written English.
CO4. Analysing the communication behaviours of others and themselves in a variety of scenario (e.g. interpersonal, intercultural, group, public and professional communication, and mass media).
CO5. Evaluate and organize their thoughts for effective presentation and writing.
CO6. Improve research, organizational, and critical thinking skills by finding and evaluating reference material and organizing and presenting effective messages adapted to specific situations.

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Course Title : Basics of Electrical and Electronics Engineering **Semester : I/II**
Course Code : ME/CE/EE/ET/IT/CS 2T007 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Electrical and Electronic **L – T – P : 2-0-0**
Stream : Theory Subject **Credits : 0 (Audit)**

COURSE OBJECTIVES

1. To provide a basic information and use of electrical and electronics components.
2. To understand and study the materials used for the preparation of electrical and electronics components.
3. To provide basic knowledge of operation and functionality of electrical and electronics components.

COURSE OUTCOMES:

1. Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics.

2. Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode.

3. Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices.

4. Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations.

5. Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.

6. Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gates.

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Course Title :	**Introduction to Drones**	**Semester :**	**II**
Course Code :	**AI2T009**	**Course Type :**	**Compulsory**
Pre-requisite :	**Nil**	**L – T – P :**	**2 – 0– 0**
Stream :	**Theory subject**	**Credits :**	**Audit**

Course Objectives

The main aim of this course is to understand the basics of Drones and its various applications. The course will also impart the knowledge of how to fly a drone by considering the rules and regulations to the specific country. Further the students will be introduced to the safety measures to be taken during flight.

Course Outcomes:

Student will be able to

CO1: To introduce the various types of frame design used for the UAV and to accommodate the electronics over the frame to fly UAV.

CO2: To make the students understand the basic working principal behind the electronic components used and its specification to build a drone from scratch.

CO3: To enable the students to identify and understand various functional modules of the controller using a preprogrammed controller used in the UAV.

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Course Title : Basic Civil and Mechanical Engineering **Semester : I/II**
Course Code : ME/CE/EE/ET/IT/CS/1T004
Course Type : Compulsory
Pre-requisite : Basic knowledge of Graphics **L – T – P : 2 – 0– 0**
Stream : Theory subject (Audit) **Credits : 0**

COURSE OBJECTIVES :

1. To understand the basic stream of Mechanical Engineering and Civil Engineering.
2. To understand the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. To have basic knowledge of Casting, Machining, Designing, Manufacturing, different materials for building construction and surveying.

COURSE OUTCOMES:

Students would be able to

1. Define basic stream of Mechanical & Civil Engineering.
2. Explain the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. Apply Basic knowledge of Casting, Machining, Designing, Manufacturing & Civil Construction technique.
4. Analyzed the different mechanical system and properties of construction & surveying material.
5. Interpret the problem in mechanical system and civil structure.
6. Solve the problem in mechanical system and civil structure.

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CS3T001	Organizational Behaviour	2 Credit

Course Objectives:

1. To help the students to develop cognizance of the importance of human behavior.
2. To enable students to describe how people behave under different conditions and understand why people behave as they do.
3. To provide the students to analyze specific strategic human resources demands for future action.
4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behavior and improve results.
5. To learn and appreciate different cultures and diversity in the workplace.

Course outcomes:

1. Students will be able to remember various methods and terms used in different organizational behaviour models.
2. Students will be able to understand Individual as well as Group Behaviour like attitude, perception, motivation, personality, mis-behavior and emotions.
3. Students will be able to apply the Principles of Organization Behaviour through leadership, Power & Politics.
4. Students will be able to analyze the dynamics of organizational behaviour and managing change.
5. 5. Students will be able to evaluate the importance of Advanced Communication tools and Techniques for the decision making Process.
6. Students will be able to design a Policy or Frame Rules and Regulation which will be useful for the employees working under any organization.

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CS3T002	Mathematics-III	4 Credits

COURSE OBJECTIVES:

1. To understand the concept of Laplace Transform , Inverse Laplace Transform ,Fourier transform, complex variables Numerical Linear algebra and Stochastic calculus.
2. To understand the application of Mathematics in engineering and in real life.
3. To enable students to apply mathematical tool to solve problems in real life.
4. To enable students to apply mathematical tool to analyze problems in real life

COURSE OUTCOMES:

1. Describe the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra and Stochastic calculus.
2. Illustrate the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra and Stochastic calculus.
3. Apply the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra and Stochastic calculus.
4. Analyze the problem by using the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra and Stochastic calculus.
5. Evaluate the problem base on the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra and Stochastic calculus.

6. Create the new concept by using the theory of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra and Stochastic calculus

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CS3T003	Programming for Problem Solving	3 Credit

COURSE OBJECTIVES:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems

COURSE OUTCOMES:

At the end of this course,

1. 1.Student shall be able to learn and understand to formulate simple algorithms for arithmetic and logical problems
2. 2.Student shall be able to translate the algorithms to programs (in C language).
3. 3.Student shall be able to test and execute the programs and correct syntax and logical errors
4. 4.Student shall be able to implement conditional branching, iteration and recursion
5. 5.Student shall be able to decompose a problem into functions and synthesize a complete program using divide
6. Student shall be able to formulate simple algorithms for arithmetic and logical problems

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CS3T004	Universal Human Value	3 Credit

Course Objective:

1. The objective of the course is fourfold:
2. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
3. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
4. Strengthening of self-reflection.

CS3T006	Data Structure & Algorithms	4 Credit

7.

Course Objectives:

1. To understand the concepts of ADTs.
2. To learn linear data structures – lists, stacks, and queues
3. To understand sorting, searching and hashing algorithms.
4. To apply Tree and Graph structures.

Course Outcomes:

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

1. Student shall be able to Implement abstract data types for linear data structures.
2. Student shall be able to apply the different linear and non-linear data structures to problem solutions
3. Student shall be able to critically analyze the various sorting algorithm.

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CS3T007	Operating System	3 Credit

Course Objective:

At the end of the Course, Student will be able to:

1	To understand the services provided by and the design of an operating system.
2	To understand the structure and organization of the file system.
3	To understand what a process is and how processes are synchronized and scheduled.
4	To understand different approaches to memory management.
5	Students should be able to use system calls for managing processes, memory and the file system.
6	Students should understand the data structures and algorithms used to implement an OS.

Course Outcomes:

1	Identify the significance of operating system in computing devices.
2	Exemplify the communication between application programs and hardware devices through system calls
3	Compare and illustrate various process scheduling algorithms
4	Apply appropriate memory and file management schemes
5	Illustrate various disk scheduling algorithms.
6	Understand the need of access control and protection in an operating system

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CS3T007 Digital Electronics & Computer Organization 3 Credit

Course Objectives:

1. Understanding basic knowledge of Boolean algebra and automaton theory as a core of computer science.
2. Theoretical and practical knowledge about synthesis of combinational and sequential circuits, and programmable structures.

Course Outcomes:

Students will be able to:

1. Define basic logical circuits, Boolean algebra, minimization methods, methods for writing Boolean functions, combinational and sequential circuits, flip-flops, digital automaton, and programmable structures.
2. Describe operation methods of combinational and sequential circuits, similarities and differences of writing the Boolean functions and minimizations.
3. Select appropriate methods for realization and circuit minimization.
4. Pattern recognition for specific circuit realization and error discovery during circuit design process.
5. Synthesis of appropriate combinational and sequential logic circuits.
6. Evaluation of own solutions and error discovery.

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CS3L009 Data structure and Algorithms (Lab) 1 Credit

Course Objectives:

1. To develop skills to design and analyze simple linear and non linear data structures.
2. To identify and apply the suitable algorithm for the given real world problem.
3. To gain knowledge in practical applications of data structures and algorithms

Course Outcomes:

1. To design and analyze the time and space efficiency of the data structure
2. To identity the appropriate data structure for given problem
3. To apply the knowledge of data structures and algorithm to solve the problem

CS3L010 Web Designing Lab 1 Credit

Course Objectives:

1. To learn the basics in web designing using HTML, CSS, and XML.
2. To develop web applications using JSP, servlet, PHP, and Net Beans.

Course Outcomes:

1.To Develop web pages using HTML, CSS, and XML

2.To Deploy real world applications using client side and server-side scripting languages.

3.To Design web applications in Net Beans Environment

4.To Perform the Database Connectivity with MySQL using Java Servlets, JSP, and PHP.

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CS4T001	Java Programming	3 Credit

COURSE OBJECTIVES

1	To learn the Advanced concepts in J2SE
2	To understand Web Application Development, Database Connectivity and itsImplementation using Servlets, JSP and JDBC
3	To introduce advanced Java frameworks for improving the web application design.

COURSE OUTCOMES

1	Student shall be able to Understand and implement advanced Java concepts.
2	Student shall be able to Develop Java based Web applications using Servlets and JSP
3	Student shall be able toIncorporate cutting-edge frameworks in web application development.

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CS4T002 FLAT (Formal Language and Automata Theory) 4 Credit

COURSE OBJECTIVES

1	To Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
2	To Enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms

COURSE OUTCOMES

1	Students shall able to Define the mathematical principles behind theoretical computer science.
2	Students shall able to Differentiate and give examples for the different types of automata like finite automata, push down automata, linear bounded automata and turing machine
3	Students shall able to Correlate the different types of automata to real world applications
4	Students shall able toChoose and design appropriate automata for the different requirements outlined by theoretical computer science
5	Students shall able toIdentify the different computational problems and their associated complexity.

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CS4T003	Computer Network	3 Credit

OURSE OBJECTIVES

1	Acquire the computer networking knowledge as well as the existing connectivity technologies and the required infrastructure which comprises the key steps involved in the communication process.
2	Identify the key issues for the realization of the LAN/WAN/MAN network
3	Establish a solid knowledge of the layered approach that makes design, implementation and operation of extensive networks possible. To learn the 7-layer OSI network model (each layer and its responsibilities) and understand the TCP/IP suite of protocols and the networked applications supported by it.
4	Establish a solid knowledge of the layered approach that makes design, implementation, and operation of extensive networks possible.
5	Acquire the knowledge of the basic protocols involved in wired/wireless communication process
6	Acquire the computer networking knowledge as well as the existing connectivity technologies and the required infrastructure which comprises the key steps involved in the communication process.

COURSE OUTCOMES

1	Defining, using and implementing Computer Networks and the basic components of a Network system, explain the importance of data communications, how communication works in data networks.

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2	Evaluate data communication link considering elementary concepts of data link layer protocols for error detection and correction.
3	Apply various network layer techniques for designing subnets and supernets and analyse packet flow on basis of routing protocols.
4	Estimate the congestion control mechanism to improve quality of service of networking application
5	Analyze the features and operations of various application layer protocols such as Http, DNS, Telnet, FTP and SMTP.

CS4T004	Database Management Systems	3 Credit

COURSE OBJECTIVES

1	To Eliminate redundant data.
2	To Make access to the data easy for the user.
3	To Provide for mass storage of relevant data.
4	To Make the latest modifications to the data base available immediately.
5	To Protect data from physical harm and un-authorised systems.
6	To Allow multiple users to be active at one time.

COURSE OUTCOMES

1	Student shall be able to learn and understand fundamentals of database management system
2	Student shall be able to exhibit the query development knowledge
3	Student shall be able to learn modeling and normalization of databases.

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4 Student shall be able to learn query processing and optimization techniques.

5 Students shall be able to exhibit to File Organization, Indexing and Hashing

6 Student shall be able to exhibit the knowledge of transaction and concurrency control.

CS4L006	JAVA(Lab)	1Credit

Course Objective:

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
3. Understand the principles of inheritance, packages and interfaces.

Course Outcome:

1. Identify classes, objects, members of a class and relationships among them needed for a specific problem
2. Write Java application programs using OOP principles and proper program structuring
3. Demonstrate the concepts of polymorphism and inheritance.
4. Write Java programs to implement error handling techniques using exception handling

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CS4L008	DBMS (Lab)	1

COURSE OBJECTIVES:

1. To explain basic database concepts, applications, data models, schemas and instances.
2. To demonstrate the use of constraints and relational algebra operations. IV. Describe the basics of SQL and construct queries using SQL.
3. To emphasize the importance of normalization in databases.
4. To facilitate students in Database design
5. To familiarize issues of concurrency control and transaction management.

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

1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction.
3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.

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CS4L007	Computer Networks (Lab)	1 Credit

Course Objectives:

1. To understand the working principle of various communication protocols.
2. To analyze the various routing algorithms.
3. To know the concept of data transfer between nodes.

Course Outcomes:

Students will be able to:

1. Understand fundamental underlying principles of computer networking.
2. Understand details and functionality of layered network architecture.
3. Apply mathematical foundations to solve computational problems in computer networking.
4. Analyze performance of various communication protocols.
5. Compare routing algorithms.
6. Practice packet /file transmission between nodes.

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CS4T009	Consumer Affairs	Audit

Course Objectives:

1. To familiarise the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.
2. To provide an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards.

Course Outcomes:

The student should be able to

1. Remember the basic terminology related to Consumer Affairs
2. Understand the different approaches applied in different aspects of consumption, customer protection and consumer awareness and their evolution.
3. Apply the knowledge in different aspects of consumption, customer protection and consumer awareness.
4. Comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.
5. Analyse: the norms applicable to different consumption patterns.
6. Evaluating the functioning of Consumer Protection mechanism in India.

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CS5T001	Internet of Things	3 Credit

COURSE OBJECTIVES:

1. Understand the definition and significance of the Internet of Things
2. Discuss the architecture, operation, and business benefits of an IoT solution
3. Examine the potential business opportunities that IoT can uncover
4. Explore the relationship between IoT, cloud computing, and big data
5. Identify how IoT differs from traditional data collection systems.
6. Implement IOT Applications in different areas.

COURSE OUTCOMES:

Students will able to:

1. Apply the concept of IoT.
2. Identify the different technology
3. Apply IoT to different applications.
4. Analysis and evaluate protocols used in IoT
5. Design and develop smart city in IoT
6. Analysis and evaluate the data received through sensors in IoT

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CS5T002	TCP/IP	3 Credit

COURSE OBJECTIVES:

1. To understand the basic concepts of TCP/IP Architecture.
2. To Understand Network Layer and Applications.
3. To learn UDP and TCP applications.
4. To learn Transport Layer Reliability.

COURSE OUTCOMES:

1. To compare and contrast TCP and UDP in terms of the application that uses them.
2. To design network-based applications using the socket mechanism.
3. To work with IPv4 addresses in terms of subnetting and supernetting.
4. To setup a host and network in terms of IP addressing.

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CS5T003	Design and Analysis of Algorithm	4 Credit

COURSE OBJECTIVES:

1. To learn fundamentals of algorithms design techniques.
2. To understand basic knowledge of computational complexity, approximation and randomized algorithms, selection of the best algorithm to solve a problem.
3. To analyze the performance of algorithms, to compare algorithms with respect to time and space complexity.
4. To develop proficiency in problem solving and programming.
5. Apply important algorithmic design paradigms and methods of analysis.
6. Synthesize efficient algorithms in common engineering design situations

COURSE OUTCOMES:

1. After learning the course the students should be able:
2. Develop efficient algorithms for simple computational tasks.
3. Gain understanding of concepts of time and space complexity, worst case, average case and best case complexities and the big-O notation.
4. Design standard algorithms such as sorting, searching, and problems involving graphs.
5. Compute complexity measures of algorithms, including recursive algorithms using recurrence relations

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CS5O001	Open Elective-1	Web Development & Design	4 Credit

COURSE OBJECTIVES:

1. Students will able to understand and illustrate HTML.
2. Students will be able to understand about CSS Properties.
3. Student will able to understand basic of Java Script
4. Student will able to design website

COURSE OUTCOMES: Student will able to

CO1. Remember the basic tags of HTML, CSS, and JavaScript

CO2. Understand the basic tags of HTML, CSS, and JavaScript

CO3: Execute the different Syntax and Tags present in HTML, CSS, and JavaScript

CO4. Analyze difference between various web design Languages

CO5. Evaluate the design of Different Forms

CO6. Design the web site form

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CS5O001	Open Elective –I Open Source Operating System	4

Course Outcomes:-

1. Understand Linux Architecture, different Linux installation and Linux commands.
2. Effectively use Linux Environment using shell, file system, scripts, filters &program development tools
3. Perform file I/O management through commands and perform package management, storage management and failure recovery.
4. Create backup and do recovery using tools like Rsync and Bacula
5. Automate tasks and write simple programs using scripts
6. Configure important services like FTP, DNS, MAIL and WEB.

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CS5TE01A	Elective –I (Augmented Reality)	3 Credit

COURSE OBJECTIVES:

1. To make students know the basic concept and framework of virtual reality.
2. To introduce students the technology for multimodal user interaction and perception in VR, in particular the visual, audial and haptic interface and behavior.
3. To aware students the technology for managing large scale VR environment in real time.
4. To provide students with an introduction to the VR system framework and development tools.
5. To expose learners to the basic of AR/VR technology and devices.
6. Implement applications on AR/VR technology.

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

1. To understand the basic concept and framework of virtual reality
2. To understand the technology for multimodal user interaction and perception in VR
3. Decide & Apply algorithmic strategies to solve a given problem
4. To apply VR Tools in real time environment.
5. To understand augmented reality
6. To implement application of AR/VR technology with hands on experience through more informative and practical exploration.

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CS5TE01B	Elective –I(Block Chain)	3 Credit

Course Objectives:

1. To understand the concepts of blockchain
2. To understand various cryptocurrency and their working
3. To Use various algorithms for distributed consensus
4. To build a applications based on blockchain technology

Course Outcome:

CO1: Understand emerging abstract models for Blockchain Technology.

CO2: Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain.

CO3: It provides conceptual understanding of the function of Blockchain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.

CO4: Apply hyperledger Fabric and Etherum platform to implement the Block chain Application

CO5: To designapplications based on blockchain technology for E-Governance, Land Registration, Medical Information Systems, and others

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CS5TE01C	Elective –I (3D Printing & Design)	3 Credit

COURSE OBJECTIVES:

1. To gain knowledge and skills related to 3D printing technologies.
2. To learn the selection of material, equipment and development of a product for Industry 4.0 environment.
3. To understand the various software tools, process and techniques for digital manufacturing.
4. To apply these techniques into various applications.

COURSE OUTCOMES:

1. Develop CAD models for 3D printing. Import and Export CAD data and generate .stl file.
2. Select a specific material for the given application.
3. Select a 3D printing process for an application.
4. Produce a product using 3D Printing or Additive Manufacturing (AM).

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CS5L005	Internet of Things (Lab)	1 Credit

Course Objectives:

1. To understand the technologies in Internet of Things.
2. Students should get the knowledge of Arduino board and Raspberry-Pi board
3. Students should get the knowledge about the different components of IoT such as LED, LCD, different sensors, actuators etc..
4. To Analyze, design and develop parts of Internet of Things solution.
5. To understand the concept of IoT and can able to build the IoT applications.

Course Outcomes:

Students will able to;

1. Identify and adopt knowledge of the terminology, application, requirements and constraints of IoT development.
2. Explain development of hardware and software in real-time environment via advanced automated designing and testing tools.
3. Design and implementation of IoT with advanced microcontroller and interfaces.
4. Testing of complex and critical real world IoT, interfaced to digital hardware in real world situation.
5. Evaluate a real-time. IoT industrial control system using an embedded microcontroller with associated interface and communication devices.

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CS5L006	TCP/IP (Lab)	1 Credit

COURSE OBJECTIVES:

1. To understand the basic concepts of TCP/IP Architecture.
2. To Understand Network Layer and Applications.
3. To learn UDP and TCP applications.
4. To learn Transport Layer Reliability.

COURSE OUTCOMES:

1. To compare and contrast TCP and UDP in terms of the application that uses them.
2. To design network-based applications using the socket mechanism.
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CS5L007	Python Programming(Lab)	1 Credit

Course Objectives:

1. Develop a basic understanding of programming and the Python programming language.
2. To acquire programming skills in core Python.
3. To acquire Object Oriented Skills in Python
4. To develop the skill of designing Graphical user Interfaces in Python.
5. To develop the ability to write database applications in Python

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

1. Explain basic principles of Python programming language
2. Implement object oriented concepts
3. Implement database and GUI applications.

CS5T009	Innovation and Entrepreneurship Development	Audit

COURSE OBJECTIVES

1. To understand the importance of Innovation and Idea Generation
2. To understand the concept of entrepreneurship.

COURSE OUTCOMES

At the end of the course students will be able to

1. Identify and validate of ideas.
2. Remember Patent registration of Innovation.
3. Understand roles and responsibilities of Entrepreneurship.

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CS6T001	Artificial Intelligence & Robotics	3 Credit

COURSE OBJECTIVES:

- To understand the concept of Artificial Intelligence (AI) .
- To learn various peculiar search strategies for AI
- To acquaint with the fundamentals of mobile robotics
- To develop a mind to solve real world problems unconventionally with optimality

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

- Identify and apply suitable Intelligent agents for various AI applications
- Design smart system using different informed search / uninformed search or heuristic approaches.
- Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
- Apply the suitable algorithms to solve AI problems

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CS6T002	Neural Networks and Machine Learning	3 Credit

COURSE OBJECTIVES:

1. Basic neuron models: McCulloch-Pitts model and the generalized one, distance or similarity based neuron model, radial basis function model, etc.
2. Basic neural network models: multilayer perceptron, distance or similarity based neural networks, associative memory and self-organizing feature map, radial basis function based multilayer perceptron, neural network decision trees, etc.
3. Basic learning algorithms: the delta learning rule, the back propagation algorithm, self-organization learning, the r4-rule, etc.

COURSE OUTCOMES:

After learning the course the student will be able:

1. Understand the mathematical foundations of neural network models
2. Design and implement neural network systems to solve real world problems.

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CS6TE02A	Cloud Computing	3 Credit

COURSE OBJECTIVES:

1.To provide students with the fundamentals and essentials of Cloud Computing.

2.To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

3.To enable students exploring some important cloud computing driven commercial systems and applications.

4.To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

COURSE OUTCOMES:

1. Understand the core concepts of the cloud computing and its benefits along with its various models and services in cloud computing.

2.Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.

3.Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.

4.Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.

5.Analyze various cloud programming models and apply them to solve problems on the cloud.

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CS6TE02B	Angular JS	3 Credit

COURSE OBJECTIVES:

1. To Understand the architecture and the instruction set of microprocessor
2. To study Assembly language programming as well as the design of various types of Digital and analog interfaces
    1. To Understand the architecture of 8086

COURSE OUTCOMES:

1. Perform the conversion among different number systems
2. Design digital components including – decoders, multiplexers, arithmetic circuits.
3. Design of synchronous sequential circuits.
4. Illustrate how the different peripherals are interfaced with Microprocessor.
5. Distinguish and analyze the properties of Microprocessors & Microcontrollers.

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CS6TE02C	Middleware Technologies	3 Credit

COURSE OBJECTIVES:

The course content enables students to:

1. Understand different types, benefits and pitfalls of client server computing models.
2. Establish communication between client and server through java RMI and JDBC.
3. Implement C#.Net applications using Assemblies, and Callback Interfaces.
4. Develop client server applications using heterogeneous programming languages with CORBA
5. Learn java bean component model with EJBS and CORBA.

COURSE OUTCOMES:

At the end of the course students are able to:

1. Choose appropriate client server computing model for given problem.
2. Design a dynamic remote application with RMI and JDBC Connectivity.
3. Develop client server applications using C#.net
4. Select appropriate language for homogeneous and heterogeneous objects.
5. Develop real time projects by combining CORBA and database interfacing

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CS6TE02D	Human Computing	3 Credit

COURSE OBJECTIVES

The student should be made to:

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Gain an understanding and articulate the fundamental design concepts and practices associated with the design of human-computer interactions.
- Analyze human factors such as cognition, affect and behaviour as they relate to the human-computer interaction and apply them in the development of human-computer interactions.
- Evaluate the impact of new and emerging technology trends on human computer interactions and the user experience.
- Synthesize sound (solid) design principles and aesthetics as they apply to the design of innovative interfaces.

COURSE OUTCOMES

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

- Design effective dialog for HCI.
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
- Develop meaningful user interface.

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CS6TE03A	Brain Machine Interface and Interaction	3 Credit

Course Objectives:

(1) Obtain the background to conduct research in brain-computer interaction and human-computer interaction;

(2) Understand the literature in the field of brain sensing for human-computer interaction research;

(3) Understand the various tools used in brain sensing, with a focus on functional near-infrared spectroscopy (fNIRS) research at Drexel;

(4) Understand the steps required to use real-time brain sensing data as input to an interactive system;

(5) Understand the domains and contexts in which brain-computer interfaces may be effective;

(6) Understand the open questions and challenges in brain-computer interaction research today.

Course Outcomes:

Learner will be able to understand the biophysical basis of non-invasive brain signals, to apply signal processing, discrimination, and classification tools to interpret these signals, and to implement these tools into a control system for a brain-computer interface

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CS6TE03B	Computer Forensic	3 Credit

COURSE OBJECTIVES:

1. To correctly define and cite appropriate instances for the application of computer forensics correctly collect and analyze computer forensic evidence.

2. Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics

COURSE OUTCOMES:

1. Students will explain and properly document the process of digital forensics analysis.

2. Students will gain an understanding of the tradeoffs and differences between various forensic tools.

3. Students will be able to describe the representation and organization of data and metadata within modern computer systems.

4. Students will understand the inner workings of file systems.

5. Students will be able to create disk images, recover deleted files and extract hidden information.

6. Students will be introduced to the current research in computer forensics. This will encourage them to define research problems and develop effective solutions.

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To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

CS6TE03C	Deep Learning	3 Credit

COURSE OBJECTIVES:

1. understand complexity of Deep Learning algorithms and their limitations
2. understand modern notions in data analysis oriented computing;
3. Be capable of confidently applying common Deep Learning algorithms in practice and implementing their own.
4. Be capable of performing distributed computations.
5. Be capable of performing experiments in Deep Learning using real-world data.

COURSE OUTCOMES:

1. Learn topics such as convolutional neural networks, recurrent neural networks, training deep networks and high-level interfaces.
2. Understand the language and fundamental concepts of artificial neural networks.
3. Troubleshoot and improve deep learning models.
4. Implement deep learning algorithms, understand neural networks and traverse the layers of data abstraction which will empower the student to understand data more precisely.

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CS6TE03D	Quantum Computing	3 Credit

COURSE OBJECTIVES:

1. The objective of this course is to provide the students an introduction to quantum computation.
2. Much of the background material related to the algebra of complex vector spaces and quantum mechanics is covered within the course.

COURSE OUTCOMES:

1. Basics of complex vector spaces.
2. Quantum mechanics as applied in Quantum computing.
3. Architecture and algorithms.
4. Fundamentals of Quantum computations

COURSE OBJECTIVES:

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CS6L003	Neural Networks and Machine Learning(Lab)	3 Credit

1. To understand the basic concepts and methods of machine learning.
2. To make use of some elementary machine learning techniques in the design of computer systems.
3. To develop a broad perspective about the applicability of ML algorithms in different fields.
4. To understand the major machine learning algorithms, the problem settings and assumptions that underlies them.
5. To possess insights, concerning the relative strengths and weaknesses of various common machine learning methods.

COURSE OUTCOMES:

After learning the course the student will be able:

1. To demonstrate knowledge of the machine learning literature.
2. To describe how and why machine learning methods work.
3. To demonstrate results of parameter selection.
4. To explain relative strengths and weaknesses of different machine learning methods.
5. To select and apply appropriate machine learning methods to a selected problem. 6. To implement machine learning algorithms on real datasets.
7. To suggest ways to improve results.

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CS6L005 Advance Java Programming(LAB) 3 Credit

Course Objectives:

1. To build software development skills using java programming for real world applications.
2. To implement frontend and backend of an application.
3. To implement classical problems using java programming.

Course Outcomes:

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

1. Understand the structure and model of the Java programming language, (knowledge)
2. Use the Java programming language for various programming technologies (understanding).
3. Develop software in the Java programming language, (application).
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis).
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis).
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

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CS6T007 Intellectual Property Rights 3 Credit

Course Objective :

1. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
2. To disseminate knowledge on patents, patent regime in India and abroad and registration aspects.
3. To disseminate knowledge on copyrights and its related rights and registration aspects.
4. To disseminate knowledge on trademarks and registration aspects.
5. To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects.
6. To aware about current trends in IPR and Govt. steps in fostering IPR

Course Outcome :

1. The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works.

2. During their research career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their ideaor innovations.

3. Pave the way for the students to catch up Intellectual Property(IP) as an career option R&D IP Counsel, Government Jobs such as Patent Examiner, Private Jobs,Patent agent and Trademark agent , Entrepreneur

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Affiliated to DBATU, RTMNU
Department of Computer Science & Engineering
"A Place to Learn, A Chance to Grow"
Session: 2021-22

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CS6P007	Campus Recruitment Training	1 Credit

COURSE OBJECTIVES

1. To enhance the problem solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of campus recruitment drive.
2. To groom the students to the corporate level
3. To ensure that all eligible students are employed by the end of the final year of study.

COURSE OUTCOMES

At the end of the course students will be able to

1. Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.
2. Analyze the Problems logically and approach the problems in a different manner.
3. Students will be able to apply mathematical analysis of data to make connections, draw conclusions and solve problems.
4. Students will learn a series of techniques through practical activities to develop presenting skills and enhance confidence to expand the potential of the individual.
5. Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.
6. Students demonstrate an ability to target the resume to the presenting purpose
7. Demonstrate professional behavior(s) including preparedness, professional attire, and respectful presentation during interviews.

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Course outcome-2021-22

Course Title : Engineering Mathematics-1 **Semester : I**

Course Code : MA1T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematics **L – T – P : 3 – 1– 0**

Stream : Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe rank, Bernoulli's theorem, Taylor's and Maclaurin's theorems for functions of two variables, – Euler's Theorem for functions containing two and three variables, Lagrange's theorem
2. Illustrate the examples of ordinary differential equation, partial differential equation, matrices.
3. Solve questions related to ordinary differential equation, partial differential equation, matrices and their applications.
4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, and their applications to real world problems.
5. Interpret the results of matrices, ordinary differential equation, partial differential equation and their applications.
6. Design a method or modal on matrices, ordinary differential equation, and partial differential equation.

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Course Title : Introduction To Computer Programming **Semester : I**

Course Code : HU1T002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 2 – 0– 0**

Stream : Theory subject **Credits : 2**

Course Objectives:

1. To understand the importance of Programming
2. To understand the application of C Programming.
3. To investigate the key concepts of C Programming.
4. To enable students build a applications based on C programming.

Course Outcome:

CO1: Define the algorithms, flowcharts, array , pointer, structure ,function , python.

CO2: Discuss and differentiate between variables , operators ,statements , loops, array dimensions.

CO3:Demonstrate working programs using functions, loops ,conditional statements ,array ,pointer, structure and files in C and python language .

CO4:Distinguish between different steps of programming and prioritize levels of programming.

CO5:Find errors and predict outcome in C and python programming.

CO6:Compose and develop any application using C and python programming.

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Course Title : Engineering Physics **Semester : II**

Course Code : AI1T005 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Physics **L – T – P : 3 – 1– 2**

Stream : Core **Credits : 4**

Objectives:-

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2. To understand and study the Physics principles behind the developments of engineering materials.
3. To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

Outcomes

1. Acquire fundamental understanding of concepts specifically concern to Ultrasonic, Dielectrics, Laser, optical fibre, Electron Optics, Quantum Mechanics, Crystal Structure, Electrodynamics, Magnetics and SemiconductingMaterials and their engineering applications.
2. Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering Physics.
3. To develop a systematic, logical approach to problem – solving that can be applied to problems in physics and to problems in general.

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Course Title : Energy and Environment Engineering **Semester : I**

Course Code : AI1T006 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Environment **L – T – P : 3 – 0– 0**

Stream : Theory subject **Credits : 3**

COURSE OBJECTIVES

1. To understand the importance of Energy and Environment
2. To understand the application of energy saving tool in real life.
3. To investigate the key concepts of Energy and Environment

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.
2. Understand the importance of ecosystem for human beings..
3. Discover innovative method of power generation.
4. Correlate the cost of various method of power generation.
5. Judge the quality of air.

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Course Title : Introduction To Computer Programming (LAB) **Semester : I**

Course Code : HU1L002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 0 – 0– 4**

Stream :Theory subject **Credits : 2**

Course Objective

1. To introduce students to the basic knowledge of programming fundamentals of C language.
2. To impart writing skill of C programming to the students and solving problems.
3. To impart the concepts like looping, array, functions, pointers, file, structure

COURSE OUTCOME

After completing this lab course you will be able to:

1. Understand the logic for a given problem.
2. Write the algorithm of a given problem.
3. Draw a flow chart of a given problem.
4. Recognize and understand the syntax and construction of C programming code..
5. Make use of different data-structures like arrays, pointers, structures and files.
6. Know the alternative ways of providing solution to a given problem.

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Course Title : Workshop Practices **Semester : I**

Course Code : WS1L001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of workshop **L – T – P : 0 – 0– 4**

Stream : Practical subject **Credits : 2**

Instructions to the student:

Each student is required to maintain a „workshop journal" consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job.

Contents:

a) **Carpentry:** Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.

b) **Welding:** Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.

c) **Fitting:** Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation.

e) Machine shop: Lathe machine, types of lathes, major parts, cutting tool, turning operations (Demo), safety precautions

List of Practical:

1. Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.

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Course Title : Engineering Physics-Lab **Semester : I**

Course Code : AI1L005 **Course Type : Compulsory**

Pre-requisite : Basics of Physics Practical **L – T – P : 0 – 0– 2**

Stream :Core subject **Credits : 1**

Course Objective:

Students will be able to

1. Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques and graphical analysis to the experimental data
5. Develop the skills to identify various parts of the apparatus used in the experiment in laboratory.
6. Design and apply the practical knowledge of engineering physics in daily life

Course Outcome:

Students will be able to

1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber and electric and magnetic field.
2. Understand the working principles of Semiconducting devices and their application.
3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and optical systems
4. Analyze the different crystal structure with the help of crystal models.
5. Construct the various devices based on optical phenomenon.
6. Design the frame work of various electronic circuitries based on semiconducting materials.

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Course Title : Introduction to A I & Its Application **Semester : I**

Course Code : AI1T008 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematical Logic **L – T – P : 2 – 0– 0**

Stream : Theory subject **Credits : Audit**

COURSE OBJECTIVES

1. To understand the importance of AI and use of AI tools
2. To understand the application of AI in engineering and in real life.
3. To investigate the key concepts of knowledge representation and different notations.
4. To enable students to analyze a problem so that appropriate problem solving techniques may be applied.

COURSE OUTCOMES

Upon successful completion of this course student will able :

1. To understand the basics of Artificial Intelligence , Intelligent Agents and its structure
2. To Apply various searching techniques of Problem solving
3. To Acquire theoretical knowledge about principles for logic-based representation and reasoning
4. To Participate in the design of systems that act intelligently and learn from experience
5. To Understand the relation between AI & various domains

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Course Title : Communication Skills **Semester : I**

Course Code : HU2T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of English **L – T – P : 2 – 0– 0**

Stream :Theory subject **Credits : 2**

Course Objectives:

The main objective of the subject is to enhance the employability skills of engineering studentsas well as communication skills at work place.

The sub-objectives are:

1) To develop students' reading skills and pronunciation.
2) To develop technical communication skills through drafting, letter writing, and précis writing.
3) To develop literary skills through essay writing.
4) To develop public speaking skills of the students.
5) To expose the students to the ethics of English language by teaching grammar

Course Outcomes:

At the end of the course students will be able to

1) to better reading comprehension, pronunciation, and functional English grammar.
2) to write letters and resumes
3) to organize their thoughts for effective presentation and writing.
4) to learn skills to present themselves well in an interview, and handle a Group Discussion

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Course Title : Engineering Chemistry **Semester : II**

Course Code : AI2T002 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Chemistry
2. To understand the application of Chemistry in engineering and in real life.
3. To investigate the key concepts of Chemistry knowledge
4. To enable students to analyze a Chemistry problem so that appropriate problem solving techniques maybe applied.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe various properties of water, nanomateral, transition metal ions and their magnetic properties, Debye-Hückel theory, Quinonoid theory, various electrode, spectro photometric techniqes .
2. Illustrate the various types of water, carbon nano tubes, Molecular orbital theory,Transport number by Moving Boundary method, Ostwald's theory of acid-base indicator, various batteries, UV and NMR
3. Analyze the question on water characteristics, electrochemistry and various types of instrumental titration,various unknown sample by UV and NMR spectroscopy .
4. Apply the Knowledge of zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept, spectroscopic techniques.
5. Develop a Modal on softening of water, standardization of acid and base by various instruments, doping on band structure, spectroscopic techniques.
6. Organize water as per quality, carbon nano tubes, electrodes, Energy level diagramsof diatomic molecules, various elements as per their spectroscopic techniques.

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Course Title : Engineering Graphics **Semester : I**

Course Code : AI2T003 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Graphics **L – T – P : 1 – 0– 0**

Stream :Practical subject **Credits : 1**

COURSE OBJECTIVES

1. To understand the concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient

2. To understand theory of projection and simple machine parts in first and third angle of projection systems.

3. To understand the key concepts CAD software.

4. To enable students to analyze a 2-dimensional & 3-dimensional problem.

COURSE OUTCOMES:

1. Define various concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient.

2. Interpret drawings of simple machine component in first and third angle of projection systems

3. Apply theory of projections in projection of lines, projection of planes and projection of solid.

4. Classify solid geometry in different positions.

5. Assess the two dimensional and three dimensional drawing in CAD software.

6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title : Engineering Chemistry-Lab **Semester : I**

Course Code : HU2L001 **Course Type : Compulsory**

Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

Course Objective:

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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Course Title : Engineering Chemistry-Lab **Semester : I**

Course Code : AI2L002 **Course Type : Compulsory**

Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

Course Objective:

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
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Course Title : Engineering Graphics-Lab **Semester : I**

Course Code : AI2L003 **Course Type : Compulsory**

Pre-requisite : Basics of Graphics Lab **L – T – P : 0 – 0– 4**

Stream :Practical subject **Credits : 2**

COURSE OBJECTIVES:

The objective of the course is to enable students to

1. Provide basic foundation in CAD software.
2. Understand the fundamentals used to create and manipulate geometric models.
3. Get acquainted with the basic CAD software for to design geometric modeling.

COURSE OUTCOMES:

1. Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices

   and display devices to become professionally efficient to operate CAD software.
2. Explain drawing of simple machine component in CAD software.
3. Acquire the knowledge of geometric modeling in CAD software.
4. Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Vision	Mission
To lay a robust foundation for the Institute to reach its Zenith.	▪ Achieving academic excellence through rigorous teaching, learning and evaluation practices. ▪ To develop an ability to apply knowledge of basic science and Mathematics to excel in the field of Engineering. ▪ To provide salutary environment for the betterment of faculty and the students.

Course Title	**Introduction to Drones**	**Semester**	**II**
Course Code	**AI2T009**	**Course Type**	**Compulsory**
Pre-requisite	**Nil**	**L – T – P**	**2 – 0– 0**
Stream	**Theory subject**	**Credits**	**Audit**

Course Objectives

The main aim of this course is to understand the basics of Drones and its various applications. The course will also impart the knowledge of how to fly a drone by considering the rules and regulations to the specific country. Further the students will be introduced to the safety measures to be taken during flight.

Course Outcomes:

Student will be able to

CO1: To introduce the various types of frame design used for the UAV and to accommodate the electronics over the frame to fly UAV.

CO2: To make the students understand the basic working principal behind the electronic components used and its specification to build a drone from scratch.

CO3: To enable the students to identify and understand various functional modules of the controller using a preprogrammed controller used in the UAV.

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Course Title : Basic Civil and Mechanical Engineering **Semester : I**
Course Code : ME1T004 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Graphics **L – T – P : 2 – 0– 0Stream : Theory subject** **Credits : 0 (Audit)**

COURSE OBJECTIVES :

1. To understand the basic stream of Mechanical Engineering and Civil Engineering.
2. To understand the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. To have basic knowledge of Casting, Machining, Designing, Manufacturing, differentmaterials for building construction and surveying.

COURSE OUTCOMES:

Students would be able to

1. Define basic stream of Mechanical & Civil Engineering.
2. Explain the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. Apply Basic knowledge of Casting, Machining, Designing, Manufacturing & CivilConstruction technique.
4. Analyzed the different mechanical system and properties of construction & surveyingmaterial.
5. Interpret the problem in mechanical system and civil structure.
6. Solve the problem in mechanical system and civil structure.

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Vision	Mission
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Course Title : Basics of Electrical and Electronics Engineering **Semester** : II

Course Code : ME2T007 **Course Type** :

Compulsory Pre-requisite : Basic knowledge of Electrical and Electronic **L – T – P**

: 2-0-0Stream : Theory

Subject Credits : 0 (Audit)

COURSE OBJECTIVES

1. To provide a basic information and use of electrical and electronics components.
2. To understand and study the materials used for the preparation of electrical and electronics components.
3. To provide basic knowledge of operation and functionality of electrical and electronicscomponents.

COURSE OUTCOMES:

1. Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics.
2. Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode.
3. Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices.
4. Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations.
5. Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.
6. Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gate.

BoS Chairman

Chairman
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Session : 2021-22

3rd Semester

Name of Subject - Engineering Economics
Subject Code - EE3T001

Course outcome nun	CO statement
CO1	Remember and define basics of the Economics
CO2	Understand Mechanism of Price Fixation
CO3	Identify Time value of Money.
CO4	Analyze and classify basic Factors of Production
CO5	Interpret Indian Economy and Globalization.
CO6	Plan To become Self Employed

Name of Subject - Engineering Mathematics –III
Subject Code - EE3T002

CO1	Remember properties of Laplace transform , Convolution Theorem, Fourier integral theorem , Parseval‟s identity , Cauchy‘s integral theorem , Cauchy‘s residue theorem
CO2	Describe properties of Laplace transform , Convolution Theorem, Fourier integral theorem , Parseval‟s identity , Cauchy‘s integral theorem , Cauchy‘s residue theorem .
CO3	Illustrate the examples using Laplace transform, Fourier Transform, Partial differential equation, Function of Complex Variables, Matrices.
CO4	Apply the knowledge of Laplace transform ,Z-transform, function of complex variable, Advance partial differential equation.
CO5	Analyze the question on Laplace transform, Fourier Transform, Partial differential equation , Function of Complex Variables
CO6	Create a modal using Laplace transform, Fourier Transform, Partial differential equation, Function of Complex Variables, Matrices.

Name of Subject -Fundamentals of Electrical Engineering
Subject Code - EE3T003

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CO1	Remember the basic laws of electric and magnetic circuits also Define various A.C. and D.C Quantities
CO2	Understand and interpret the sinusoidal electrical quantities mathematically as well as graphically in the form of waveforms/phasors and illustrate the 1-phase/3-phase AC circuits.
CO3	Apply knowledge to calculate the power loss, voltage drop of electric and magnetic circuit also identify illumination required and the knowledge related with its need.
CO4	Analyze various electric, magnetic circuit and distinguish between properties
CO5	Evaluate lighting system, recommend various lighting as per requirement also able to Explain A.C. fundamentals.
CO6	Design lighting system and also able to give solutions on single phase, poly phase and magnetic circuit unknown quantities.

Name of Subject -Network Analysis
Subject Code - EE3T004

CO1	Define basic concepts and principles related to Circuit Analysis
CO2	Identify the super mesh & super nodal problems.
CO3	Apply a variety of circuit analysis methods including theorems and Laplace transform
CO4	Solve two port network problems.
CO5	To design and develop network equations and their solutions.
CO6	Select best possible method of circuit analysis for a given situation

Name of Subject -Electrical Machine I
Subject Code - EE3T005

CO1	Recall the basic laws and rules of electromagnetic induction, electric and magnetic circuits.
CO2	Understand constructional features, working principles of electrical machines and explain different types of starting & speed control methods of electric motors.
CO3	Apply knowledge to calculate the power loss, voltage regulation, efficiency of transformer and operating speed of electric motor and choose type of motor, its starting and speed control methods with respect to applications.
CO4	Analyse performance indices, vector diagrams of electrical machines and examine the need of parallel operation, O.C. & S.C. test, Polarity test on transformer, and blocked rotor test on induction motors.
CO5	Evaluate braking methods of DC, and induction motor.

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CO6	Design motoring system able to give solutions for single phase, three phase and DC supply with respect to supply available and load requirements

Name of Subject -Measurement and Instrumentation
Subject Code - EE3T006

CO1	Remember the different types of instruments used in electrical measurements.
CO2	Understand the operating principles of various electrical measuring instruments.
CO3	Apply knowledge of variety of instruments available for required parameter and identify the appropriate one.
CO4	Analyze and classify different electrical measuring instruments on basis of type of electrical/ physical quantity to be measured.
CO5	Evaluate different electrical measuring instruments
CO6	Test and solve various problems on electrical measuring instruments

Name of Subject - Universal Human Values -II
Subject Code - EE3T007

CO1	Students are expected to become more aware of their surroundings, society, social problems and their sustainable solutions, while keeping human relationships and human nature in mind.
CO2	They would have better critical ability.
CO3	They would also become sensitive to their commitment towards what they believe in (humane values. Humane relationships and humane society).
CO4	they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Name of Subject - Network Analysis Lab
Subject Code - EE3L004

CO1	Define basic concepts and principles related to Circuit Analysis
CO2	Identify the super mesh & super nodal problems
CO3	Verifies principles of network
CO4	Solve two port network problems
CO5	To Analyze RLC Circuit

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Name of Subject - Electrical Machine I Lab
Subject Code - EE3L005

CO1	The basic principle of transfer of electrical power, operation, construction of Single phase and Three phase transformers, their classification, connections and phasor diagrams.
CO2	The basic principle, construction, operation, Performance characteristics, steady state analysis and applications of DC generators and motors.
CO3	The basic principle, construction, operation, Performance characteristics, steady state analysis, Speed control and applications of Single Phase and Three phase Induction motors.

Name of Subject - Measurement and Instrumentation Lab
Subject Code - EE3L006

CO1	Choose correct instrument for measuring given electrical/ physical quantity.
CO2	Compare various methods and instruments available for measurement of single quantity..
CO3	Apply understanding about instrumentation concepts which can be applied to electrical measurements.
CO4	Analyse the testing and measuring set up for electrical systems
CO5	Evaluate efficiency of different instruments
CO6	Design circuit for measuring given quantity

4th Semester

Name of Subject - Numerical method and probability
Subject Code - EE4T001

CO1	Define approximation and errors in numerical differentiation and Integration.
CO2	Evaluate the roots of the equation using Bracketing methods: Bisection methods, Open methods: Newton Raphson method
CO3	Apply the Cramer‘s rule, Gauss- Elimination Method, pivoting, scaling, Heun‘s method, Runge–Kutta Method,to engineering problem.
CO4	Analyze the question Newton‘s Cotes Integration Formulas: Trapezoidal Rule, Simpson‘s rule, engineering applications Numerical differentiation using Finite divide Difference method.
CO5	Compute the linear and non linear equation, regression, Interpolation and ordinary differential equation using MATLAB programming
CO6	Develop computer program for linear and non linear equation

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Name of Subject - Power Station Practice
Subject Code - EE4T002

CO1	Remember the basic operations of various power plants.
CO2	Understand and interpret the requirements and basics of power plant installation and site selection.
CO3	Apply knowledge to Economic Operation of Power Systems and the knowledge related with its need.
CO4	Analyze various electric power plants operations and distinguish between properties.
CO5	Evaluate thermal, hydro, nuclear, gas power plant also able to Explain its fundamentals.
CO6	Design Economic Operation of Power Systems and also able to give solutions implementation of power plant on its basics.

Name of Subject - Electronic Devices and circuits
Subject Code - EE4T003

CO1	Understand the characteristics of the p-n junction, the diode and some special function diodes and these diodes‘ application in electronic circuits
CO2	Familiarize the operation and applications of transistor like BJT .
CO3	Develop design competence in power amplifiers using BJT.
CO4	Apply the knowledge of amplifier in order to Design various differential amplifier
CO5	Design Various Oscillator Circuits and Understand the concept of FETs as well as MOSFETs
CO6	Apply the knowledge of Digital Electronics in order to develop the truth tables for various logic Gates

Name of Subject - Power System I
Subject Code - EE4T004

CO1	To define basic components of power system and remember the structure of power system
CO2	To understand the working of transmission and distribution system and relate the different parameters of transmission and distribution system
CO3	To do Modeling and representation of the system component used in power system
CO4	To Analyze the per unit system of power system

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CO5	To select the proper parameter of power system and determine the value of inductance, capacitance, voltage regulation and efficiency of transmission line and explain the effect of sag and corona on transmission line.
CO6	To create the structure of power system with suitable components and improve the efficiency of power system

Name of Subject - Electrical Machine II
Subject Code - EE4T005

CO1	Define voltage regulation, load torque angle and MMF of windings.
CO2	Classify reactances under transient conditions and effects of variable excitation.
CO3	Apply the method of synchronous impedance and Potier triangle to find voltage regulation.
CO4	Develop phasor diagram of three phase synchronous machine.
CO5	Analyze the V curves and effects of excitation and load on motor operation
CO6	Compare various methods of cooling in synchronous machine.

Name of Subject - Innovation and entrepreneurship Development
Subject Code - EE4T007

CO1	Discover the creative / innovative side within her/him
CO2	Hone entrepreneurial and leadership skills within his/her personality.
CO3	Develop new ways of thinking and Learn the entire innovation cycle from Ideation to
CO4	GoToMarket.
CO5	Study frameworks, strategies, techniques and business models for conceived ideas.
CO6	Develop skills for evaluating, articulating, refining, and pitching a new product or service.

Name of Subject - Electrical Machine II Lab
Subject Code - EE4L005

CO1	Performance characteristics of synchronous machines using direct and indirect methods
CO2	Regulation of three phase alternator using the predetermination methods
CO3	Saliency nature of synchronous machine
CO4	Starting and Speed control of ac machines

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CO5	Synchronization of two three phase alternators
CO6	Measurement of impedances and short circuit ratio of alternator

5th Semester

Name of Subject - Power Electronics
Subject Code - EE5T001

CO1	To remember the principle of operation of various basic semiconductor devices
CO2	To understand the characteristics of various types of semiconductor device and its working as converters.
CO3	To make use of various semiconductor device for the converters operation under various load types.
CO4	Examine the performance of various types of converters.
CO5	Compare various types of converters based on performance parameter.
CO6	To design the converters based on real time industrial applications.

Name of Subject - Control System I
Subject Code - EE5T002

CO1	To remember the basic concept of control system, types & effect of Feedback
CO2	To apply Block diagram and Signal flow graph technique
CO3	To apply knowledge for Time domain analysis.
CO4	To analyze the stability of a system & to construct Root Locus
CO5	To apply knowledge for Frequency domain analysis.
CO6	To construct state model of a system

Name of Subject - Power System II
Subject Code - EE5T003

CO1	Define the different parameters of power system operation.
CO2	Illustrate the different parameters of power system operation and control.
CO3	To identify the different issues related to power systems
CO4	Analyze the different solution methods related to power system ..
CO5	Choose amongst the different analytical & numerical methods for power flow solutions.
CO6	Solve the different problems related to cost load flow, fault, reactive power and Stability constraints in the power systems

Name of Subject - Elective I (Renewable Energy System)

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Subject Code EE5E001(A)

CO1	To define basic properties of different renewable sources of energy and technologies for their utilization.
CO2	Describe main elements of technical systems designed for utilization of renewable sources of energy
CO3	Interpret advantages and disadvantages of different renewable sources of energy
CO4	Undertake simple analysis of energy potential of renewable sources of energy
CO5	Interpret the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.
CO6	Discuss the economics of harnessing energy from renewable energy sources.

Name of Subject - Elective I (Electromagnetic Field)
Subject Code - EE5E001(B)

CO1	Remember, Understand Scalars & vector analysis, vector and scalars conversion for different coordinate system.
CO2	Apply Gauss law, Divergence theorem to electric field intensity.
CO3	Apply Faradays law of electromagnetic induction (as a component of Maxwell‘s equations) to solve and analyze problems of Performance and behavior of electromechanical devices such as Motors, Generators and Transformers.
CO4	Apply effective analysis tool like Poisson's and Laplace equations to current, current density, dielectrics and capacitances.
CO5	Analyze& Apply Biot-Savorts law.
CO6	Solve & Analyze problems of Capacitance of parallel plate capacitor, Capacitance of two wire line, Poissons.

Name of Subject - Elective I (Introduction to Special Machines)
Subject Code - EE5E001 C

CO1	Remember basic principles of some special electrical machines.
CO2	Understand the basics of construction & principle of operation of special electrical machines.
CO3	Identify the different operational characteristics related to the special electrical machines.
CO4	Analyze the performance indices of special electrical machines.
CO5	Evaluate the operation & characteristics of special electrical machines.
CO6	Solve the different problems related to operation, supply conversion & performance indices of special electrical machines.

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Name of Subject - Elective I (Electrical Power Utilization & Practice)
Subject Code - EE5E001(D)

CO1	The students should be able to understand the process and application of different types of Electric Heating equipments.
CO2	The students should be able to understand the process and application of different types of Welding equipments.
CO3	Students should be able to understand basics of illumination and working principles of different light sources.
CO4	The students shall be able to apply the fundamentals of illumination systems for lighting design for indoor/ outdoor installations for residential/ commercial and industrial applications.
CO5	The students should be able to understand the working principles and applications for various electrolytic processes for industrial applications.
CO6	The students should be able to understand the Refrigeration cycle process and electrical circuit used in different cooling system.

Name of Subject - Elective II(Advance Renewable Energy System)
Subject Code -EE5E002(A)

CO1	To Define the principle of energy conversion technique from biomass, geothermal and hybrid energy systems.
CO2	To Summarize the effects of air pollution and ecosystems Unit Contents Contact
CO3	To Identify the essential characteristics and technical requirements of photovoltaic and biomass energy systems.
CO4	To Analyze the need of various forms of non conventional energy sources, historical and latest developments
CO5	Illustrate design of biogas, geothermal and hybrid power plant.
CO6	Discuss about the environmental aspects of renewable energy resources.

Name of Subject - Elective II(Analog Digital Electronics)
Subject Code -EE5E002(B)

CO1	Understand the operation and analyze the characteristics of semiconductor diodes, MOSFET, and BJT
CO2	Examine and design electronic circuits containing non-linear elements such as diodes, MOSFET, & BJT using the concepts of biasing, load lines, operating point and incremental analysis

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CO3	Apply feedback techniques in amplifier and examine its effect on parameters of amplifiers (ex. Gain, bandwidth, i/p and o/p impedance, etc) and the stability of amplifier
CO4	Design different combinational circuits for various applications
CO5	Design various sequential circuits for different applications
CO6	Design and verify digital systems using combinational and sequential circuits

Name of Subject - Elective II(Electrical Machine Design)
Subject Code -EE5E002 C

CO1	Remember appropriate ratings, material, heating and cooling time constants.
CO2	Understand magnetic, electric materials, windings and transformers.
CO3	Apply concepts in design of electrical apparatus, devices and computer aided designing of transformer.
CO4	Analyze different materials, windings and modes of heat generation and heat dissipation in electrical machines.
CO5	Evaluate fault parameters in windings, voltage regulation and efficiency in transformer.
CO6	Design different types of transformers, heating coils and field coils.

Name of Subject - Elective II(Electrical Installation & Design)
Subject Code -EE5E002(D)

CO1	To Define various terms related to electrical installation system.
CO2	To Illustrate methods of installation, testing and commissioning of electrical apparatus and conductors.
CO3	To Apply knowledge to design the distribution system for residential, commercial, industrial applications and utility distribution networks and illumination design.
CO4	To Examine fault level at various locations in radial networks and be able to find rating and location of series reactors.
CO5	Design single line diagrams with specifications for distribution networks, motor and power control centers for industrial installations and design reactive power compensation.
CO6	Understand the fundamental principles for the design and installation of associated protective systems relating to electrical installations and understand the fundamental transformer testing and recognizes the limits of acceptance of each test.

Name of Subject -Open Elective I - Electrical Safety & Management

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Subject Code -EE5O001

CO1	Explain the objectives and precautions of Electrical Safety, effects of Shocks and their Prevention.
CO2	Summarize the Safety aspects during Installation of Plant and Equipment.
CO3	Describe the electrical safety in residential, commercial and agricultural installations..
CO4	Describe the various Electrical Safety in Hazardous Areas, Equipment Earthing and System Neutral Earthing.
CO5	State the electrical systems safety management and IE rules.

Name of Subject - Open Elective I - Industrial Instrumentation
Subject Code -EE5O001

CO1	Select the instruments for measurement of various physical quantities,
CO2	Select a transducer based on its operating characteristics for the required application.
CO3	Check various available techniques and select appropriate to obtain satisfactory task for the parameter to be measured.
CO4	Know advantages and limitations of selected techniques.

Name of Subject -Consumer Affairs
Subject Code -EE5T004

CO1	Familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.
CO2	It also provide an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards.
CO3	The student should be able to comprehend the business firms‘ interface with consumers and the consumer related regulatory and business environment.

Name of Subject -Power Electronics Lab
Subject Code -EE5L001

CO1	To remember the principle of operation of various basic semiconductor devices
CO2	To understand the characteristics of various types of semiconductor device and its working as converters.
CO3	To make use of various semiconductor device for the converters operation under various load types.

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CO4	Examine the performance of various types of converters.
CO5	Compare various types of converters based on performance parameter.
CO6	To design the converters based on real time industrial applications

Name of Subject -Control System I Lab
Subject Code -EE5L002

CO1	To remember the basic concept of control system, types & effect of Feedback
CO2	To apply Block diagram and Signal flow graph technique
CO3	To apply knowledge for Time domain analysis.
CO4	To analyze the stability of a system & to construct Root Locus
CO5	To apply knowledge for Frequency domain analysis.
CO6	To construct state model of a system

Name of Subject -Power System II Lab
Subject Code -EE5L003

CO1	Define the different parameters of power system operation.
CO2	Illustrate the different parameters of power system operation and control.
CO3	CO3 To identify the different issues related to power systems
CO4	CO4 Analyze the different solution methods related to power system ..
CO5	CO5 Choose amongst the different analytical & numerical methods for power flow solutions.
CO6	CO6 Solve the different problems related to cost load flow, fault, reactive power and Stability constraints in the power systems

6th Semester

Name of Subject - Microprocessor and microcontroller
Subject Code -EE6T001

CO1	To remember the architecture of 8085 and 8051.
CO2	To understand interfacing and interrupt features of 8085 and 8051.
CO3	To develop program for basic applications
CO4	To distinguish and analyze the properties of Microprocessors & Microcontrollers
CO5	To explain programming logic and concepts of 8085 microprocessors and 8051 micro-controller.

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CO6	To build strong foundation for designing real world applications using microprocessors and microcontrollers

Name of Subject - Advance Control System
Subject Code -EE6T002

CO1	To remember the basic concepts of compensation, State va-riable analysis, Non linear Control System, Digital Control system.
CO2	To understand the basic concepts of compensation, State variable analysis, Nonlinear Control System, Digital Control system.
CO3	To apply different concepts to find controllability, observa-bility and stability of non-linear control system, sampled data control system.
CO4	To analyze continuous time system using state space tech-nique and investigate Controllability and Observability of the system, digital systems using the Z-transformation, and nonlinear system using the describing function technique and phase plane analysis
CO5	To evaluate various parameters of continuous time system, digital systems using the Z-transformation, and nonlinear system using various methods.
CO6	To design controllers to achieve desired specification

Name of Subject - Elective III- Electrical Energy Conservation &Audit
Subject Code- EE6E003(A)

CO1	Know Present energy scenario with need of energy audit and energy conservation.
CO2	Classify and Manage electric and thermal energy in the industry.
CO3	Identify various aspects of energy audit such as planning, monitoring and implementation
CO4	Analyze the energy flow diagram of an industry and identify the energy wasted or a waste stream.
CO5	Evaluate the techno economic feasibility of the energy conservation technique adopted.
CO6	Choose appropriate energy conservation method to reduce the wastage of energy

Name of Subject - Elective III- Linear Electronic Circuits
Subject Code -EE6E003(B)

CO1	To understand characteristics of IC and Op-Amp and identify the internal structure.
CO2	To introduce various manufacturing techniques.

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CO3	To study various op-amp parameters and their significance for Op-Amp.
CO4	To learn frequency response, transient response and frequency compensation techniques for Op-Amp.
CO5	To analyze and identify linear and nonlinear applications of Op-Amp.
CO6	To understand functionalities of PLL.

Name of Subject - Elective III- Introduction to AC and DC Drive
Subject Code -EE6E003(C

CO1	Examine factors governing selection of Electric Motors like speed torque characteristics under starting, running, and braking for particular application in a common electric drive system.
CO2	Select motor rating, Flywheel of common drive motors for continuous and intermittent periodic duties.
CO3	Analyze control circuit of ac/dc contactors and relays for automatic starting and braking of ac/dc motors.
CO4	Analyze the performance and suitability of motors used in ac/dc traction, their performance characteristic, and control and braking.
CO5	Apply digital control of electric motor, plc programming in electrical drives.
CO6	Examine factors governing selection of Electric Motors like speed torque characteristics under starting, running, and braking for particular application in a common electric drive system.

Name of Subject - Elective III- Electrical Power Distribution System
Subject Code -EE6E003(D)

CO1	Remember basic principles of distribution systems and reliability indices.
CO2	Understand the principle of operation of feeder, substation and data acquisition system.
CO3	To identify the different factors related to distribution systems.
CO4	Analyze the effect of various equipments on voltage control and substation protection requirements.
CO5	Evaluate voltage drop, power loss and line drop in distribution system
CO6	Solve different problems related to radial networks, reactive power requirements and substation protection

Name of Subject - Elective IV- Solar Photovoltaic Devices
Subject Code -EE6E004(A)

CO1	Calculate and analyse solar insolation on a collecting surface by locating the sun position at anygiven location and time, interpret sun path diagrams.

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CO2	Interpret I-V curves from the circuit model of a PV cell, understand the impact of temperature andsolar insolation on I-V curves.
CO3	Evaluate the algorithms used for the maximum power point tracking of PV array.
CO4	Understand the principle of DC-AC power conversion in Grid connected PV system
CO5	Design standalone PV system by estimating the load, sizing and selecting the batteries, sizing and
CO6	Selecting the PV modules and other components

Name of Subject - Elective IV- High Power Semiconductor Devices
Subject Code -EE6E004(B)

CO1	To remember the principle of operation of various Power switching devices
CO2	To Understand the characteristics of various types of Power switching devices
CO3	To make use of steady state and dynamic models of Power switching devices
CO4	To analyse various types of Thermal Protection required for protection of Power switching devices
CO5	To compare various Thermal Protections and firing protection Circuits of Power switching devices
CO6	To design the Firing and Protecting Circuits for various Power switching devices.

Name of Subject - Elective IV- Power Semiconductor Based Drive
Subject Code -EE6E004 C

CO1	Remember fundamental principles of power electronics and electric drives.
CO2	Understand the basics of construction & principle of operation ofvarious electric drives.
CO3	Apply suitable control methods to different motor drives.
CO4	Analyze the output of conventional drives and semiconductor based drives.
CO5	Evaluate the power factor, harmonics and ripple in motor current.
CO6	Solve the problems related starting, braking and speed control of motor drives.

Name of Subject - Elective IV- High Voltage DC transmission(HVDC)
Subject Code -EE6E004(D)

CO1	Remember basic principles of some HVDC Systems.

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CO2	Understand the basics of HVDC Systems and their implementation.
CO3	To identify the different operational characteristics related to HVDC Systems.
CO4	Analyze the performance of HVDC Systems.
CO5	Evaluate the operation & characteristics of HVDC Systems.
CO6	Solve the different problems related to operation of HVDC Systems.

Name of Subject - Open Elective II- Electrical AUTOCAD
Subject Code -EE6O002

CO1	Understand the concept and techniques of Engineering drawing and become familiar with the AutoCAD user in-terface.
CO2	Apply basic CAD concepts to develop and construct accu-rate 2D geometry through creation of basic geometric con-structions.
CO3	Create advanced drafting and modifying tools in Auto-CAD
CO4	Apply elements of drafting such as layers, dimensions, hatching, annotation, drawing formats, and 2D figures in projects with a focus on ANSI industry standards.
CO5	Create blocks and attributes in AutoCAD
CO6	Understand the concept and techniques of Engineering drawing and become familiar with the AutoCAD user in-terface.

Name of Subject -Open Elective II- Smart Grid Technology
Subject Code -EE6O002

CO1	Explain the objectives and precautions of Electrical Safety, effects of Shocks and their Prevention.
CO2	Summarize the Safety aspects during Installation of Plant and Equipment.
CO3	Describe the electrical safety in residential, commercial and agricultural installations.
CO4	State the electrical systems safety management and IE rules.
CO5	Explain the objectives and precautions of Electrical Safety, effects of Shocks and their Prevention.

Name of Subject -Research Methodology
Subject Code -EE6T003

CO1	Remember the basic framework of research process.
CO2	Demonstrate various sources of information for research.
CO3	Develop an understanding of various research design and techniques.
CO4	Compare various sources of information for literature review and data collection.

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CO5	Interpret the fundamental functions and working of analytical instruments used in research.
CO6	Discuss different methodologies and techniques used in research work.

Name of Subject -Microprocessor and microcontroller Lab
Subject Code -EE6L001

CO1	To remember the architecture of 8085 and 8051.
CO2	To understand interfacing and interrupt features of 8085 and 8051.
CO3	To develop program for basic applications
CO4	To distinguish and analyze the properties of Microprocessors & Microcontrollers
CO5	To explain programming logic and concepts of 8085 microprocessors and 8051 micro-controller.
CO6	To build strong foundation for designing real world applications using microprocessors and microcontrollers.

Name of Subject -Computer Aided Design Lab
Subject Code -EE6L003

CO1	Understand the concept and techniques of Engi-neering drawing and become familiar with the AutoCAD user interface.
CO2	Apply basic CAD concepts to develop and con-struct accurate 2D geometry through creation of basic geometric constructions.
CO3	Create advanced drafting and modifying tools in AutoCAD
CO4	Apply elements of drafting such as layers, di-mensions, hatching, annotation, drawing formats, and 2D figures in projects with a focus on ANSI industry standards.
CO5	Create blocks and attributes in AutoCAD
CO6	Understand the concept and techniques of Engi-neering drawing and become familiar with the AutoCAD user interface.

7th Semester

Name of Subject -POWER SYSTEM OPERATION AND CONTROL
Subject Code - BTEEC701

CO1	Explain the fundamental concept of power system.
CO2	Design the mathematical model of synchronous machine.
CO3	Design the mathematical model Excitation system and speed governing system.
CO4	Analyze the transient stability of power system using swing equation and equal area criteria.
CO5	Analyze the economic operation of power system.

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CO6	Explain the methods of Voltage control.

Name of Subject -HIGH VOLTAGE ENGINEERING
Subject Code - BTEEC702

CO1	Illustrate the concept of electric field stresses, applications of insulating materials and methods for Non-destructive bushings, lightning arrestors, cables, circuit breakers and surge diverters.testing of equipment like transformers, insulators, isolators,
CO2	Explain the breakdown process in solid, liquid, and gaseous materials
CO3	Analyze methods for generation and measurement of High Voltages and Currents (both ac and dc)
CO4	Describe the phenomenon of over-voltage and choose appropriate insulation coordination levels based on IS & IEC Standards.

Name of Subject -ELECTRICAL DRIVES
Subject Code - BTEEC703

CO1	Analyze the dynamics of Electrical Drives system.
CO2	Use various control techniques for controlling the speed of AC and DC motors.
CO3	Analyze the AC and DC drives.
CO4	To Select/recommend the appropriate Drive according to the particular applications.
CO5	State the recent technology of AC and DC drive

Name of Subject -SPECIAL PURPOSE ELECTRICAL MACHINES
Subject Code -BTEEE704

CO1	Demonstrate construction, working principle, and application of various types of special purpose electrical machines
CO2	Select a special Machine for a particular application
CO3	Demonstrate behaviour of induction generator and induction machine.

Name of Subject -ELECTRIC TRACTION & UTILIZATION
Subject Code -BTEEE704

CO1	Identify types of Traction System.
CO2	Interprete Various Power supply in Electric Traction.
CO3	Analyze Various Traction Motors.
CO4	Define methods of Traction motor Control.
CO5	Elobrate Train movement & Breaking in Traction system.
CO6	Classify the indoor and outdoor Illumination system.

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Name of Subject -Engineering System Design and Optimization
Subject Code -BTEEE704

CO1	To understand different level optimization problem formulation.
CO2	To study novel methods in optimization.
CO3	To understand and develop genetic algorithm for engineering problems.

Name of Subject -Financial Management
Subject Code -BTEEE704

CO1	The students would be able to understand and define basic terminology used in finance and accounts
CO2	The students would be able to prepare& appraise Financial Statements and evaluate a company in the light of different measurement systems.
CO3	The students would be able to analyze the risk and return of alternative sources of financing.
CO4	Estimate cash flows from a project, including operating, net working capital, and capital spending.
CO5	To estimate the required return on projects of differing risk ,to estimate the cash flows from an investment project, project, and make a recommendation to accept or reject the projectcalculate the appropriate discount rate, determine the value added from the
CO6	To describe and illustrate the important elements in project finance Using financial calculator and Excel in a variety of problems.

Name of Subject -DIGITAL SIGNAL PROCESSING
Subject Code - BTEEE705

CO1	Represent signals, systems and digital processing of analog signals.
CO2	Represent discrete time signals, systems and analysis of Discrete-Time Linear Time-Invariant Systems.
CO3	Apply digital signal processing techniques to analyze discrete time signals in time domain.
CO4	Apply digital signal processing techniques to analyze discrete time signals in frequency
CO5	Design different filter structure
CO6	Validate system functionality and evaluate results.

Name of Subject -Energy Audit and Conservation

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Subject Code - BTEEE705

CO1	To recognize Global Environmental Issues and Role of Renewable & non-conventional energy sources
CO2	To estimate Energy efficiency opportunities in Thermal- Mechanical Systems and Electrical System.
CO3	To analyze Energy Conservation Proposals economically and prepare audit reports.

Name of Subject -ELECTRICAL POWER QUALITY
Subject Code - BTEEE705

CO1	To study the various power quality issues, their production, monitoring and mitigation.
CO2	To study the various power quality standards.
CO3	To study various power quality monitoring methods.
CO4	To apply appropriate solution techniques for power quality Problems.

Name of Subject -HVDC TRANSMISSION AND FACTS
Subject Code - BTEEE705

CO1	To understand importance, configuration and types of HVDC transmission.
CO2	To analyst the operation of HVDC converter, system control and protection.
CO3	To understand the concept of FACTS, their role, type and functionality.
CO4	To analyze the operation of static series and shunt compensator.

Academic Incharge

HOD EE

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Course outcome-2021-22

Course Title : Engineering Mathematics-1 **Semester : I**

Course Code : MA1T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematics **L – T – P : 3 – 1– 0**

Stream : Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe rank, Bernoulli's theorem, Taylor's and Maclaurin's theorems for functions of two variables, – Euler's Theorem for functions containing two and three variables, Lagrange's theorem
2. Illustrate the examples of ordinary differential equation, partial differential equation, matrices.
3. Solve questions related to ordinary differential equation, partial differential equation, matrices and their applications.
4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, and their applications to real world problems.
5. Interpret the results of matrices, ordinary differential equation, partial differential equation and their applications.
6. Design a method or modal on matrices, ordinary differential equation, and partial differential equation.

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Course Title : Introduction To Computer Programming **Semester : I**

Course Code : HU1T002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 2 – 0– 0**

Stream : Theory subject **Credits : 2**

Course Objectives:

1. To understand the importance of Programming
2. To understand the application of C Programming.
3. To investigate the key concepts of C Programming.
4. To enable students build a applications based on C programming.

Course Outcome:

CO1: Define the algorithms, flowcharts, array , pointer, structure ,function , python.

CO2: Discuss and differentiate between variables , operators ,statements , loops, array dimensions.

CO3:Demonstrate working programs using functions, loops ,conditional statements ,array ,pointer, structure and files in C and python language .

CO4:Distinguish between different steps of programming and prioritize levels of programming.

CO5:Find errors and predict outcome in C and python programming.

CO6:Compose and develop any application using C and python programming.

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Course Title : Engineering Physics **Semester : II**

Course Code : AI1T005 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Physics **L – T – P : 3 – 1– 2**

Stream : Core **Credits : 4**

Objectives:-

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2. To understand and study the Physics principles behind the developments of engineering materials.
3. To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

Outcomes

1. Acquire fundamental understanding of concepts specifically concern to Ultrasonic, Dielectrics, Laser, optical fibre, Electron Optics, Quantum Mechanics, Crystal Structure, Electrodynamics, Magnetics and SemiconductingMaterials and their engineering applications.
2. Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering Physics.
3. To develop a systematic, logical approach to problem – solving that can be applied to problems in physics and to problems in general.

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Course Title : Energy and Environment Engineering **Semester : I**

Course Code : AI1T006 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Environment **L – T – P : 3 – 0– 0**

Stream : Theory subject **Credits : 3**

COURSE OBJECTIVES

1. To understand the importance of Energy and Environment
2. To understand the application of energy saving tool in real life.
3. To investigate the key concepts of Energy and Environment

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.
2. Understand the importance of ecosystem for human beings..
3. Discover innovative method of power generation.
4. Correlate the cost of various method of power generation.
5. Judge the quality of air.

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Course Title : Introduction To Computer Programming (LAB) **Semester : I**

Course Code : HU1L002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 0 – 0– 4**

Stream :Theory subject **Credits : 2**

Course Objective

1. To introduce students to the basic knowledge of programming fundamentals of C language.
2. To impart writing skill of C programming to the students and solving problems.
3. To impart the concepts like looping, array, functions, pointers, file, structure

COURSE OUTCOME

After completing this lab course you will be able to:

1. Understand the logic for a given problem.
2. Write the algorithm of a given problem.
3. Draw a flow chart of a given problem.
4. Recognize and understand the syntax and construction of C programming code..
5. Make use of different data-structures like arrays, pointers, structures and files.
6. Know the alternative ways of providing solution to a given problem.

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Course Title : Workshop Practices **Semester : I**

Course Code : WS1L001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of workshop **L – T – P : 0 – 0– 4**

Stream : Practical subject **Credits : 2**

Instructions to the student:

Each student is required to maintain a „workshop journal" consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job.

Contents:

a) **Carpentry:** Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.

b) **Welding:** Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.

c) **Fitting:** Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation.

e) Machine shop: Lathe machine, types of lathes, major parts, cutting tool, turning operations (Demo), safety precautions

List of Practical:

1. Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.

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Course Title : Engineering Physics-Lab **Semester : I**

Course Code : AI1L005 **Course Type : Compulsory**

Pre-requisite : Basics of Physics Practical **L – T – P : 0 – 0– 2**

Stream :Core subject **Credits : 1**

Course Objective:

Students will be able to

1. Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques and graphical analysis to the experimental data
5. Develop the skills to identify various parts of the apparatus used in the experiment in laboratory.
6. Design and apply the practical knowledge of engineering physics in daily life

Course Outcome:

Students will be able to

1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber and electric and magnetic field.
2. Understand the working principles of Semiconducting devices and their application.
3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and optical systems
4. Analyze the different crystal structure with the help of crystal models.
5. Construct the various devices based on optical phenomenon.
6. Design the frame work of various electronic circuitries based on semiconducting materials.

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Course Title : Introduction to A I & Its Application **Semester : I**

Course Code : AI1T008 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematical Logic **L – T – P : 2 – 0– 0**

Stream : Theory subject **Credits : Audit**

COURSE OBJECTIVES

1. To understand the importance of AI and use of AI tools
2. To understand the application of AI in engineering and in real life.
3. To investigate the key concepts of knowledge representation and different notations.
4. To enable students to analyze a problem so that appropriate problem solving techniques may be applied.

COURSE OUTCOMES

Upon successful completion of this course student will able :

1. To understand the basics of Artificial Intelligence , Intelligent Agents and its structure
2. To Apply various searching techniques of Problem solving
3. To Acquire theoretical knowledge about principles for logic-based representation and reasoning
4. To Participate in the design of systems that act intelligently and learn from experience
5. To Understand the relation between AI & various domains

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Course Title : Communication Skills **Semester : I**

Course Code : HU2T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of English **L – T – P : 2 – 0– 0**

Stream :Theory subject **Credits : 2**

Course Objectives:

The main objective of the subject is to enhance the employability skills of engineering studentsas well as communication skills at work place.

The sub-objectives are:

1) To develop students' reading skills and pronunciation.
2) To develop technical communication skills through drafting, letter writing, and précis writing.
3) To develop literary skills through essay writing.
4) To develop public speaking skills of the students.
5) To expose the students to the ethics of English language by teaching grammar

Course Outcomes:

At the end of the course students will be able to

1) to better reading comprehension, pronunciation, and functional English grammar.
2) to write letters and resumes
3) to organize their thoughts for effective presentation and writing.
4) to learn skills to present themselves well in an interview, and handle a Group Discussion

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Course Title : Engineering Chemistry **Semester : II**

Course Code : AI2T002 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Chemistry
2. To understand the application of Chemistry in engineering and in real life.
3. To investigate the key concepts of Chemistry knowledge
4. To enable students to analyze a Chemistry problem so that appropriate problem solving techniques maybe applied.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe various properties of water, nanomateral, transition metal ions and their magnetic properties, Debye-Hückel theory, Quinonoid theory, various electrode, spectro photometric techniqes .
2. Illustrate the various types of water, carbon nano tubes, Molecular orbital theory,Transport number by Moving Boundary method, Ostwald's theory of acid-base indicator, various batteries, UV and NMR
3. Analyze the question on water characteristics, electrochemistry and various types of instrumental titration,various unknown sample by UV and NMR spectroscopy .
4. Apply the Knowledge of zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept, spectroscopic techniques.
5. Develop a Modal on softening of water, standardization of acid and base by various instruments, doping on band structure, spectroscopic techniques.
6. Organize water as per quality, carbon nano tubes, electrodes, Energy level diagramsof diatomic molecules, various elements as per their spectroscopic techniques.

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Course Title : Engineering Graphics **Semester : I**

Course Code : AI2T003 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Graphics **L – T – P : 1 – 0– 0**

Stream :Practical subject **Credits : 1**

COURSE OBJECTIVES

1. To understand the concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient

2. To understand theory of projection and simple machine parts in first and third angle of projection systems.

3. To understand the key concepts CAD software.

4. To enable students to analyze a 2-dimensional & 3-dimensional problem.

COURSE OUTCOMES:

1. Define various concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient.

2. Interpret drawings of simple machine component in first and third angle of projection systems

3. Apply theory of projections in projection of lines, projection of planes and projection of solid.

4. Classify solid geometry in different positions.

5. Assess the two dimensional and three dimensional drawing in CAD software.

6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title : Engineering Chemistry-Lab **Semester : I**

Course Code : HU2L001 **Course Type : Compulsory**

Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

Course Objective:

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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Course Title : Engineering Chemistry-Lab **Semester : I**

Course Code : AI2L002 **Course Type : Compulsory**

Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

Course Objective:

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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Vision	Mission
To lay a robust foundation for the Institute to reach its Zenith.	▪ Achieving academic excellence through rigorous teaching, learning and evaluation practices. ▪ To develop an ability to apply knowledge of basic science and Mathematics to excel in the field of Engineering. ▪ To provide salutary environment for the betterment of faculty and the students.

Course Title : Engineering Graphics-Lab **Semester : I**

Course Code : AI2L003 **Course Type : Compulsory**

Pre-requisite : Basics of Graphics Lab **L – T – P : 0 – 0– 4**

Stream :Practical subject **Credits : 2**

COURSE OBJECTIVES:

The objective of the course is to enable students to

1. Provide basic foundation in CAD software.
2. Understand the fundamentals used to create and manipulate geometric models.
3. Get acquainted with the basic CAD software for to design geometric modeling.

COURSE OUTCOMES:

1. Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices

   and display devices to become professionally efficient to operate CAD software.
2. Explain drawing of simple machine component in CAD software.
3. Acquire the knowledge of geometric modeling in CAD software.
4. Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title	**Introduction to Drones**	**Semester**	**II**
Course Code	**AI2T009**	**Course Type**	**Compulsory**
Pre-requisite	**Nil**	**L – T – P**	**2 – 0– 0**
Stream	**Theory subject**	**Credits**	**Audit**

Course Objectives

The main aim of this course is to understand the basics of Drones and its various applications. The course will also impart the knowledge of how to fly a drone by considering the rules and regulations to the specific country. Further the students will be introduced to the safety measures to be taken during flight.

Course Outcomes:

Student will be able to

CO1: To introduce the various types of frame design used for the UAV and to accommodate the electronics over the frame to fly UAV.

CO2: To make the students understand the basic working principal behind the electronic components used and its specification to build a drone from scratch.

CO3: To enable the students to identify and understand various functional modules of the controller using a preprogrammed controller used in the UAV.

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Course Title : Basic Civil and Mechanical Engineering **Semester : I**
Course Code : ME1T004 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Graphics **L – T – P : 2 – 0– 0Stream : Theory subject** **Credits : 0 (Audit)**

COURSE OBJECTIVES :

1. To understand the basic stream of Mechanical Engineering and Civil Engineering.
2. To understand the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. To have basic knowledge of Casting, Machining, Designing, Manufacturing, differentmaterials for building construction and surveying.

COURSE OUTCOMES:

Students would be able to

1. Define basic stream of Mechanical & Civil Engineering.
2. Explain the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. Apply Basic knowledge of Casting, Machining, Designing, Manufacturing & CivilConstruction technique.
4. Analyzed the different mechanical system and properties of construction & surveyingmaterial.
5. Interpret the problem in mechanical system and civil structure.
6. Solve the problem in mechanical system and civil structure.

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An Autonomous Institute, with NAAC "A" Grade
Department of Basic Science & Humanities

Vision	Mission
To lay a robust foundation for the Institute to reach its Zenith.	▪ Achieving academic excellence through rigorous teaching, learning and evaluation practices. ▪ To develop an ability to apply knowledge of basic science and Mathematics to excel in the field of Engineering. ▪ To provide salutary environment for the betterment of faculty and the students.

Course Title : Basics of Electrical and Electronics Engineering **Semester** : II

Course Code : ME2T007 **Course Type** :

Compulsory Pre-requisite : Basic knowledge of Electrical and Electronic **L – T – P**

: 2-0-0Stream : Theory

Subject Credits : 0 (Audit)

COURSE OBJECTIVES

1. To provide a basic information and use of electrical and electronics components.
2. To understand and study the materials used for the preparation of electrical and electronics components.
3. To provide basic knowledge of operation and functionality of electrical and electronicscomponents.

COURSE OUTCOMES:

1. Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics.
2. Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode.
3. Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices.
4. Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations.
5. Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.
6. Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gate.

BoS Chairman

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(Basic Science & Humanities)
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VISION	MISSION
"To be a Department providing high quality & globally competent knowledge of concurrent technologies in the field of Electronics and Telecommunication."	1. To provide quality teaching learning process through well-developed educational environment and dedicated faculties. 2. To produce competent technocrats of high standards satisfying the needs of all stakeholders.

Course Name- Multivariate Calculus
Course Code- ET3T001
Semester- III
Credits- 3
Course outcomes:

Students will be able to:

1. Describe properties of Laplace transform, Convolution Theorem, Fourier integral theorem, Parseval's identity, Cauchy's integral theorem, Cauchy's residue theorem.
2. Illustrate the examples using Laplace transform, Fourier Transform, Partial differential equation, Function of Complex Variables, Matrices.
3. Apply the knowledge of Laplace transform, Z-transform, function of complex variable, Advance partial differential equation.
4. Analyze the question on Laplace transform, Fourier Transform, Partial differential equation, Function of Complex Variables
5. Create a modal using Laplace transform, Fourier Transform, Theory of probability, Function of Complex Variables, Matrices.

Course Name- Electronics Devices and Circuits-I
Course Code- ET3T002
Semester- III
Credits- 4
Course Outcomes:

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

1. Explain the working principle, operation and characteristics of basic solid state devices such as PN junction diode, BJT and JFET.
2. Apply the concept of biasing techniques and feedback to improve stability of circuits.
3. Categorize amplifiers and oscillators based on feedback topology.
4. Analyse different amplifier configurations and DC bias circuitry of BJT.
5. Interpret BJT circuits for small signal at low and high frequencies.
6. Design Electronic circuits using diodes and transistors.

Course Name- Analog Communication System
Course Code- ET3T003

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Semester- III

Credits- 3

Course Outcomes:

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

1. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
2. Distinguish between different types of analog modulation techniques based on bandwidth Occupied and power transmitted.
3. Analyze the performance of analog communications in the presence of noise by evaluating the figure of merit for different schemes of modulation
4. Evaluate different components of analog communication systems such as modulator, demodulator, mixer, receiver etc in time and frequency domain.
5. Design the modulators, demodulators for amplitude and frequency modulated systems.
6. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.

Course Name- Digital Circuits and Microprocessor

Course Code- ET3T004

Semester- III

Credits- 3

Course Outcomes:

Students will be able to:

1. Define Logic Families and Programmable Devices and understand the architecture of logic families and combinational digital circuits and describe the basic concept and interrupts in microprocessors.
2. Classify SOP and POS forms, combinational and sequential circuits, synchronous and asynchronous circuits.
3. Apply the principles of Boolean algebra to manipulate, minimize design logic circuits using logic gates and K-map and Use HDL & appropriate EDA tool for digital logic design and simulation.
4. Analyze combinational logic circuits and sequential circuits.
5. Recommend various combinational logic circuits like code converters, multiplexers, adders in the design of complex hierarchical combinational blocks like multipliers, fast adders etc and Validate sequential logic circuits elements like latches, flip-flops for counters, registers, simple finite state machine and similar circuits.
6. Design modular combinational circuits, synchronous sequential logic circuits and interface various devices with microprocessor.

Course Name- Integrated Circuit and Applications

Course Code- ET3T005

Semester- III

Credits- 4

Course Outcomes:

Students will be able to:

1. Understand and explain the basic concepts of OPAMP.

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2. Demonstrate the working principle of various analog circuits.
3. Conduct experiments using analog electronic components, electronic instruments and modern tool.
4. Analyze analog circuits to evaluate various performance parameters.
5. Compare multivibrator circuits, Data converters.
6. Design and realize filters, Oscillators, linear and non-linear applications of Op-Amp.

Course Name- Network Synthesis and Analog Filter
Course Code- ET3T006
Semester- III
Credits- 3
Course Outcomes:

Students will be able to:

1. Define various terminologies and network theorems.
2. Understand the basics of Network synthesis and analog filters.
3. Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
4. Analyze steady state and transient response of electrical circuits
5. Characterize the transfer function for two – port networks.
6. Design various electrical circuits using network theorems.

Course Name- Electronics Devices and Circuits-I Lab
Course Code- ET3L002
Semester- III
Credits- 1
Course Outcomes:

At the end of the laboratory work, students will demonstrate the ability to:

1. Acquire the basic concepts of different semiconductor components and understand the use of semiconductor devices in different electronic circuits.
2. Identify basic devices such as diodes, BJT and JFET from their package information by referring to manufacturer's data sheets.
3. Plot and study the characteristics of semiconductor devices.
4. Simulate Electronic circuits using SPICE.
5. Calculate different performance parameters of transistor.
6. Design, build and test the performance of various circuits.

Course Name- Analog Communication System Lab
Course Code- ET3L003
Semester- III
Credits- 1
Course Outcomes:

Students will be able to:

1. Observe SSB detection techniques.
2. Realize various modulation technique..
3. Generate signals using Scilab.

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4. Identify and design different analog modulation techniques.
5. Analyze multiplexing systems such as FDM, TDM and QAM.
6. Compare different communication systems by analysing in time and frequency domain.

Course Name- Digital Circuits and Microprocessor Lab
Course Code- ET3L004
Semester- III
Credits- 1
Course Outcomes:

Students will be able to:

1. Find and prevent various hazards and timing problems in a digital design.
2. Understand the fundamental of basic gates and their use in combinational and sequential circuits Outline the use of digital components as a switching elements.
3. Develop ability to handle arithmetic operations using assembly language programming.
4. Analyze basic arithmetic and logical circuits required in microcomputer systems.
5. Examine the structure of various number systems and its application in digital design.
6. Design various combinational and sequential circuits and develop skill to build, and troubleshoot cost effective digital circuits.

Course Name- Universal Human Values
Course Code- ET3T007
Semester- III
Credits- 3

Course Outcomes:

At the end of the course students will be able to

1. Distinguish between self and body, and formulate the role of self in the day-today activities of a human being .
2. Examine the role of a human being in ensuring harmony in society and nature.
3. Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.
4. Analyze the value of harmonious relationship based on trust and respect in their life and profession
5. Evaluate the significance of value inputs in formal education and start applying them in their life and profession.

Course Name- Partial Differential Equation and Numerical Methods
Course Code- ET4T001
Semester- IV
Credits- 3
Course Outcomes:

At the end of course students will be able to

1. Understand calculation and interpretation of various errors in numerical methods and partial differential equations.
2. Familiar with finite precision computation.

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3. Solve nonlinear equations in a single variable and find numerical solutions.
4. Apply Numerical analysis which has enormous application in the field of science and some fields of Engineering.
5. Analyze the numerical integration and differentiation, numerical solution of ordinary differential equation.
6. Design mathematical model for various electronic applications.

Course Name- Basics of Python Programming
Course Code- ET4T002
Semester- IV
Credits- 3

Course Outcomes:

Students will be able to

1. Remember variables, types, operators,data structures, arguments, object oriented programming and libraries.
2. Understand assignment, keyword, expressions, lists, modules, exceptions and standard libraries.
3. Apply variables, types, operators, data structures, arguments, object oriented programming and Libraries.
4. Analyse modern updates in python for keyword, expressions, lists, modules, exceptions, standard libraries.
5. Evaluate storage space required to program python scripts, variables, types, operators and data structures.
6. Create python code to make functional Electronics hardware.

Course Name- Electrical Machines and Instruments
Course Code- ET4T003
Semester- IV
Credits- 3
Course outcomes:

Students will be able to:

1. Remember basic principles & construction, of electrical instruments and ac & dc machines.
2. Understand the operation, performance and characteristics of electrical instruments and ac & dc machines.
3. To identify the different issues related to the electrical instruments, speed control and torque improvement in ac & dc machines.
4. Analyse the performance indices of electrical instruments and ac & dc machines. Dcmachines during various conditions..
5. Evaluate the operation of ac and dc machines along with the testing of electrical instruments.
6. Solve the different problems related to operation, & performance indices of electrical instruments ac and dc machines.

Course Name- Electronics Devices and Circuits-II
Course Code- ET4T004
Semester- IV

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Credits- 3

Course Outcomes:

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

1. Explain the working principle, operation and characteristics of Semiconductor devices such as MOSFET
2. Apply Knowledge of semiconductor devices and concepts to implement various electronic circuits.
3. Analyze different amplifier configurations.
4. Evaluate the small signal model and performance parameters of the device.
5. Design different oscillator circuits for various frequencies
6. Build and test the performance of electronic circuits

Course Name- Signal and System

Course Code- ET4T005

Semester- IV

Credits- 3

Course Outcomes:

1. Understanddifferent types of signals & systems.
2. Familiar with the properties of LTI (Linear Time Invariant System) system and process involved in analysis of signals before transmission.
3. Solve various complex mathematical problems for signal analysis and conversion of signals from one domain to another.
4. Apply knowledge of sampling and interpolation to sample and reconstruct signals during real time signal transmission and reception.
5. Analyze continuous and discrete systems in time and frequency domain.
6. Design Various Mathematical models to Investigate stability of the system.

Course Name- Electromagnetic Fields

Course Code- ET4T006

Semester- IV

Credits- 4

Course Outcomes:

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

1. Understand characteristics and wave propagation on high frequency transmission lines
2. Carryout impedance transformation on TL
3. Use sections of transmission line sections for realizing circuit elements
4. Characterize uniform plane wave
5. Calculate reflection and transmission of waves at media interface
6. Analyze wave propagation on metallic waveguides in modal form
7. Understand principle of radiation and radiation characteristics of an antenna

Course Name- Electrical Machines and Instruments Lab

Course Code- ET4L003

Semester- IV

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Credits- 1

Course Outcomes:

Students will be able to:

1. Remember basic principles & construction, of electrical instruments and ac & dcmachines.
2. Understand the operation, performance and characteristics of electrical instruments andac & dc machines.
3. To identify the different issues related to the electrical instruments, speed control andtorque improvement in ac & dc machines.
4. Analyse the performance indices of electrical instruments and ac & dc machines.
5. Evaluate the operation of ac and dc machines along with the testing of electricalinstruments.
6. Solve the different problems related to operation, & performance indices of electrical instruments ac and dc machines.

Course Name- Electronic Circuit and Devices-II Lab
Course Code- ET4L004
Semester- IV
Credits- 1
Course Outcomes:

At the end of the laboratory work, students will demonstrate the ability to:

1. Acquire the basic concepts of different semiconductor components and understand theuse of semiconductor devices in different electronic circuits.
2. Plot and study the characteristics of semiconductor devices like MOSFET, UJT
3. Simulate Electronic circuits using SPICE.
4. Calculate different performance parameters of transistor.
5. Design, build, and test the performance of various circuits.

Course Name- Signal and System Lab
Course Code- ET4L005
Semester- IV
Credits- 1
Course Outcomes:

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

1. Understand basics of Scilab syntax, functions and programming.
2. Familiar With characterization of various continuous and discrete time signals.
3. Solve the Problems on basic operations on the signals.
4. Apply Knowledge of linear time-invariant (LTI) systems for computing its response.
5. Analyze the spectral characteristics of signals using various transforms.
6. Design the Mathematical model of systems using various transforms.

Course Name- Innovation and Entrepreneurship Development
Course Code- ET4T007
Semester- IV
Credits- Audit

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Course Objective:

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

1. Identify and validate of ideas.
2. Remember Patent registration of Innovation.
3. Understand roles and responsibilities of Entrepreneurship.

Course Name- Digital Signal Processing
Course Code- ET5T001
Semester- V
Credits- 3
Course Outcomes:
At the end of the course students will be able to:

1. Represent discrete-time signals analytically and visualize them in the time domain.
2. Understand and meet the requirement of theoretical and practical aspects of DSP with regard to sampling and reconstruction.
3. Apply the concepts of different transforms and analyze the discrete time signals and systems.
4. Realize the use of LTI filters for filtering different real world signals.
5. Justify the use of Filter design to estimate the wavelet transform.
6. Discuss the use of multi rate signal processing to estimate the wavelet transform.

Course Name- Microcontroller and Application
Course Code- ET5T002
Semester- V
Credits- 3
Course Outcomes:
At the end of the course students will be able to:

1. Know importance of microcontroller in designing embedded application and use of hardware and software tools.
2. Understand modern tools like Programmers, Debuggers, cross compilers and current IDE i.e. integrated development environment tools
3. Apply knowledge of microcontroller to interface mechanical system to function in multidisciplinary system like robotics, Automobiles
4. Analyze and formulate control and monitoring systems using microcontrollers.
5. Evaluate experiments based on interfacing of devices to real world applications.
6. Design real time cost effective controllers using microcontroller based system and develop interfacing to real world devices to serve engineering solution for Global, social and economic context.

Course Name- Control System Engineering
Course Code- ET5T003
Semester- V
Credits- 3
Course Outcomes:
At the end of the course students will be able to:

1. Categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form.

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2. Characterize any system in Laplace domain to illustrate different specification of the system using transfer function concept.
3. Interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis
4. Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions.
5. Formulate different types of analysis in frequency domain to explain the nature of stability of the system
6. Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system.

Course Name- Introduction to Robotics and Computer Programming (PE-I)
Course Code- ET5E004A
Semester- V
Credits- 3
Course Outcomes:
At the end of the course students will be able to:

1. Know the basic components of robots.
2. Differentiate types of robots and robot grippers.
3. Explain robot programming methods
4. Understand the components of robot programming
5. Design simple program to simulate robot movements
6. Develop robot program for specific application.

Course Name- Telecommunication Switching System (OE-I)
Course Code- ET5E004B
Semester- V
Credits- 4
Course Outcomes:
At the end of the course students will be able to:

1. Know the main concepts of telecommunication network design.
2. Analyse and evaluate fundamental telecommunication traffic models.
3. Design basic modern signalling system.
4. Solve traditional interconnection switching system design problems.
5. Interpret concept of Network engineering.
6. Compare and Design telephone network, data network and integrated service digital network related to Cellular Telephone Concepts.

Course Name- Digital signal processing lab
Course Code- ET5L001
Semester- V
Credits- 1
Course Outcomes:
At the end of the course students will be able to:

1. Acquire the basic concepts of various digital signals by plotting them.
2. Analyse and process the signals in the discrete domain.
3. Apply the techniques, skills, and modern engineering tools like MATLAB and digital processors.
4. Write and simulate the MATLAB/SCILAB program for various applications.

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5. Design the filters to suit requirements of specific applications.

Course Name- Microcontroller and application lab
Course Code- ET5L002
Semester- V
Credits- 1

Course Outcomes:

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

1. Design assembly languages structure and programming.
2. Interface various peripherals with 8051 microcontroller.
3. Simulate the programs on different software platforms.

Course Name- Software workshop lab
Course Code- ET5L005
Semester- V
Credits- 1

Course Outcomes:

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

1. Write MATLAB program for any given problem.
2. Plot various functions using different graphical techniques.
3. Make mathematical analysis for the given problem.
4. Get the complete expert hand on pSpice Software.
5. Draw, analyse and plot the electronic circuits using pSpice Software.

Course Name- Consumer Affairs
Course Code- ET5T006
Semester- V
Credits- 1

Course Outcomes:

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

1. Understand the genesis of consumer protection laws in India .
2. Identify and explain factors which influence consumer behaviour.
3. Demonstrate how knowledge of consumer behaviour can be applied to marketing.

Course Name- Education, Technology and Society
Course Code- ET6T001
Semester- VI
Credits- 2

Course Outcomes:

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

1. Integrate their technical education for betterment of society as well motivates them to lead a good
2. Plan, design, and assess effective learning environments and experiences
3. Develop technology-enabled assessment and evaluation strategies
4. Compare and contrast social, ethical, and legal issues surrounding technology
5. Compare and contrast social, ethical, and legal issues surrounding technology

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Course Name- Antennas and Wave Propagation
Course Code- ET6T002
Semester- VI
Credits- 2

Course Outcomes:

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

1. Formulate the wave equation and solve it for uniform plane wave.
2. Describe transmission line characteristics
3. Analyze and design antenna arrays.
4. Analyze the given wire antenna and its radiation characteristics
5. Describe the operation of aperture and reflector antennas.
6. Identify the suitable antenna for a given communication system.

Course Name- Computer Networks and Cloud Computing
Course Code- ET6T003
Semester- VI
Credits- 3

Course Outcomes:

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

1. Know the terminology and concepts of the OSI reference model and the TCP-IP reference model.
2. Analyze the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks and Remember the wireless networking concepts.
3. Understand the contemporary issues in networking technologies and Apply network tools and network programming.
4. Analyze a given requirement of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) and design it based on the market available component.
5. Apply the network programming for a given problem related TCP/IP protocol.
6. Create DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Course Name- Embedded Processor & it's Interfacing with RTOS (PE-II)
Course Code- ET6E004A
Semester- VI
Credits- 3

Course Outcomes:

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

1. Define and Classify Embedded System and understand role of each element of embedded system. State special requirements and constraints (such as sustainability, reliability) that are imposed on embedded systems.
2. Design example for interfacing Keys, LED/LCD Displays, ADC and DAC.
3. Conversant with Assembly and C language programming for 8051.Formulate and Develop efficient assembly/C code for embedded system
4. Describe ARM processor, its modes, exception handling, instruction pipelining and basic programming.
5. Understand concepts of RTOS and its functionalities. Model system tasks using specification techniques such as FSM, State chart, UML

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6. Build a typical cost-effective real-world embedded system in team with appropriate hardware components and software algorithms.

Course Name- AI: Knowledge Representation & Reasoning (PE-II)
Course Code- ET6E004B
Semester- VI
Credits- 3
Course Outcomes:

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

1. Understand the basic principles of Artificial Intelligence and challenges involved in designing intelligent systems by exploring human intelligence nature and its role in problem solving
2. Represent given problem using state space representation and apply informed and uninformed search techniques on it.
3. Analyze the issues in the design of search programs and apply appropriate search algorithms.
4. Apply knowledge representation techniques and problem solving strategies to common AI applications.
5. Use Prolog Programming language using Predicate Logic.
6. Design Knowledge Based Systems

Course Name- Computer Networks and Cloud Computing Lab
Course Code- ET6L003
Semester- VI
Credits- 1
Course Outcomes:

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

1. Know the terminology and concepts of Networking.
2. Analyze the concepts of network interfaces and design/performance issues in local area networks and wide area networks.
3. Understand the contemporary issues in networking technologies and Apply network tools.
4. Analyze a given requirement of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) and design it based on the market available component
5. Apply the network programming for a given problem related TCP/IP protocol.
6. Create DNS, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Firewalls using open source available software and tools.

Course Name- Electronic Design Engineering Lab
Course Code- ET6L005
Semester- VI
Credits- 1
Course Outcomes:

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

1. Use DSO and Spectrum Analyzer.
2. Interface peripherals with computer
3. Design PCB using PCB designing software
4. Design & fabricate mini project.

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Course Name- Campus Recruitment Training
Course Code- ET6P001
Semester- VI
Credits- 1

Course Outcomes:

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

1. Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.
2. Analyze the Problems logically and approach the problems in a different manner.
3. Apply mathematical analysis of data to make connections, draw conclusions and solve problems.
4. Learn a series of techniques through practical activities to develop presenting skills and enhance confidence to expand the potential of the individual.
5. Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.
6. Ability to target the resume to the presenting purpose and Demonstrate professional behaviour(s) including preparedness, professional attire, and respectful presentation during interviews

Course Name- Mini Project
Course Code- ET6P003
Semester- VI
Credits- 1

Course Outcomes:

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

1. Identify problems based on societal /research needs.
2. Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
3. Demonstrate project management principles during project work.
4. Apply Knowledge and skill to solve societal problems in a group
5. Analyze the impact of solutions in societal and environmental context for sustainable development.
6. Excel in written and oral communication
7. Draw the proper inferences from available results through theoretical/ experimental/simulations.

Course Name- Research Methodology
Course Code- ET6T006
Semester- VI
Credits- Audit

Course Outcomes:

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

1. Student will learn the meaning, objective, motivation and type of research
2. Student will be able to formulate their research work with the help of literature review
3. Student will be able to develop an understanding of various research design and techniques
4. Student will have overview knowledge of modeling and simulation of research work
5. Student will be able to collect the statistical data with different methods related to research work
6. Student will be able to write their own research work with ethics and non-plagiarized way.

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Course Name- Introduction to Microprocessor, Microcontroller & Robotics (OE-II)
Course Code- ET6O002
Semester- VI
Credits- 4
Course Outcomes:

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

1. Select a microprocessor or microcontroller suitable to the application.
2. Architect a microprocessor or microcontroller system and estimate the required hardware and software resources.
3. Perform the detailed hardware design of a microprocessor or microcontroller system.
4. Program the microprocessor or microcontroller using suitable techniques including use of allocation schemes and device drivers
5. Program the microprocessor or microcontroller using suitable techniques including use of allocation schemes and device drivers.
6. Explain the fundamentals of robotics and its components

Course Name- Broadband Communication (OE-II)
Course Code- ET6O002B
Semester- VI
Credits- 4
Course Outcomes:

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

1. Recall Knowledge of theory and practice related to Broadband communication.
2. Understand knowledge about Elements of Optical Fiber Systems and knowledge about Computer networks.
3. Analyze the various aspects of Computer networks and multimedia networks.
4. Solve problems related to satellite and Ability to identify engineering problems related to satellite communication.
5. Identify and solve engineering problems related to Mobile communication system.

Course Name- Digital Communication
Course Code- BTETC701
Semester- VII
Credits- 3
Course Outcomes:

1. Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
2. Perform the time and frequency domain analysis of the signals in a digital communication system.
3. Select the blocks in a design of digital communication system.
4. Analyze Performance of spread spectrum communication system.

Course Name- Microwave Theory and Techniques
Course Code- BTETPE702A

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Semester- VII

Credits- 3

Course Outcomes:

After successfully completing the course students will be able to

1. Formulate the wave equation in wave guide for analysis.
2. Identify the use of microwave components and devices in microwave applications.
3. Understand the working principles of all the microwave tubes.
4. Understand the working principles of all the solid state devices.
5. Choose a suitable microwave tube and solid state device for a particular application.
6. Carry out the microwave network analysis.
7. Choose a suitable microwave measurement instruments and carry out the required measurements.

Course Name- RF Circuit Design

Course Code- BTETPE702B

Semester- VII

Credits- 3

Course Outcomes:

After successfully completion of the course students will be able to

1. Understand behavior of passive components at high frequency and modeling of HF circuit.
2. Design HF amplifiers with gain bandwidth parameters.
3. Understand Mixer types and characteristics.
4. Gain the knowledge about PLLs and Oscillators with respect to their circuit topologies

Course Name- Satellite Communication

Course Code- BTETPE702C

Semester- VII

Credits- 3

Course Outcomes:

At the end of the course, the students will have:

1. Knowledge of theory and practice related to radar and Satellite communication.
2. Ability to identify, formulate and solve engineering problems related to radar and Satellite communication.
3. The student would be able to analyze the various aspects of establishing a geo-stationary satellite communication link.
4. Acquired knowledge about Satellite Navigation System.
5. Acquired knowledge about Radar and Radar Equations.

Course Name- Fiber Optic Communication

Course Code- BTETPE702D

Semester- VII

Credits- 3

Course Outcomes:

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

1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.

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2. Understand the properties of the optical fibers and optical components.
3. Understand operation of lasers, LEDs, and detectors.
4. Analyze system performance of optical communication systems.
5. Design optical networks and understand non-linear effects in optical fibers.

Course Name- Wireless Sensor Networks
Course Code- BTETPE702E
Semester- VII
Credits- 3
Course Outcomes:
At the end of the course the students will be able to
1. Design wireless sensor networks for a given application
2. Understand emerging research areas in the field of sensor networks
3. Understand MAC protocols used for different communication standards used in WSN
4. Explore new protocols for WSN.

Course Name- Mobile Computing
Course Code- BTETPE702F
Semester- VII
Credits- 3
Course Outcomes:
At the end of the course, the student will be able to demonstrate:
1. A working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities
2. The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.

Course Name- Embedded System Design
Course Code- BTETPE703A
Semester- VII
Credits- 3
Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Suggest design approach using advanced controllers to real-life situations.
2. Design interfacing of the systems with other data handling / processing systems.
3. Appreciate engineering constraints like energy dissipation, data exchange speeds etc.
4. Get to know the hardware – software co design issues and testing methodology for embedded system.

Course Name- Artificial Intelligence Deep Learning
Course Code- BTETPE703B
Semester- VII
Credits- 3

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Course Outcomes:

This course will enable students to

1. Identify the AI based problems.
2. Apply techniques to solve the AI problems.
3. Define learning and explain various logic inferences.
4. Discuss different learning techniques.

Course Name- VLSI Design & Technology

Course Code- BTETPE703C

Semester- VII

Credits- 3

Course Outcomes:

After successfully completing the course, students will be able to

1. Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
2. Understand chip level issues and need of testability.
3. Design analog & digital CMOS circuits for specified applications

Course Name- Data Compression & Encryption

Course Code- BTETPE703D

Semester- VII

Credits- 3

Course Outcomes:

At the end of this course

1. The student will have the knowledge of Plaintext, cipher text, RSA and other cryptographic algorithm.
2. The student will have the knowledge of Key Distribution, Communication Model, Various models for data compression.

Course Name- Big Data Analytics

Course Code- BTETPE703E

Semester- VII

Credits- 3

Course Outcomes:

At the end of this course, Students will able to:

1. Explain the motivation for big data systems and identify the main sources of Big Data in the real world.
2. Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics.
3. Implement several Data Intensive tasks using the Map Reduce Paradigm
4. Apply several newer algorithms for Clustering Classifying and finding associations in Big Data.

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Course Name- Cyber Security
Course Code- BTETPE703F
Semester- VII
Credits- 3
Course Outcomes:

Students should be able to understand.
1. The difference between threat, risk, attack and vulnerability.
2. How threats materialize into attacks.
3. Where to find information about threats, vulnerabilities and attacks.
4. Typical threats, attacks and exploits and the motivations behind them.

Course Name- Consumer Electronics
Course Code- BTETPE704A
Semester- VII
Credits- 3
Course Outcomes:

Students will be able to:
1. List technical specification of electronics Audio system (microphone and speaker)
2. Trouble shoots consumer electronics products like TV, washing machine and AC.
3. Identify and explain working of various color TV transmission blocks.
4. Adjust various controls of color TV receiver and troubleshoot it.
5. Use various functions of Cam coder and shoot a video and take snapshots and save them in appropriate format.

Course Name- Analog Integrated Circuit Design
Course Code- BTETPE704B
Semester- VII
Credits- 3
Course Outcomes:

After the successful completion of this course, Students will be able to:
1. Describe the models for active devices in MOS and Bipolar IC technologies.
2. Describe layout considerations for active and passive devices in analog ICs.
3. Analyze and design IC current sources and voltage references.
4. Describe the noise sources and models applicable to ICs.
5. Understand and appreciate the importance of noise and distortion in analog circuits.
6. Analyze integrated circuit noise performance.
7. Analyze and design IC operational amplifiers.

Course Name- Soft Computing
Course Code- BTETPE704C
Semester- VII
Credits- 3
Course Outcomes:

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After the successful completion of this course, students will be able to:
1. Use a new tool /tools to solve a wide variety of real world problems.
2. Find an alternate solution, which may offer more adaptability, resilience and optimization.
3. Identify the suitable antenna for a given communication system.
4. Gain knowledge of soft computing domain which opens up a whole new career option.
5. Tackle real world research problems.

Course Name- Advance Industrial Automation-1
Course Code- BTETPE704D
Semester- VII
Credits- 3
Course Outcomes:

After the successful completion of this course, the student will be able:
1. To identify suitable automation hardware for the given application.
2. To recommend appropriate modeling and simulation tool for the given manufacturing application.

Course Name- Mechatronics
Course Code- BTETPE704E
Semester- VII
Credits- 3
Course Outcomes:

1. Identification of key elements of mechatronics system and its representation in terms of block diagram.
2. Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O.
3. Interfacing of Sensors, Actuators using appropriate DAQ micro-controller.
4. Time and Frequency domain analysis of system model (for control application).
5. PID control implementation on real time systems.
6. Development of PLC ladder programming and implementation of real life system.

Course Name- Entrepreneurship Development
Course Code- BTETPE801A
Semester- VIII
Credits- 3
Course Outcomes:

After the completion of the course, the students will be able to:
1. Have the ability to discern distinct entrepreneurial traits.
2. Know the parameters to assess opportunities and constraints for new business ideas.
3. Understand the systematic process to select and screen a business idea.
4. Design strategies for successful implementation of ideas.
5. Write a business plan.

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Course Name- Mixed Signal Design
Course Code- BTETPE801B
Semester- VIII
Credits- 3
Course Outcomes:
At the end of the course, students will demonstrate the ability to:
1. Understand the practical situations where mixed signal analysis is required.
2. Analyze and handle the inter-conversions between signals.
3. Design systems involving mixed signals.

Course Name- Bio-medical Signal Processing
Course Code- BTETPE801C
Semester- VIII
Credits- 3
Course Outcomes:

After successfully completing the course students will be able to:
1. The student will be able to model a biomedical system
2. The student will be able to understand various methods of acquiring bio signals.
3. The student will be able to understand various sources of bio signal distortions and its Remedial techniques
4. The students will be able to analyze ECG and EEG signal with characteristic feature points.
5. The student will have a basic understanding of diagnosing bio-signals and classifying them.

Course Name- Multirate Digital Signal Processing
Course Code- BTETPE801D
Semester- VIII
Credits- 3
Course Outcomes:

After successfully completing the course students will have:
1. Ability to understand the concepts of sampling rate conversions, Decimation and Interpolation as part of Signal Processing techniques.
2. Able to explain how the multirate implementation of ADC and DAC converters works.
3. Able to describe basic sampling rate conversion algorithms.
4. Able to draw and describe different kinds of interpolator and decimator.
5. Able to analyze how the interpolated FIR filter works.
6. Able to do sampling rate conversion.

Course Name- Wavelet Theory
Course Code- BTETPE801E
Semester- VIII
Credits- 3
Course Outcomes:

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At the end of the course, students will demonstrate the ability to:
1. Understand time-frequency nature of the signals.
2. Apply the concept of wavelets to practical problems.
3. Mathematically analyze the systems or process the signals using appropriate wavelet functions.

Course Name- Mobile Communication & Networks
Course Code- BTETPE802B
Semester- VIII
Credits- 3
Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Understand the working principles of the mobile communication systems.
2. Understand the relation between the user features and underlying technology.
3. Analyze mobile communication systems for improved performance.

Course Name- Geo-Informatics and Spatial Computing
Course Code- BTETPE802C
Semester- VIII
Credits- 3
Course Outcomes:

At the end of the course, students will be able to map, analyze, manipulate and store geographical data in order to provide solutions to real world problems and help in planning for the future.

Course Name- Software Defined Radio
Course Code- BTETPE802D
Semester- VIII
Credits- 3
Course Outcomes:

1. The student will study Needs, Characteristics, Benefits and Design Principles of a Software Radio.
2. The student will be study design aspects of software radios.
3. The student will understand concept of Smart Antennas.
4. The student will study key hardware elements and related Trade-Offs.

Course Name- Advanced Industrial Automation 2
Course Code- BTETOE803A
Semester- VIII
Credits- 3

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Course Outcomes:

1. Select & identify suitable automation hardware for the given application.
2. Describe & explain potential areas of automation.
3. Differentiate various control aspects of automation.
4. Demonstrate the self-learning capability of Industrial Automation.

Course Name- IoT Based Embedded System Design
Course Code- BTETOE803B
Semester- VIII
Credits- 3
Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Understand the practical situations where mixed signal analysis is required.
2. Analyze and handle the inter-conversions between signals.
3. Design systems involving mixed signals.

Course Name- Industrial Drives and control
Course Code- BTETOE803C
Semester- VIII
Credits- 3
Course Outcomes:

At the end of the course, students will demonstrate the ability to gain an ability to design and conduct performance experiments, as well as to identify, formulate and solve drives related problems.

Course Name- Robotics Design
Course Code- BTETOE803D
Semester- VIII
Credits- 3
Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Describe kinematics and dynamics of stationary and mobile robots
2. Describe trajectory planning for robots.
3. Implement trajectory generation and path planning various algorithms
4. Work in interdisciplinary projects.

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B.TECH. FIRST YEAR
SESSION:2021-22

BRANCH CODE: All

Course Outcome-2021-22

Course Title : Engineering Mathematics-1 | **Semester : I**
Course Code : MAT001 | **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Mathematics | **L – T – P : 3 – 1– 0**
Stream :Core subject | **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe rank, Bernoulli's theorem, Taylor's and Maclaurin's theorems for functions of two variables, – Euler's Theorem for functions containing two and three variables, Lagrange's theorem
2. Illustrate the examples of ordinary differential equation, partial differential equation, matrices.
3. Solve questions related to ordinary differential equation, partial differential equation, matrices and their applications.
4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, and their applications to real world problems.
5. interpret the results of matrices, ordinary differential equation, partial differential equation and their applications.
6. Design a method or modal on matrices, ordinary differential equation, partial differential equation.

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Course Title : Engineering Physics **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI/1T/2T005 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Physics **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1.To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2.To understand and study the Physics principles behind the developments of Engineering materials.
3.To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

COURSE OUTCOMES

At the end of the course students will be able to

1.Acquire fundamental understanding of concepts specifically concern to semiconducting materials, Optics, Fibre optics, Ultrasonics, Dielectric Materials, Electron optics, Quantum Mechanics, Crystal structure and Nano-science, and their engineering applications.
2.Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering Physics.
3.To develop a systematic, logical approach to problem – solving that can be applied to problems in physics and to problems in general.

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SESSION:2021-22

Course Title : Engineering Physics-Lab **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI1L/2L005 **Course Type : Compulsory**

Pre-requisite : Basics of Physics Practical **L – T – P : 0 – 0– 2**

Stream :Core subject **Credits : 1**

COURSE OBJECTIVE

Students will be able to

1. Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques and graphical analysis to the experimental data
5. Develop the skills to identify various parts of the apparatus used in the experiment in laboratory.
6. Design and apply the practical knowledge of engineering physics in daily life

COURSE OUTCOME

Students will be able to

1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber and electric and magnetic field.
2. Understand the working principles of Semiconducting devices and their application.
3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and optical systems
4. Analyze the different crystal structure with the help of crystal models.
5. Construct the various devices based on optical phenomenon.
6. Design the frame work of various electronic circuitries based on semiconducting materials.

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SESSION:2021-22

Course Title : Energy and Environment Engineering **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI1T/2T006 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Environment **L – T – P : 3 – 0– 0**

Stream :Theory subject **Credits : 3**

COURSE OBJECTIVES

1. To understand the importance of Energy and Environment
2. To understand the application of energy saving tool in real life.
3. To investigate the key concepts of Energy and Environment.

COURSE OUTCOMES

At the end of the course students will be able to

1) Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.

2) Understand the importance of ecosystem for human beings..

3) Discover innovative method of power generation.

4) Correlate the cost of various method of power generation.

5) Judge the quality of air.

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Course Title : Introduction To Computer Programming **Semester : I**

Course Code : HU1T002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 2 – 0– 0**

Stream :Theory subject **Credits : 2**

COURSE OBJECTIVES

1. To understand the importance of Programming
2. To understand the application of C Programming.
3. To investigate the key concepts of C Programming.
4. To enable students build a applications based on C programming

COURSE OUTCOMES

CO1: Define the algorithms, flowcharts, array , pointer, structure ,function , python.

CO2: Discuss and differentiate between variables , operators ,statements , loops, array dimensions.

CO3:Demonstrate working programs using functions, loops ,conditional statements ,array ,pointer, structure and
files in C and python language .

CO4:Distinguish between different steps of programming and prioritize levels of programming.

CO5:Find errors and predict outcome in C and python programming.

CO6:Compose and develop any application using C and python programming.

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Course Title : Introduction To Computer Programming (LAB) **Semester : I**

Course Code : HU1L002 **Course Type : Compulsory**

Pr-requisite : Basic knowledge of Computer **L – T – P : 0 – 0– 4**

Stream : Theory subject **Credits : 2**

COURSE OBJECTIVES

1. To introduce students to the basic knowledge of programming fundamentals of C language.
2. To impart writing skill of C programming to the students and solving problems.
3. To impart the concepts like looping, array, functions, pointers, file, structure

COURSE OUTCOME

After completing this lab course you will be able to:

1. Understand the logic for a given problem.
2. Write the algorithm of a given problem.
3. Draw a flow chart of a given problem.
4. Recognize and understand the syntax and construction of C programming code..
5. Make use of different data-structures like arrays, pointers, structures and files.
6. Know the alternative ways of providing solution to a given problem.

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SESSION:2021-22

Course Title : Workshop Practices **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS/AI 1L/2L001 **Course Type : Compulsory**

Pre-requisite : Basic Knowledge Of Workshop **L – T – P :0 – 0– 4**

Stream :Practical subject **Credits : 2**

Instructions to the student:

Each student is required to maintain a „workshop journal" consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job.

Contents:

a) **Carpentry:** Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.

b) Welding: Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.

c) Fitting: Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation.

e) Machine shop: Lathe machine, types of lathes, major parts, cutting tool, turning operations (Demo), safety precautions

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SESSION:2021-22

Course Title : Introduction to A I & Its Application **Semester : I**

Course Code : AI1T008 **Course Type:Compulsory**

Pre-requisite : Basic knowledge of Mathematical Logic **L – T – P :2 – 0– 0**

Stream :Theory subject **Credits : Audit**

COURSE OBJECTIVES

1. To understand the importance of AI and use of AI tools
2. To understand the application of AI in engineering and in real life.
3. To investigate the key concepts of knowledge representation and different notations.
4. To enable students to analyze a problem so that appropriate problem solving techniques may be applied.

COURSE OUTCOMES

Upon successful completion of this course student will able :

1. To understand the basics of Artificial Intelligence , Intelligent Agents and its structure
2. To Apply various searching techniques of Problem solving
3. To Acquire theoretical knowledge about principles for logic-based representation and reasoning
4. To Participate in the design of systems that act intelligently and learn from experience
5. To Understand the relation between AI & various domains

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SESSION:2021-22

Course Title : Engineering Mathematics-II **Semester : II**

Course Code : MA2T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematics **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus.
2. Illustrate the concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus by using examples.
3. Apply the knowledge of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.
4. Analyze the problems and results of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.
5. Evaluate the problems by using complex numbers, integral calculus & multiple integrals, Fourier series &transform, vector differential calculus, vector integral calculus to solve the engineering problems.
6. Create the methods or model by using complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Engineering Chemistry **Semester : I/ II**

Course Code : ME/CE/EE/ET/IT/CS/AI/1T/2T002 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 3 – 1– 0**

Stream :Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Chemistry
2. To understand the application of Chemistry in engineering and in real life.
3. To investigate the key concepts of Chemistry knowledge
4. To enable students to analyze a Chemistry problem so that appropriate problem solving techniques
   may be applied.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe various properties of water, nano-materal, transition metal ions and their magnetic properties, Debye-Hückel theory, Quinonoid theory, various electrode, spectro-photometric techniques.
2. Illustrate the various types of water, carbon nanotubes, Molecular orbital theory, Transport number by Moving Boundary method, Ostwald's theory of acid-base indicator, various batteries, UV and NMR spectroscopy.
3. Analyze the question on water characteristics, electrochemistry and various types of instrumental titration, various unknown sample by UV and NMR spectroscopy .
4. Apply the Knowledge of zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept, spectroscopic techniques.
5. Develop a Modal on softening of water, standardization of acid and base by various instruments, doping on band structure, spectroscopic techniques.
6. Organize water as per quality, carbon nanotubes, electrodes, Energy level diagrams of diatomic molecules, various elements as per their spectroscopic techniques.

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Engineering Chemistry Practical **Semester : II**

Course Code : ME/CE/EE/ET/IT/CS 1L/2L002 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Chemistry **L – T – P : 0 – 0– 2**

Stream :Theory subject **Credits : 1**

COURSE OBJECTIVES

Students will be able to

1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

COURSE OUTCOMES

Students will be able to

1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Engineering Graphics **Semester : I/II**

Course Code : ME/CE/EE/ET/IT/CS1T/2T003 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Graphics **L – T – P : 1 – 0– 0**

Stream :Practical subject **Credits : 1**

COURSE OBJECTIVES

1. To understand the concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient
2. To understand theory of projection and simple machine parts in first and third angle of projection systems.
3. To understand the key concepts CAD software.
4. To enable students to analyze a 2-dimensional & 3-dimensional problem.

COURSE OUTCOMES

1. Define various concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient.
2. Interpret drawings of simple machine component in first and third angle of projection systems
3. Apply theory of projections in projection of lines, projection of planes and projection of solid.
4. Classify solid geometry in different positions.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Engineering Graphics-Lab **Semester : II**

Course Code : ME/CE/EE/ET/IT/CS/2L003 **Course Type : Compulsory**

Pre-requisite : Basics of Graphics Lab **L – T – P : 0 – 0– 4**

Stream :Practical subject **Credits : 2**

COURSE OBJECTIVES:

The objective of the course is to enable students to

1. Provide basic foundation in CAD software.
2. Understand the fundamentals used to create and manipulate geometric models.
3. Get acquainted with the basic CAD software for to design geometric modeling.

COURSE OUTCOMES:

1. Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices and display devices to become professionally efficient to operate CAD software.
2. Explain drawing of simple machine component in CAD software.
3. Acquire the knowledge of geometric modeling in CAD software.
4. Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Communication Skills **Semester : I/II**

Course Code : HU1T/2T001 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of English **L – T – P : 2 – 0– 0**

Stream :Theory subject **Credits : 2**

Course Objectives:

The main objective of the subject is to enhance the employability skills of engineering studentsas well as communication skills at work place.

The sub-objectives are:

1) To develop students' reading skills and pronunciation.
2) To develop technical communication skills through drafting, letter writing, and précis writing.
3) To develop literary skills through essay writing.
4) To develop public speaking skills of the students.

Course Outcomes:

At the end of the course students will be able to

1) to better reading comprehension, pronunciation, and functional English grammar.
2) to write letters and resumes
3) to organize their thoughts for effective presentation and writing.
4) to learn skills to present themselves well in an interview, and handle a Group Discussion

To expose the students to the ethics of English language by teaching grammar

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Communication Skills-Lab **Semester : II**

Course Code : HU2L001 **Course Type : Compulsory**

Pre-requisite : Basics of English grammar **L – T – P : 0 – 0– 4**

Stream :Theory subject **Credits : 2**

COURSE OBJECTIVES:

1. Apply appropriate communication skills. Students are able to enhance their employability skills as well as communication skills at work place.

2. Demonstrate knowledge of communication theory and application. Students have better reading comprehension, pronunciation, and functional English grammar.

3.Practice critical thinking to develop innovative and well-founded perspectives related to the students' emphases.

4.Build and maintain healthy and effective relationships. Students are able to write letters and resumes.

5.Use technology to communicate effectively in various settings and contexts. Students are able to organize their thoughts for effective presentation and writing.

6.Demonstrate appropriate and professional ethical behavior. Students are able to learn skills to present themselves well in an interview, and handle a Group Discussion

COURSE OUTCOMES

Students will be able to

CO1.Remember Communication Skills by giving adequate exposure in reading, writing, listening and speaking.

CO2.Understand the communication process by identifying, explaining, and applying current communication theories as they relate to a variety of contexts.

CO3.Apply proficiency, both in spoken and written English.

CO4.Analysing the communication behaviours of others and themselves in a variety of scenario (e.g. interpersonal, intercultural, group, public and professional communication, and mass media).

CO5.Evaluate and organize their thoughts for effective presentation and writing.

CO6. Improve research, organizational, and critical thinking skills by finding and evaluating reference material and organizing and presenting effective messages adapted to specific situations.

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Basics of Electrical and Electronics Engineering **Semester : I/II**
Course Code : ME/CE/EE/ET/IT/CS 2T007 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Electrical and Electronic **L – T – P : 2-0-0**
Stream : Theory Subject **Credits : 0 (Audit)**

COURSE OBJECTIVES

1. To provide a basic information and use of electrical and electronics components.
2. To understand and study the materials used for the preparation of electrical and electronics components.
3. To provide basic knowledge of operation and functionality of electrical and electronics components.

COURSE OUTCOMES:

1. Define fundamentals of electrical system and choose measuring instruments for measurement of electrical quantities & describe the concept PN junction diode and its characteristics.

2. Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor configuration in CE, CB & CC mode.

3. Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to construct Amplifier devices.

4. Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's equations.

5. Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.

6. Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers, transistors and logic gates.

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title :	**Introduction to Drones**	**Semester :**	**II**
Course Code :	**AI2T009**	**Course Type :**	**Compulsory**
Pre-requisite :	**Nil**	**L – T – P :**	**2 – 0– 0**
Stream :	**Theory subject**	**Credits :**	**Audit**

Course Objectives

The main aim of this course is to understand the basics of Drones and its various applications. The course will also impart the knowledge of how to fly a drone by considering the rules and regulations to the specific country. Further the students will be introduced to the safety measures to be taken during flight.

Course Outcomes:

Student will be able to

CO1: To introduce the various types of frame design used for the UAV and to accommodate the electronics over the frame to fly UAV.

CO2: To make the students understand the basic working principal behind the electronic components used and its specification to build a drone from scratch.

CO3: To enable the students to identify and understand various functional modules of the controller using a preprogrammed controller used in the UAV.

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B.TECH. FIRST YEAR
SESSION:2021-22

Course Title : Basic Civil and Mechanical Engineering **Semester : I/II**
Course Code : ME/CE/EE/ET/IT/CS/1T004
Course Type : Compulsory
Pre-requisite : Basic knowledge of Graphics **L – T – P : 2 – 0– 0**
Stream : Theory subject (Audit) **Credits : 0**

COURSE OBJECTIVES :

1. To understand the basic stream of Mechanical Engineering and Civil Engineering.
2. To understand the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. To have basic knowledge of Casting, Machining, Designing, Manufacturing, different materials for building construction and surveying.

COURSE OUTCOMES:

Students would be able to

1. Define basic stream of Mechanical & Civil Engineering.
2. Explain the concepts of product manufacturing, Energy engineering, design engineering, Automobile engineering, construction technique and civil surveying.
3. Apply Basic knowledge of Casting, Machining, Designing, Manufacturing & Civil Construction technique.
4. Analyzed the different mechanical system and properties of construction & surveying material.
5. Interpret the problem in mechanical system and civil structure.
6. Solve the problem in mechanical system and civil structure.

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Affiliated to DBATU, RTMNU & MSBTE Mumbai
Department of Information Technology
"Progress Beyond Excellence"
2021-22

VISION	MISSION
To be recognized as a centre of excellence in the field of Information Technology where inquisitive minds of students are fostered, leading to skills professionals for satisfying the needs of society.	1. Apply knowledge of engineering fundamentals & cutting-edge technology to identify and implement innovative solutions for engineering problems and issue in society at large. 2. Build strong interpersonal skills and will engage in life long learning to enhance their career positions, both as team members and leaders.

COs of year 2022-23 Information Technology Department

Semester –III

1. **Organization Behavior**
   1. Outline the applicability of the concept of organizational behaviour to understand the behaviour of people in the organization.
   2. Categorizing the applicability of analyzing the complexities associated with management of individual behaviour in the organization.
   3. Analyze the complexities associated with management of the group behaviour in the organization
   4. Validate how the organizational behaviour can integrate in understanding the motivation (why) behind behaviour of people in the organization
2. **Mathematics-III**
   1.Describe the concept of Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra, Stochastic calculus, Computational graph theory
   2.Illustrate the concept of Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra, Stochastic calculus, Computational graph theory by using examples.
   3.Apply the concept of Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra, Stochastic calculus, Computational graph theory to solve the problem.
   4.Analyze the problem by using the concept of Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra, Stochastic calculus, Computational graph theory.
   5.Evaluate the problem base on the concept of Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra, Stochastic calculus, Computational graph theory.

3. **Digital Electronics & Fundamentals of Microprocessor**

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1. Define basic logical circuits, Boolean algebra, minimization methods, methods for writing Boolean functions, combinational and sequential circuits, flip-flops, digital automaton, and programmable structures.
2. Describe operation methods of combinational and sequential circuits, similarities and differences of writing the Boolean functions and minimizations.
3. Select appropriate methods for realization and circuit minimization.
4. Pattern recognition for specific circuit realization and error discovery during circuit design process.
5. Synthesis of appropriate combinational and sequential logic circuits.

4. Computer Arhcitecture & Organsization

1. Outcome- Interpret the functional architecture of computing systems. (Understanding) Classify and compute the performance of machines.
2. Explain addressing modes, instruction formats and program control statements.
3. Relate to arithmetic for ALU implementation. Understand the basics of hardwired and micro-programmed control of the CPU.
4. Build large memories using small memories for better performance. Write ISA level code for RISC and CISC machines.
5. Identify, compare and assess issues related to ISA, memory, control and I/O functions. (Applying, Analyzing, Evaluating)

5. Data structure using OOPs

1. Understand the concept of ADT.
2. Identify data structures suitable to solve problems.
3. Develop and analyze algorithms for stacks, queues.
4. Develop algorithms for binary trees and graphs.
5. Implement sorting and searching algorithms.

6. Computer Graphics

1. Understand the scope of computer graphics and also identified the field related to computer Graphics
2. Demonstrate on the concepts on transforms including translation, rotation, scaling, shearing and reflection.
3. Design algorithms for different geometric shapes, lines , circle, ellipse.
4. Develop algorithms for binary trees and graphs.
5. Implement sorting and searching algorithms.

7. Data structure using OOPs(Lab)

1. Ability to analyze algorithms and algorithm correctness.
2. Ability to summarize searching and sorting techniques.
3. Ability to describe stack, queue and linked list operation.
4. Ability to have knowledge of tree and graphs concepts.

8. Digital Electronics & Fundamentals of Microprocessor (Lab)

1.Describe and explain the operation of fundamental digital gates.

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2.Analyze the operation of medium complexity standard combinational circuits like the encoder, decoder, multiplexer, de-multiplexer, and adder.
3.Analyze the operation of a flip-flop and examine relevant timing diagrams.
4.Learn importance of Microprocessors in designing real time applications.
5.Describe the 8085, 8086 & 80386 Microprocessors architectures and its feature.

9. Computer Graphics (Lab)

1. To list the basic concepts used in computer graphics.
2. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
3. To describe the importance of viewing and projections.
4. To understand a typical graphics pipeline.

10. Universal Human Values

1. Apply effective written and oral communication skills to business and legal situations.
2. Analyze the global legal environment.
3. Students will graduate with the ability to analyze complex problems, find and deploy a variety of legal authorities, and communicate effectively in a variety of settings.
4. Use critical thinking skills in business situations.
5. Apply an ethical understanding and perspective to business situations.

Semester –IV

1. Theory of Computation

1. Students shall able to define the mathematical principles behind theoretical computer science.
2. Students shall able to Differentiate and give examples for the different types of automata like finite automata, push down automata, linear bounded automata and turing machine.
3. Students shall able to correlate the different types of automata to real world applications.
4. Students shall able to Choose and design appropriate automata for the different requirements outlined by theoretical computer science.
5. Students shall able to identify the different computational problems and their associated complexity.

2. Java Programming

1. Student shall be able to Understand and implement advanced Java concepts.
2. Student shall be able to Develop Java based Web applications using Servlets and JSP.
3. Student shall be able to incorporate cutting-edge frameworks in web application development

3. Operating System

1. Identify the significance of operating system in computing devices.
2. Exemplify the communication between application programs and hardware devices through system calls.

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3. Compare and illustrate various process scheduling algorithms.
4. Apply appropriate memory and file management schemes.
5. Illustrate various disk scheduling algorithms.

4. Computer Networks

1. Discuss the physical and logical as well as the electrical characteristics of digital signals and the basic methods of data transmission.
2. Identify the importance of the ISO 7-layer reference model.
3. Identify and requirements hosted in communication protocols and give an overview of data communication standards, how these standards were developed and under which assumptions they were adopted.
4. Establish a solid knowledge of the layered approach that makes design, implementation, and operation of extensive networks possible.
5. Acquire the knowledge of the basic protocols involved in wired/wireless communication process.

5. DBMS

1. Learn and understand fundamentals of database management system.
2. Exhibit the query development knowledge.
3. Learn modeling and normalization of databases.
4. Learn query processing and file organization.
5. Exhibit the knowledge of transaction and concurrency control

6. Discrete Mathematics & Graph Theory

1.Be able to construct simple mathematical proofs and possess the ability to verify them ABET

2. Acquire ability to describe computer programs (e.g. recursive functions) in a formal mathematical manner

3. Be able to apply basic counting techniques to solve combinatorial problems

7. DBMS(Lab)

1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction.
3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
4. Analyze and Select storage and recovery techniques of database system.

8. Computer Networks(Lab)

1. Understand fundamental underlying principles of computer networking.
2. Understand details and functionality of layered network architecture.
3. Apply mathematical foundations to solve computational problems in computer networking.
4. Analyze performance of various communication protocols.
5. Compare routing algorithms.

9. Java Programming(Lab)

1. Understand the structure and model of the Java programming language, (knowledge)

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2. Use the Java programming language for various programming technologies (understanding).
3. Develop software in the Java programming language, (application).
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis).
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis).

10. Field Training

1. Participate in the projects in industries during his or her industrial training.
2.Describe use of advanced tools and techniques encountered during industrial training and visit.
3.Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
4.Develop awareness about general workplace behavior and build interpersonal and team skills.
5.Prepare professional work reports and presentations.

Semester –IV

11. Theory of Computation **IT4T001**

1. Students shall able to define the mathematical principles behind theoretical computer science.
2. Students shall able to Differentiate and give examples for the different types of automata like finite automata, push down automata, linear bounded automata and turing machine.
3. Students shall able to correlate the different types of automata to real world applications.
4. Students shall able to Choose and design appropriate automata for the different requirements outlined by theoretical computer science.
5. Students shall able to identify the different computational problems and their associated complexity.

12. Java Programming **IT4T002**

1. Student shall be able to Understand and implement advanced Java concepts.
2. Student shall be able to Develop Java based Web applications using Servlets and JSP.
3. Student shall be able to incorporate cutting-edge frameworks in web application development

13. Operating System **IT4T003**

1. Identify the significance of operating system in computing devices.
2. Exemplify the communication between application programs and hardware devices through system calls.
3. Compare and illustrate various process scheduling algorithms.
4. Apply appropriate memory and file management schemes.

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5. Illustrate various disk scheduling algorithms.

14. Computer Networks **IT4T004**

1. Discuss the physical and logical as well as the electrical characteristics of digital signals and the basic methods of data transmission.
2. Identify the importance of the ISO 7-layer reference model.
3. Identify and requirements hosted in communication protocols and give an overview of data communication standards, how these standards were developed and under which assumptions they were adopted.
4. Establish a solid knowledge of the layered approach that makes design, implementation, and operation of extensive networks possible.
5. Acquire the knowledge of the basic protocols involved in wired/wireless communication process.

15. DBMS **IT4T005**

1. Learn and understand fundamentals of database management system.
2. Exhibit the query development knowledge.
3. Learn modeling and normalization of databases.
4. Learn query processing and file organization.
5. Exhibit the knowledge of transaction and concurrency control

16. Discrete Mathematics & Graph Theory **IT4T006**

1.Be able to construct simple mathematical proofs and possess the ability to verify them ABET

2. Acquire ability to describe computer programs (e.g. recursive functions) in a formal mathematical manner

3. Be able to apply basic counting techniques to solve combinatorial problems

17. DBMS(Lab) **IT4L007**

1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction.
3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
4. Analyze and Select storage and recovery techniques of database system.

18. Computer Networks(Lab) **IT4L008**

1. Understand fundamental underlying principles of computer networking.
2. Understand details and functionality of layered network architecture.
3. Apply mathematical foundations to solve computational problems in computer networking.
4. Analyze performance of various communication protocols.
5. Compare routing algorithms.

19. Java Programming(Lab) **IT4L009**

1. Understand the structure and model of the Java programming language, (knowledge)
2. Use the Java programming language for various programming technologies (understanding).

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3. Develop software in the Java programming language, (application).
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis).
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis).

20. Field Training

2. Participate in the projects in industries during his or her industrial training.
2.Describe use of advanced tools and techniques encountered during industrial training and visit.
3.Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
4.Develop awareness about general workplace behavior and build interpersonal and team skills.
5.Prepare professional work reports and presentations.

Semester –V

1. Embedded System & IoT **IT5T001**

1. To acquire the knowledge of fundamentals of embedded system and peripherals.
2. To acquire the knowledge of fundamentals of firmware used in embedded systems to perform an
application specific task.
3. To acquire the knowledge of fundaments of IOT
4. To acquire the knowledge to choose between available technologies and devices that are stated for
embedded systems and IOT challenges.
5. To design & develop embedded systems for variousreal-life scenarios.

2. Cyber Security & Cryptography **IT5T002**

1 To Understand basic concepts of Cyber security.

2 To apply various standards Symmetric Encryption algorithms to provide confidentiality and Asymmetric Encryption algorithms to achieve authentication.
3 To Compare and apply various authentication Techniques
4 To Evaluate and Communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training
5 To select and apply appropriate Intrusion detection and prevention techniques and to examine various security algorithms to Interpret security incidents

3. Design and Analysis of Algorithm **IT5T003**

1. Ability to understand how the choice of data structures and the algorithm design methods impact the
performance of programs.
2. Compute complexity measures of algorithms, including recursive algorithms using recurrence relations

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3. Design standard algorithms such as sorting, searching, and problems involving graphs
4. Develop efficient algorithms for simple computational tasks.
5. Gain understanding of concepts of time and space complexity, worst case, average case and best-case
complexities and the big-O notation.

4. Open Elective-1 (WDD) **ITOEC1**

1. Understand thebasic tags of HTML, CSS, and JavaScript
2: Execute the different Syntax and Tags present in HTML, CSS, and JavaScript
3. Analyze difference between various web design Languages
4. Evaluate the design of Different Forms
5. Design the web site form

5. Elective -I (SW) **IT5TE01**

1: Understand the fundamentals of Semantic web
2: Creating structured web documents in XML
3: Apply ontology engineering to various problems.
4: Understand Semantic Web query languages (SPARQL)
5: Program semantic applications with Java and Jena API.

6. Embedded System & IoT (Lab) **IT5L004**

Investigate a variety of emerging devices and technologies such as smart sensing, pervasiveconnectivity, virtual interfaces & ubiquitous computing and their potential applications in consumer, retail, healthcare and industrial contexts

7. Cyber Security & Cryptography (Lab) **IT5L005**

1: Understand computer security principles and discuss ethical issues for theft of information. Identify threat models and common computer network security goals
2: Explain various encryption algorithms, hashing functions, one-way authentication and public key cryptology
3: Analyze firewalls, DOS attacks and defense types. Dramatize example scenarios in DNS and IPSec applications

8. Design and Analysis of Algorithm (Lab) **IT5L008**

1.To find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate).
2.To apply classical sorting, searching, optimization and graph algorithms Apply classical sorting, searching, optimization and graph algorithms
3. To understand basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, and greedy.
4.To explain NP-Completeness and deal with NP-complete problems.

9. Mini Project **IT5P007**

1. Students will be able to practice acquired knowledge within the chosen area of technology for project development.
2. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.

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3. Reproduce, improve and refine technical aspects for engineering projects.
4. Work as an individual or in a team in development of technical projects.
5. Communicate and report effectively project related activities and findings

10. Innovation and Enterpreneurship Development **IT5T009**

1. Identify and validate of ideas.
2. Remember Patent registration of Innovation.
3. Understand roles and responsibilities of Entrepreneurship.

Semester –VI

1. Adhoc Wireless Networks **IT6T001**

CO1. Design their own wireless network
CO2. Evaluate the existing network and improve its quality of service
CO3. Choose appropriate protocol for various applications
CO4. Examine security measures present at different level
CO5. Analyze energy consumption and management

2. Machine Learning **IT6T002**

CO1. To demonstrate knowledge of the machine learning literature.
CO2. To describe how and why machine learning methods work.
CO3. To demonstrate results of parameter selection.
CO5. To select and apply appropriate machine learning methods to a selected problem.
CO6. Toimplement machine learning algorithms on real datasets.

3. Elective -II (Cloud Computing and Storage Management Semester) **IT6TE02**

1. To understand the key dimensions of the challenge of Cloud Computing.
2. To assess the economics, financial and technological implications for selecting cloud Computing for organization.
3. To describe and apply storage technologies.
4. To identify leading storage technologies that provide cost-effective IT solutions for medium to large scale businesses and data centres.
5. To describe important storage technology features such as availability, replication, scalability and performance.

4. Elective -II (Blockchain) **IT6TE02**

CO1: Understand emerging abstract models for Blockchain Technology.
CO2: Identify major research challenges and technical gaps existing between theory and practice
in crypto currency domain.
CO3: It provides conceptual understanding of the function of Blockchain as a method of securing
distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.
CO4: Apply hyperledger Fabric and Etherum platform to implement the Block chain Application

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5. **Elective -II (Expert Systems)** **IT6TE02**

CO1. Students will be able to understand Knowledge Representation.
CO2. Students will be able to understand what is Machine Learning.
CO3. Students will be able to analyse a Hybrid Expert System for Insurance Policy.
CO4. Students will illustrate the Frame Problem.
CO5. Students will be Understand what is Neural Network

6. **Elective -II (Big Data Analytic Technique)** **IT6TE02**

CO1. Understand basic concepts and techniques of Hadoop ecosystem and Big data.
CO2.Design different component of Hadoop ecosystem.
CO3. Understand the domain of data science and analysis of big data.

7. **Elective-III (Graph Analytic for Big data)** **IT6TE03**

CO1.To model and implement efficient big data solutions for various application areas using appropriately selected algorithms and data structures.
CO2.To analyze methods and algorithms, to compare and evaluate them with respect to time and
space requirements, and make appropriate design choices when solving real-world problems.
CO3.To explain trade-offs in big data processing technique design and analysis in written and oral form.
CO4.To explain the Big Data Fundamentals, including the evolution of Big Data, the characteristics of Big Data and the challenges introduced.
CO5.To apply non-relational databases, the techniques for storing and processing large volumes
of structured and unstructured data, as well as streaming data.

8. **Elective-III (Smart Sensors for Robotics)** **IT6TE03**

CO1.Student shall be able to differentiate sensors uses..
CO2.Student shall be able to apply the knowledge of different sensors in different area of robotics.
CO3.Students shall able to understand the robotics assembly

9. **Elective-III (Human Computing Interface)** **IT6TE03**

CO1. Design effective dialog for HCI.
CO2.Design effective HCI for individuals and persons with disabilities.
CO3.Assess the importance of user feedback.
CO4 Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
CO5 Develop meaningful user interface.

10. **Elective-III (Machine Learning with Big Data)** **IT6TE03**

CO1. Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
CO2. Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
CO3. Ability to solve problems associated with batch learning and online learning, and the big

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data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
CO4. Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
CO5. Ability to recognize and implement various ways of selecting suitable model parameters
for different machine learning techniques.

11. Adhoc Wireless Networks (Lab) **IT6L003**

To be able to understand importance of ad-hoc network, NS3 and assembly programming
To be able to understand about importance of various Interfaces.

12. Machine Learning (Lab) **IT6L004**

1. To demonstrate knowledge of the machine learning literature.
2. To describe how and why machine learning methods work.
3. To demonstrate results of parameter selection.
4. To explain relative strengths and weaknesses of different machine learning methods.
5. To select and apply appropriate machine learning methods to a selected problem. 6. To implement machine learning algorithms on real datasets.

13. Multimedia (Lab) **IT6L005**

1. Students will be able to understand how to create their own Animations by using differentMultimedia software.
2. Students will understand Flash8 software.
3. Students will understand background given techniques while creating Animation.
4. Students will understand how to simulate movement.

14. Mini Project **IT6P006**

1. Students will be able to practice acquired knowledge within the chosen area of technology for project development.
2. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
3. Reproduce, improve and refine technical aspects for engineering projects.
4. Work as an individual or in a team in development of technical projects.
5. Communicate and report effectively project related activities and findings

15. CRT(Campus Recruitment Training) **IT6P007**

1. Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.
2. Analyze the Problems logically and approach the problems in a different manner.
3. Students will be able to apply mathematical analysis of data to make connections, draw conclusions and solve problems.
4. Students will learn a series of techniques through practical activities to develop presenting skills and enhance confidence to expand the potential of the individual.
5. Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.

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16. Intellectual Property Rights **IT6T009**

CO 1: To provide an understanding of the law relating to Intellectual Property and Competition in India.

CO2: To understand the concept of Intellectual Property and Intellectual Property Rights with special reference to India.

CO3:To appreciate the significance of Intellectual Property in modern times, in the light of its international legal regime.

CO4:To study the important Agreements, Treaties and Conventions relating to Intellectual Property Rights.

CO5:To understand the intricacies of grant of Patent, Patentability, Licensing and Revocation at National and International levels.

HOD IT

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Department of Mechanical Engineering

Education to Eternity

॥ज्ञानम् सर्वार्थ साधनम्॥

VISION	MISSION
To be a centre of excellence of learning and research in Mechanical Engineering."	1. To provide high quality, innovative and research environment in Mechanical Engineering. 2. To impart soft skills and hard skills to achieve the institutional vision

COURSE OUTCOME LIST 2021-22

Semester	Course Code	Course Name	CO Number	Course Outcome
1	HU1T001	Communication Skills	CO1	1) to better reading comprehension, pronunciation, and functional English grammar.
1	HU1T001	Communication Skills	CO2	2) to write letters and resumes
1	HU1T001	Communication Skills	CO3	3) to organize their thoughts for effective presentation and writing.
1	HU1T001	Communication Skills	CO4	4) to learn skills to present themselves well in an interview, and handle a Group Discussion
1	MA1T001	Engineering Mathematics- I	CO1	1. Describe rank, Bernoulli's theorem, Taylor's and Maclaurin's theorems for functions of two variables, – Euler's
1	MA1T001	Engineering Mathematics- I	CO2	2. Illustrate the examples of ordinary differential equation, partial differential equation, matrices.
1	MA1T001	Engineering Mathematics- I	CO3	3. Solve questions related to ordinary differential equation, partial differential equation, matrices and their
1	MA1T001	Engineering Mathematics- I	CO4	4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, and their
1	MA1T001	Engineering Mathematics- I	CO5	5. interpret the results of matrices, ordinary differential equation, partial differential equation and their
1	MA1T001	Engineering Mathematics- I	CO6	6. Design a method or modal on matrices, ordinary differential equation, partial differential equation.
1	ME1T002	Engineering Chemistry	CO1	1. Describe various properties of water, nano-materal, transition metal ions and their magnetic properties, Debye-
1	ME1T002	Engineering Chemistry	CO2	2. Illustrate the various types of water, carbon nanotubes, Molecular orbital theory, Transport number by Moving
1	ME1T002	Engineering Chemistry	CO3	3. Analyze the question on water characteristics, electrochemistry and various types of instrumental titration,
1	ME1T002	Engineering Chemistry	CO4	4. Apply the Knowledge of zeolite process, Ion exchange process, Hot Lime –Soda process, acid base concept,
1	ME1T002	Engineering Chemistry	CO5	5. Develop a Modal on softening of water, standardization of acid and base by various instruments, doping on
1	ME1T002	Engineering Chemistry	CO6	6. Organize water as per quality, carbon nanotubes, electrodes, Energy level diagrams of diatomic molecules,
1	ME1T003	Engineering Graphics	CO1	1. Define various concepts like dimensioning, conventions and standards related to engineering graphics
1	ME1T003	Engineering Graphics	CO2	2. Interpret drawings of simple machine component in first and third angle of projection systems
1	ME1T003	Engineering Graphics	CO3	3. Apply theory of projections in projection of lines, projection of planes and projection of solid.
1	ME1T003	Engineering Graphics	CO4	4. Classify solid geometry in different positions.
1	ME1T003	Engineering Graphics	CO5	5. Assess the two dimensional and three dimensional drawing in CAD software.
1	ME1T003	Engineering Graphics	CO6	6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD
1	HU1L001	Communication Skills Lab.	CO1	CO1.Remember Communication Skills by giving adequate exposure in reading, writing,
1	HU1L001	Communication Skills Lab.	CO2	CO2.Understand the communication process by identifying, explaining, and applying current communication
1	HU1L001	Communication Skills Lab.	CO3	CO3.Apply proficiency, both in spoken and written English.
1	HU1L001	Communication Skills Lab.	CO4	CO4.Analysing the communication behaviours of others and themselves in a variety of scenario (e.g. interpersonal,
1	HU1L001	Communication Skills Lab.	CO5	CO5.Evaluate and organize their thoughts for effective presentation and writing.
1	HU1L001	Communication Skills Lab.	CO6	CO6. Improve research, organizational, and critical thinking skills by finding and evaluating reference material and
1	ME1L002	Engineering Chemistry Lab	CO1	1. Recall hardness of water, acid value, saponification number of oils.

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Semester	Course Code	Course Name	CO Number	Course Outcome
1	ME1L002	Engineering Chemistry Lab	CO2	2. Demonstrate an ability to make chemical measurements and understand the limits of precision in
1	ME1L002	Engineering Chemistry Lab	CO3	3. Enhance the comprehensibility of the practical concepts and their application.
1	ME1L002	Engineering Chemistry Lab	CO4	4. Apply the analytical techniques to the experimental data
1	ME1L002	Engineering Chemistry Lab	CO5	5. Making judgments based on criteria and standards through checking and critiquing
1	ME1L002	Engineering Chemistry Lab	CO6	6. Design and apply the practical knowledge of engineering chemistry in daily life
1	ME1L003	Engineering Graphics Lab	CO1	1. Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices and display
1	ME1L003	Engineering Graphics Lab	CO2	2. Explain drawing of simple machine component in CAD software.
1	ME1L003	Engineering Graphics Lab	CO3	3. Acquire the knowledge of geometric modeling in CAD software.
1	ME1L003	Engineering Graphics Lab	CO4	4. Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
1	ME1L003	Engineering Graphics Lab	CO5	5. Assess the two dimensional and three dimensional drawing in CAD software.
1	ME1L003	Engineering Graphics Lab	CO6	6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD
1	ME1T004	Basic Civil and Mechanical Engineering	CO1	1. Define basic stream of Mechanical & Civil Engineering.
1	ME1T004	Basic Civil and Mechanical Engineering	CO2	2. Explain the concepts of product manufacturing, Energy engineering, design engineering, Automobile
1	ME1T004	Basic Civil and Mechanical Engineering	CO3	3. Apply Basic knowledge of Casting, Machining, Designing, Manufacturing & Civil Construction technique.
1	ME1T004	Basic Civil and Mechanical Engineering	CO4	4. Analyzed the different mechanical system and properties of construction & surveying material.
1	ME1T004	Basic Civil and Mechanical Engineering	CO5	5. Interpret the problem in mechanical system and civil structure.
1	ME1T004	Basic Civil and Mechanical Engineering	CO6	6. Solve the problem in mechanical system and civil structure.
2	HU2T002	Introduction to Computer programming	CO1	CO1: Define the algorithms, flowcharts, array , pointer, structure ,function , python.
2	HU2T002	Introduction to Computer programming	CO2	CO2: Discuss and differentiate between variables , operators ,statements , loops, array dimensions.
2	HU2T002	Introduction to Computer programming	CO3	CO3:Demonstrate working programs using functions, loops ,conditional statements ,array ,pointer, structure and
2	HU2T002	Introduction to Computer programming	CO4	CO4:Distinguish between different steps of programming and prioritize levels of programming.
2	HU2T002	Introduction to Computer programming	CO5	CO5:Find errors and predict outcome in C and python programming.
2	HU2T002	Introduction to Computer programming	CO6	CO6:Compose and develop any application using C and python programming.
2	MA2T001	Engineering Mathematics- II	CO1	1. Describe concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector
2	MA2T001	Engineering Mathematics- II	CO2	2. Illustrate the concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform,
2	MA2T001	Engineering Mathematics- II	CO3	3. Apply the knowledge of complex numbers, integral calculus & multiple integrals, Fourier series & transform,
2	MA2T001	Engineering Mathematics- II	CO4	4. Analyze the problems and results of complex numbers, integral calculus & multiple integrals, Fourier series &
2	MA2T001	Engineering Mathematics- II	CO5	5. Evaluate the problems by using complex numbers, integral calculus & multiple integrals, Fourier series
2	MA2T001	Engineering Mathematics- II	CO6	6. Create the methods or model by using complex numbers, integral calculus & multiple integrals, Fourier series &
2	ME2T005	Engineering Physics	CO1	1.Acquire fundamental understanding of concepts specifically concern to semiconducting materials, Optics, Fibre
2	ME2T005	Engineering Physics	CO2	2.Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering
2	ME2T005	Engineering Physics	CO3	3.To develop a systematic, logical approach to problem – solving that can be applied to problems in physics and to
2	ME2T006	Energy and Environment Engineering	CO1	1) Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.
2	ME2T006	Energy and Environment Engineering	CO2	2) Understand the importance of ecosystem for human beings..
2	ME2T006	Energy and Environment Engineering	CO3	3) Discover innovative method of power generation.
2	ME2T006	Energy and Environment Engineering	CO4	4) Correlate the cost of various method of power generation.
2	ME2T006	Energy and Environment Engineering	CO5	5) Judge the quality of air.
2	HU2L002	Introduction to Computer programming Lab	CO1	1. Understand the logic for a given problem.
2	HU2L002	Introduction to Computer programming Lab	CO2	2. Write the algorithm of a given problem.
2	HU2L002	Introduction to Computer programming Lab	CO3	3. Draw a flow chart of a given problem.
2	HU2L002	Introduction to Computer programming Lab	CO4	4. Recognize and understand the syntax and construction of C programming code..
2	HU2L002	Introduction to Computer programming Lab	CO5	5. Make use of different data-structures like arrays, pointers, structures and files.
2	HU2L002	Introduction to Computer programming Lab	CO6	6. Know the alternative ways of providing solution to a given problem.
2	ME2L005	Engineering Physics Lab	CO1	1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber a
2	ME2L005	Engineering Physics Lab	CO2	2. Understand the working principles of Semiconducting devices and their application

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Semester	Course Code	Course Name	CO Number	Course Outcome
2	ME2L005	Engineering Physics Lab	CO3	3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and
2	ME2L005	Engineering Physics Lab	CO4	4. Analyze the different crystal structure with the help of crystal models.
2	ME2L005	Engineering Physics Lab	CO5	5. Construct the various devices based on optical phenomenon.
2	ME2L005	Engineering Physics Lab	CO6	6. Design the frame work of various electronic circuitries based on semiconducting materials.
2	ME2T007	Basic Electrical and Electronics Engineering	CO1	1. Define fundamentals of electrical system and choose measuring instruments for measurement of electrical
2	ME2T007	Basic Electrical and Electronics Engineering	CO2	2. Classify wiring system and compare energy resources for electrical energy generation & elaborate the transistor
2	ME2T007	Basic Electrical and Electronics Engineering	CO3	3. Plan and organize the utilization of energy resources of electrical system & apply transistor characteristics to
2	ME2T007	Basic Electrical and Electronics Engineering	CO4	4. Compare different sources of electrical system & distinguish various logic gates and simplify the Boolean's
2	ME2T007	Basic Electrical and Electronics Engineering	CO5	5. Justify the utilization of various electrical and electronics components into electrical and electronics circuitries.
2	ME2T007	Basic Electrical and Electronics Engineering	CO6	6. Construct various circuits using Resistors, capacitors, inductors, PN junction diode, Zener diode, transformers,
3	ME3T001	Applied Maths-III	CO1	1. Describe Matrices, properties of Laplace transform and Z Transform, partial differential equation, Function of
3	ME3T001	Applied Maths-III	CO2	2. Illustrate the examples using Matrices, Laplace and Z Transform, Partial differential equation, Function of
3	ME3T001	Applied Maths-III	CO3	3. Apply the knowledge of Matrices, Laplace transform, Z Transform, Partial differential equation, Function of
3	ME3T001	Applied Maths-III	CO4	4. Analyze the question on Matrices, Laplace transform ,Z Transform, Partial differential equation , Function of
3	ME3T001	Applied Maths-III	CO5	5. Synthesize the knowledge of Matrices, Laplace transform, Z Transform, Partial differential equation, Function of
3	ME3T002	Rigid Body Mechanics	CO1	1. Define static, dynamic, kinematic and kinetic bodies, law of transmissibility, Varignon's theorem, Lami's
3	ME3T002	Rigid Body Mechanics	CO2	2. Interpret conditions of body based on rest or in motion, the system of forces like concurrent or non-
3	ME3T002	Rigid Body Mechanics	CO3	3. Apply knowledge, facts and techniques in the applications like beams, frames, trusses, spheres, composite
3	ME3T002	Rigid Body Mechanics	CO4	4. Examine the given problems using concepts such as free body diagrams and force analysis methods in
3	ME3T002	Rigid Body Mechanics	CO5	5. Present opinions on conservative as well as non-conservative forces systems and validate simple general rigid
3	ME3T002	Rigid Body Mechanics	CO6	6. Propose alternative solutions on various applications of rigid body as well as create equations based on the
3	ME3T003	Material Science	CO1	1. Define various structure of materials, their properties, testing methodologies, equilibrium diagrams, heat
3	ME3T003	Material Science	CO2	2. Classify the various materials on the basis of characterization and behavior, heat treatment process with
3	ME3T003	Material Science	CO3	3. Demonstration of the various phase transformation equilibrium diagrams, destructive and nondestructive
3	ME3T003	Material Science	CO4	4. Analyze heat treatment process for required mechanical properties.
3	ME3T003	Material Science	CO5	5. Evaluate samples of different materials for metallography.
3	ME3T003	Material Science	CO6	6. Estimate mechanical properties, phase diagrams and metallographic samples.
3	ME3T004	Engineering Thermodynamics	CO1	1. Define the four basic laws viz. zeroth law, first law, second law and third law of thermodynamics and
3	ME3T004	Engineering Thermodynamics	CO2	2. Illustrate basic concepts, properties of substances and Laws of thermodynamics.
3	ME3T004	Engineering Thermodynamics	CO3	3. Apply the Laws of Thermodynamics for various thermodynamic processes / cycles.
3	ME3T004	Engineering Thermodynamics	CO4	4. Categorize different thermodynamic processes for heat and work transfer.
3	ME3T004	Engineering Thermodynamics	CO5	5. Evaluate knowledge of thermodynamics to suggest solutions for problems.
3	ME3T004	Engineering Thermodynamics	CO6	6. Design the system using basic laws of thermodynamic.
3	ME3T005	Theory Of Machines-I	CO1	1. Define various types of mechanisms, velocity and acceleration images, cam and follower, Laws of friction,
3	ME3T005	Theory Of Machines-I	CO2	2. Explain the concepts of simple mechanism, velocity and acceleration images, types of cam and follower,
3	ME3T005	Theory Of Machines-I	CO3	3. Compute the degree of freedom,velocity and acceleration in simple mechanisms and cam and follower,
3	ME3T005	Theory Of Machines-I	CO4	4. Analyze various mechanisms, cams and follower, clutches and brakes,gears and gear trains.
3	ME3T005	Theory Of Machines-I	CO5	5. Design the various mechanisms,cam and follower, clutches and breaks,gears and gear trains for specific
3	ME3T006	Manufacturing Engineering-I	CO1	1. Identify different castings, forming, joining & plastic processing also it's working principles and applications.
3	ME3T006	Manufacturing Engineering-I	CO2	2. Classify & describe different castings, forming, joining & plastic processing. Compute the degree of freedom,
3	ME3T006	Manufacturing Engineering-I	CO3	3. Demonstrate working principles and applications of castings, forming, welding & plastic processing including
3	ME3T006	Manufacturing Engineering-I	CO4	4. Categorize different operation performed in castings, forming, joining & plastic processing.
3	ME3T006	Manufacturing Engineering-I	CO5	5. Create different job using different operation performed in castings, forming, joining & plastic processing.
3	ME3L003	Material Science Lab	CO1	1. Categorize the ferrous alloy, nonferrous alloy, heat treatment process, destructive testing, nondestructive
3	ME3L003	Material Science Lab	CO2	2. Justify the experimentation on the metallurgical microscope, heat treatment furnace and devices used for

Semester	Course Code	Course Name	CO Number	Course Outcome
3	ME3L003	Material Science Lab	CO3	3. Apply the experimental procedures for microstructure examinations, specimen preparation and heat
3	ME3L003	Material Science Lab	CO4	4. Analyze the microstructure of samples and heat treatment of steel samples.
3	ME3L006	Manufacturing Engineering-I Lab	CO1	1. Make use of various manufacturing process for preparation of pattern, moulding, casting, forming, joining.
3	ME3L006	Manufacturing Engineering-I Lab	CO2	2. Categorize the various manufacturing process as per application of industry.
3	ME3L006	Manufacturing Engineering-I Lab	CO3	3. Justify the various operations of casting, forming, joining.
3	ME3L007	Machine Drawing and Computer Graphics	CO1	1. Define sectional views, limits, fits, tolerances, machine component& symbols along with proper application
3	ME3L007	Machine Drawing and Computer Graphics	CO2	2. Illustrate sectional views, limits, fits, tolerances, symbols, machine component & assemblies for appropriate
3	ME3L007	Machine Drawing and Computer Graphics	CO3	3. Construct different sectional views, machine element, and assemblies.
3	ME3L007	Machine Drawing and Computer Graphics	CO4	4. Classify different sectional views, machine elements & assemblies.
4	ME4T001	Numerical Method	CO1	1. Describe the concept error analysis, algebraic equation, root of equation, ODE, numerical integration,
4	ME4T001	Numerical Method	CO2	2. Illustrate the concept of various Numerical Techniques Bisection methods, Newton Raphson method, Gauss-
4	ME4T001	Numerical Method	CO3	3. Solve the given Engineering problem using the suitable Numerical Technique Bisection methods, Newton
4	ME4T001	Numerical Method	CO4	4. Analyze the question on algebraic equation, root of equation, ODE, numerical integration, Interpolation, Curve
4	ME4T001	Numerical Method	CO5	5. Develop the computer programming based on the Numerical Technique of algebraic equation, root of equation,
4	ME4T002	Basic Electronic Engineering	CO1	1. Define semiconductor, Energy band diagram, diffusion component diode, DC circuit, BJT & FET amplifier.
4	ME4T002	Basic Electronic Engineering	CO2	2. Illustrate semiconductor material, energy band diagram, DC circuit, BJT & FET amplifier, Bipolar transistor &
4	ME4T002	Basic Electronic Engineering	CO3	3. Develop energy band diagram, diffusion current circuit, Bipolar transistor amplifier circuit using BJT & FET.
4	ME4T002	Basic Electronic Engineering	CO4	4. Analyse semiconductor material, diffusion current component, electronic circuit, BJT & FET amplifier circuit.
4	ME4T002	Basic Electronic Engineering	CO5	5. Interpret electronic circuit, simple amplifier circuit.
4	ME4T002	Basic Electronic Engineering	CO6	6. Design electronic circuit & amplifier circuit using BJT & FET.
4	ME4T003	Product Design and Development	CO1	1. Select phases of product design, Idea Creation, Sketching of product and different commands for 2D and 3D.
4	ME4T003	Product Design and Development	CO2	2. Demonstrate sketching of the component, fitting of the component and interpret the manufacturing process of
4	ME4T003	Product Design and Development	CO3	3. Identify reverse engineering concept and organize product specification data sheet for mechanical design.
4	ME4T003	Product Design and Development	CO4	4. Analyze the wok to meet design requirements.
4	ME4T004	Manufacturing Engineering-II	CO1	1. Identify different machine tool and it's working principles and applications.
4	ME4T004	Manufacturing Engineering-II	CO2	2. Classify & describe different machine tool & it's processes..
4	ME4T004	Manufacturing Engineering-II	CO3	3. Demonstrate working principles and applications of different machine tools & advanced joining Processes
4	ME4T004	Manufacturing Engineering-II	CO4	4. Categorize different operation performed on different machine tool.
4	ME4T004	Manufacturing Engineering-II	CO5	5. Create different job using different operation performed different machine tool.
4	ME4T004	Manufacturing Engineering-II	CO6	6. Able to outline the various systems used in a manufacturing plant and their role in an Industry 4.0 world.
4	ME4T005	Strength Of Materials	CO1	1. Define the basic definitions of axial load, eccentric load, different types of stresses and strain in different
4	ME4T005	Strength Of Materials	CO2	2. Explain the stress state (tension, compression, bending, shear, etc.) and calculate the value of stress developed
4	ME4T005	Strength Of Materials	CO3	3. Solve problems on uniaxial, multiaxial stress situation, principal stresses, stresses on oblique plane, shear force-
4	ME4T005	Strength Of Materials	CO4	4. Analyse given beam for calculations of SF and BM, slope and deflection at a point on cantilever, simply
4	ME4T005	Strength Of Materials	CO5	5. Evaluate materials, sizes and sections for various applications such as beams, shafts, pressure vessels, columns,
4	ME4T005	Strength Of Materials	CO6	6. Design basic elements of structures like beams, shafts, key etc.
4	ME4T006	Fluid Mechanics & Fluid Machines	CO1	1. Define terms like viscosity, vapor pressure, compressibility, surface tension, capillarity, meta-centre and meta-
4	ME4T006	Fluid Mechanics & Fluid Machines	CO2	2. Classify various types of fluid, fluid flow, energy losses, water turbines and pumps
4	ME4T006	Fluid Mechanics & Fluid Machines	CO3	3. Apply Pascal's law, Hydrostatic law, Bernoulli's theorem and Dimensional analysis
4	ME4T006	Fluid Mechanics & Fluid Machines	CO4	4. Analyse the hydrostatic force acting on various plane, meta-centric height of ship model, velocity & acceleration
4	ME4T006	Fluid Mechanics & Fluid Machines	CO5	5. Evaluate the performance of various turbo machines such as pelton wheel turbine, kaplan turbine, Francis
4	ME4T006	Fluid Mechanics & Fluid Machines	CO6	6. Design simple hydraulic systems using the basic principles of fluid mechanics and turbo machinery
4	ME4L004	Manufacturing Engineering Lab	CO1	1. Make use of various machining process for preparation of job.
4	ME4L004	Manufacturing Engineering Lab	CO2	2. Categorize the various machining process as per application of industry.
4	ME4L004	Manufacturing Engineering Lab	CO3	3. Justify the various operations of machining process.

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Semester	Course Code	Course Name	CO Number	Course Outcome
4	ME4L005	Strength Of Materials Lab	CO1	1. Experiment with tension, compression, shear, torsion and impact test for different materials.
4	ME4L005	Strength Of Materials Lab	CO2	2. Analyze the stress and strain relationship under different loading conditions for various metals such as mild
4	ME4L005	Strength Of Materials Lab	CO3	3. Examine the experimental procedure to measure material properties used in industry and construction purpose.
4	ME4L005	Strength Of Materials Lab	CO4	4. Develop appropriate method for testing of the material as per the application
4	ME4L006	Fluid Mechanics & Fluid Machines Lab	CO1	1. Experiment with metacentre, meta-centric height, head loss, Impulse Momentum Principle, Bernoulli's
4	ME4L006	Fluid Mechanics & Fluid Machines Lab	CO2	2. Analysis of venturi-meter, orifice meter, water turbines and hydraulic pumps.
4	ME4L006	Fluid Mechanics & Fluid Machines Lab	CO3	3. Evaluate performance parameters of various hydraulic turbines and hydraulic pumps.
4	ME4T008	Innovation and Entrepreneurship Developm	CO1	1. Identify and validate of ideas.
4	ME4T008	Innovation and Entrepreneurship Developm	CO2	2. Remember Patent registration of Innovation.
4	ME4T008	Innovation and Entrepreneurship Developm	CO3	3. Understand roles and responsibilities of Entrepreneurship.
5	ME5T001	Heat Transfer	CO1	1. State Fourier law, Newton's law of cooling, Stefan Boltzmann law & define Critical thickness, Boiling,
5	ME5T001	Heat Transfer	CO2	2. Classify, Internal heat generation, Critical thickness, Electrical Analogy, Natural & force convection, Lump theory,
5	ME5T001	Heat Transfer	CO3	3. Apply concept of heat transfer in day today works and classify steady & unsteady process, 1D, 2D & 3D heat
5	ME5T001	Heat Transfer	CO4	4. Analyse problems associate with heat transfer through Wall, Cylinder, Sphere in various applications like
5	ME5T001	Heat Transfer	CO5	5. Combine Knowledge of conduction, convection, radiation, heat exchanger, mass transfer, to design and prepare
5	ME5T001	Heat Transfer	CO6	6. Evaluate performance of an activity designed base on heat transfer knowledge, express own opinion based on
5	ME5T002	Theory Of Machines-II	CO1	1. Explain the helical, bevel, worm gear, flywheel, governor, gyroscopic effect and vibrations concept..
5	ME5T002	Theory Of Machines-II	CO2	2. Classify the helical, bevel, worm gear, flywheel, governor, gyroscope effect and vibrations for a particular
5	ME5T002	Theory Of Machines-II	CO3	3. Solve the basic parameter for helical, bevel, worm gear, flywheel, governor, gyroscope effect and vibrations for
5	ME5T002	Theory Of Machines-II	CO4	4. Compare the helical, bevel, worm gear, flywheel, governor, gyroscope and vibrations in the mechanical systems.
5	ME5T002	Theory Of Machines-II	CO5	5. Select the helical, bevel, worm gear, flywheel, governor, gyroscope and vibrations for a particular application
5	ME5T002	Theory Of Machines-II	CO6	6. Design /formulate the helical, bevel, worm gear, flywheel, governor, gyroscope and vibrations for a particular
5	ME5T003	Measurement and Quality Control	CO1	1. Describe various types and sources of errors, parallelism, concepts of interferometer, quality, and variance
5	ME5T003	Measurement and Quality Control	CO2	2. Explain Tolerance, Indian standards, cost of quality, seven quality tools, Line standard and wavelength standard.
5	ME5T003	Measurement and Quality Control	CO3	3. Compute Flatness, Surface texture, process capability, gear errors, plastic deformation.
5	ME5T003	Measurement and Quality Control	CO4	4. Apply sampling inspection, codification system, limits, fits and tolerance, brain storming.
5	ME5T003	Measurement and Quality Control	CO5	5. Create check sheets, cause-effect diagrams, scatter diagrams, control charts for variables and attributes.
5	ME5T003	Measurement and Quality Control	CO6	6. Recommend suitable sampling methods, quality tools, measurement methods.
5	ME5TE01	Elective-I (RES)	CO1	1. List the primary renewable energy sources, their feasibility and challenges.
5	ME5TE01	Elective-I (RES)	CO2	2. Explain the various renewable energy systems such as solar energy collectors, wind turbine, geothermal
5	ME5TE01	Elective-I (RES)	CO3	3. Apply mathematical treatment related to solar energy collectors and wind power generation
5	ME5TE01	Elective-I (RES)	CO4	4. Analyze the performance of renewable energy system such as solar energy collectors and wind power
5	ME5TE01	Elective-I (RES)	CO5	5. Choose the suitable renewable energy system for the desired application.
5	ME5TE01	Elective-I (Analysis and Synthesis of Mechan	CO1	1. Identify degree of freedom, equivalent linkages, transmission angle, Type Synthesis, Number Synthesis,
5	ME5TE01	Elective-I (Analysis and Synthesis of Mechan	CO2	2. Explain degree of freedom, methods of kinematic analysis, concept of mechanism synthesis and types, Type
5	ME5TE01	Elective-I (Analysis and Synthesis of Mechan	CO3	3. Compute mechanical advantage and transmission angle, Dimensional synthesis, Accuracy points, coupler curve
5	ME5TE01	Elective-I (Analysis and Synthesis of Mechan	CO4	4. Analyze four bar linkage, static and dynamic forces for planar mechanism, mechanisms using Kineto-static
5	ME5TE01	Elective-I (Analysis and Synthesis of Mechan	CO5	5. Decide appropriate method for force analysis of planar mechanisms and equation for synthesis of Planar
5	ME5L001	Heat Transfer Lab	CO1	1. Experiment with thermal conductivity of material, fins, Stefan-Boltzmann constant, drop-wise and film-wise
5	ME5L001	Heat Transfer Lab	CO2	2. Analysis of fins performance for nature as well as for force convection, all three mode of heat transfer and heat
5	ME5L001	Heat Transfer Lab	CO3	3. Evaluate performance parameters of heat exchanger, radiation, convection and conduction.
6	ME6T001	Operation Research	CO1	1. Define basic OR models in details, like LPP, Assignment model, Transportation Model, Simulation for desired
6	ME6T001	Operation Research	CO2	2. Describe the various terminology use in OR models.
6	ME6T001	Operation Research	CO3	3. Compute the cost & profit by using OR models for specific application.
6	ME6T001	Operation Research	CO4	4. Apply transportation, assignment models and queuing theory for performance evaluation of engineering and

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Semester	Course Code	Course Name	CO Number	Course Outcome
6	ME6T001	Operation Research	CO5	5. Develop the OR models for various application.
6	ME6T001	Operation Research	CO6	6. Justify & defend various OR models for particular model.
6	ME6T002	Applied Thermodynamics	CO1	1. Describe fuel combustion process, steam generators, steam nozzles, turbine, condenser and compressor.
6	ME6T002	Applied Thermodynamics	CO2	2. Classify various types of fuels, combustion chamber, steam generators, steam nozzle, turbine condenser and
6	ME6T002	Applied Thermodynamics	CO3	3. Demonstrate the performance of combustion chamber, draught system, boilers, nozzles, turbines,
6	ME6T002	Applied Thermodynamics	CO4	4. Compare and choose fuels, combustion chamber, steam generators, nozzle, turbine, condenser, compressor
6	ME6T002	Applied Thermodynamics	CO5	5. Design the different basic components of thermal power plant.
6	ME6T003	Design of Machine Element	CO1	1. Describe various terminologies use for different machine components such as springs, clutches, pressure vessel,
6	ME6T003	Design of Machine Element	CO2	2. Explain basic principle of machine design, and design procedure of joints and components such as shaft, keys,
6	ME6T003	Design of Machine Element	CO3	3. Compute and solve various dimensions of parts of mechanical components for specific application.

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6	ME6T003	Design of Machine Element	CO4	4. Apply concept of design, factors governing the selection of material to design machine components.
6	ME6T003	Design of Machine Element	CO5	5. Design and develop the different mechanism using different joints and components
6	ME6T003	Design of Machine Element	CO6	6. Justify and defend its design procedure for particular product
6	ME6TE01	Elective-II (Power plant engineering)	CO1	1. Analyze and understand the design of the major systems of conventional fossil-fuel steam-cycle power plants.
6	ME6TE01	Elective-II (Power plant engineering)	CO2	2. Thorough knowledge of the basic design principles of nuclear, gas turbine, combined cycle, and alternate power
6	ME6TE01	Elective-II (Power plant engineering)	CO3	3. Understand the economic, environmental, and regulatory issues related to power generation.
6	ME6TE01	Elective-II (Power plant engineering)	CO4	4. Compute the cost of power generation and tariffs for various power plants.
6	ME6TE01	Elective-II (FEM)	CO1	1. Describe the concept of FEM with applications, elements, discretisation and basics of FEM required to analyze
6	ME6TE01	Elective-II (FEM)	CO2	2. Illustrate the concept of coordinate system, stiffness matrix formulation, boundary conditions and dynamic
6	ME6TE01	Elective-II (FEM)	CO3	3. Solve the given Engineering problem on beams, frames, trusses, one dimensional bar element, composite
6	ME6TE01	Elective-II (FEM)	CO4	4. Analyze the question on multipoint constraints, isoparametric formulation, Jacobian matrix, finite element
6	ME6TE01	Elective-II (FEM)	CO5	5. Develop the computer oriented FEM course of action like pre-processing, meshing, processing (element level
6	ME6TE01	Elective-II (Automobile Engineering)	CO1	1. Describe the the vehicle, its components and recent advances in automobiles.
6	ME6TE01	Elective-II (Automobile Engineering)	CO2	2. Illustrate the concept of different chassis, frame, power plant, clutch, gear box, transmission system, brakes,
6	ME6L002	Applied Thermodynamics Lab	CO1	1. Experiment with calorimeter, boiler, nozzle, steam turbine, condenser, flue gas analyser, compressor and
6	ME6L002	Applied Thermodynamics Lab	CO2	2. Analysis of boiler, nozzle and steam turbine.
6	ME6L002	Applied Thermodynamics Lab	CO3	3. Evaluate performance parameters of various component of Thermal Power plant.
6	ME6L003	Design of Machine Element Lab	CO1	1. Choose and defend the selection of material, Design factors.
6	ME6L003	Design of Machine Element Lab	CO2	2. Design different mechanical components like spring, power screw, shaft, coupling etc.
6	ME6L003	Design of Machine Element Lab	CO3	3. Justify design procedure of particular machine element component for its safe and durable design.
6	ME6L004	Computer Graphics Lab	CO1	1.Describe Fundamental concept of finite element method, Benefits of CAD designing process over conventional
6	ME6L004	Computer Graphics Lab	CO3	2.Explain the difference between design software's and modeling software's ,conventional design processes ,
6	ME6L004	Computer Graphics Lab	CO5	3.Develop 2D transformations & 3D Transformations i.e. Translation, Scaling, Rotation, Reflection & Shear of basic
6	ME6P005	Campus Recruitment Training	CO1	1. Solve the problems easily by using Short-cut method with time management which will be helpful to them to
6	ME6P005	Campus Recruitment Training	CO2	2. Analyze the Problems logically and approach the problems in a different manner.
6	ME6P005	Campus Recruitment Training	CO3	3. Students will be able to apply mathematical analysis of data to make connections, draw conclusions and

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Semester	Course Code	Course Name	CO Number	Course Outcome
6	ME6P005	Campus Recruitment Training	CO4	4. Students will learn a series of techniques through practical activities to develop presenting skills and
6	ME6P005	Campus Recruitment Training	CO5	5. Students can produce a resume that describes their education, skills, experiences and measurable
6	ME6P005	Campus Recruitment Training	CO6	6. Students demonstrate an ability to target the resume to the presenting purpose
6	ME6P005	Campus Recruitment Training	CO7	7. Demonstrate professional behavior(s) including preparedness, professional attire, and respectful
6	ME6T008	Research Methodology	CO1	1. Remember the basic framework of research process.
6	ME6T008	Research Methodology	CO2	2. Demonstrate various sources of information for research.
6	ME6T008	Research Methodology	CO3	3. Develop an understanding of various research design and techniques.
6	ME6T008	Research Methodology	CO4	4. Compare various sources of information for literature review and data collection.
6	ME6T008	Research Methodology	CO5	5. Interpret the fundamental functions and working of analytical instruments used in research.
6	ME6T008	Research Methodology	CO6	6. Discuss different methodologies and understanding of paper reading techniques used in research work.

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VISION	MISSION
To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

Course Title : Introduction To Computer Programming **Semester : I**
Course Code : HU1T002 **Course Type : Compulsory**
Pr-requisite : Basic knowledge of Computer **L – T – P : 2 – 0– 0**
Stream : Theory subject **Credits : 2**

Course Objectives:
1. To understand the importance of Programming
2. To understand the application of C Programming.
3. To investigate the key concepts of C Programming.
4. To enable students build a applications based on C programming.

Course Outcome:
CO1: Define the algorithms, flowcharts, array , pointer, structure ,function , python.

CO2: Discuss and differentiate between variables , operators ,statements , loops, array dimensions.

CO3:Demonstrate working programs using functions, loops ,conditional statements ,array ,pointer, structure and files in C and python language .

CO4:Distinguish between different steps of programming and prioritize levels of programming.

CO5:Find errors and predict outcome in C and python programming.

CO6:Compose and develop any application using C and python programming.

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Course Title : Engineering Mathematics-1 **Semester : I**
Course Code : MA1T001 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Mathematics **L – T – P : 3 – 1– 0**
Stream : Core subject **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem.

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe rank, Bernoulli's theorem, Taylor's and Maclaurin's theorems for functions of two variables, – Euler's Theorem for functions containing two and three variables, Lagrange's theorem
2. Illustrate the examples of ordinary differential equation, partial differential equation,matrices.
3. Solve questions related to ordinary differential equation, partial differential equation,matrices andtheir applications.
4. Apply the knowledge of matrices, ordinary differential equation, partial differential equation, andtheir applications to real world problems.
5. Interpret the results of matrices, ordinary differential equation, partial differential equation and theirapplications.
6. Design a method or modal on matrices, ordinary differential equation, and partial differentialequation.

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Course Title : Engineering Physics | **Semester : I**
Course Code : AI1T005 | **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Physics | **L – T – P : 3 – 1– 2**
Stream : Core | **Credits : 4**

Objectives:-

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2. To understand and study the Physics principles behind the developments of engineering materials.
3. To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

Outcomes

1. Acquire fundamental understanding of concepts specifically concern to Ultrasonic, Dielectrics, Laser, optical fibre, Electron Optics, Quantum Mechanics, Crystal Structure, Electrodynamics, Magnetics and SemiconductingMaterials and their engineering applications.
2. Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering Physics.
3. To develop a systematic, logical approach to problem – solving that can be applied to problems in physics and to problems in general.

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Course Title : Energy and Environment Engineering **Semester : I**
Course Code : AI1T006 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Environment **L – T – P : 3 – 0– 0**
Stream : Theory subject **Credits : 3**

COURSE OBJECTIVES

1. To understand the importance of Energy and Environment
2. To understand the application of energy saving tool in real life.
3. To investigate the key concepts of Energy and Environment

COURSE OUTCOMES

At the end of the course students will be able to

1. Describe different kind of pollution eg. Water pollution, air pollution, soil pollution etc.
2. Understand the importance of ecosystem for human beings..
3. Discover innovative method of power generation.
4. Correlate the cost of various method of power generation.
5. Judge the quality of air.

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Course Title : Introduction To Computer Programming(LAB) **Semester : I**
Course Code : HU1L002 **Course Type : Compulsory**
Pr-requisite : Basic knowledge of Computer **L – T – P : 0 – 0– 4**
Stream :Theory subject **Credits : 2**

Course Objective

1. To introduce students to the basic knowledge of programming fundamentals of C language.
2. To impart writing skill of C programming to the students and solving problems.
3. To impart the concepts like looping, array, functions, pointers, file, structure

COURSE OUTCOME

After completing this lab course you will be able to:

1. Understand the logic for a given problem.
2. Write the algorithm of a given problem.
3. Draw a flow chart of a given problem.
4. Recognize and understand the syntax and construction of C programming code..
5. Make use of different data-structures like arrays, pointers, structures and files.
6. Know the alternative ways of providing solution to a given problem.

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Course Title : Engineering Physics-Lab
Course Code : AI1L005
Pre-requisite : Basics of Physics Practical
Stream :Core subject

Semester : I
Course Type : Compulsory
L – T – P : 0 – 0– 2
Credits : 1

Course Objective:

Students will be able to

1. Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques and graphical analysis to the experimental data
5. Develop the skills to identify various parts of the apparatus used in the experiment in laboratory.
6. Design and apply the practical knowledge of engineering physics in daily life

Course Outcome:

Students will be able to

1. Visualize and understand the concepts of various phenomenon of light, principle of LASER, Optical fiber and electric and magnetic field.
2. Understand the working principles of Semiconducting devices and their application.
3. Apply the theoretical concepts to demonstrate the ability to measure properties of a variety of electrical and optical systems
4. Analyze the different crystal structure with the help of crystal models.

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5. Construct the various devices based on optical phenomenon.

Course Title : Introduction to A I & Its Application **Semester : I**

Course Code : AI1T008 **Course Type : Compulsory**

Pre-requisite : Basic knowledge of Mathematical Logic **L – T – P : 2 – 0– 0**

Stream : Theory subject **Credits : Audit**

COURSE OBJECTIVES

1. To understand the importance of AI and use of AI tools
2. To understand the application of AI in engineering and in real life.
3. To investigate the key concepts of knowledge representation and different notations.
4. To enable students to analyze a problem so that appropriate problem solving techniques may be applied.

COURSE OUTCOMES

Upon successful completion of this course student will able :

1. To understand the basics of Artificial Intelligence , Intelligent Agents and its structure
2. To Apply various searching techniques of Problem solving
3. To Acquire theoretical knowledge about principles for logic-based representation and reasoning
4. To Participate in the design of systems that act intelligently and learn from experience
5. To Understand the relation between AI & various domains

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KATOL ROAD, NAGPUR
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in
(An Autonomous Institute, with NAAC "A" Grade)
Affiliated to DBATU, RTMNU
Department of Artificial Intelligence
"A Place to Learn, A Chance to Grow"
Session: 2021-22

VISION	MISSION
To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

Course Title : Communication Skills | **Semester : I**
Course Code : HU2T001 | **Course Type : Compulsory**
Pre-requisite : Basic knowledge of English | **L – T – P : 2 – 0– 0**
Stream :Theory subject | **Credits : 2**

Course Objectives:
The main objective of the subject is to enhance the employability skills of engineering studentsas well as communication skills at work place.
The sub-objectives are:

1) To develop students' reading skills and pronunciation.
2) To develop technical communication skills through drafting, letter writing, and précis writing.
3) To develop literary skills through essay writing.
4) To develop public speaking skills of the students.
5) To expose the students to the ethics of English language by teaching grammar

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

1) to better reading comprehension, pronunciation, and functional English grammar.
2) to write letters and resumes
3) to organize their thoughts for effective presentation and writing.
4) to learn skills to present themselves well in an interview, and handle a Group Discussion

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Course Title : Engineering Mathematics-II | **Semester : II**
Course Code : MA2T001 | **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Mathematics | **L – T – P : 3 – 1– 0**
Stream :Core subject | **Credits : 4**

COURSE OBJECTIVES

1. To understand the importance of Mathematics
2. To understand the application of Mathematics in engineering and in real life.
3. To investigate the key concepts of Mathematics.
4. To enable students to analyze a problem.

COURSE OUTCOMES

At the end of the course students will be able to

1.Describe concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus.

2.Illustrate the concept of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus by using examples.

3.Apply the knowledge of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.

4.Analyze the problems and results of complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.

5.Evaluate the problems by using complex numbers, integral calculus & multiple integrals, Fourier series & transform, vector differential calculus, vector integral calculus to solve the engineering problems.

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Course Title : Engineering Graphics **Semester : II**
Course Code : AI2T003 **Course Type : Compulsory**
Pre-requisite : Basic knowledge of Graphics **L – T – P : 1 – 0– 0**
Stream :Practical subject **Credits : 1**

COURSE OBJECTIVES

1. To understand the concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient
2. To understand theory of projection and simple machine parts in first and third angle of projection systems.
3. To understand the key concepts CAD software.
4. To enable students to analyze a 2-dimensional & 3-dimensional problem.

COURSE OUTCOMES:

1. Define various concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally efficient.
2. Interpret drawings of simple machine component in first and third angle of projection systems
3. Apply theory of projections in projection of lines, projection of planes and projection of solid.
4. Classify solid geometry in different positions.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title : Engineering Chemistry-Lab **Semester : II**
Course Code : HU2L001 **Course Type : Compulsory**
Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**
Stream :Theory subject **Credits : 1**

Course Objective:
Students will be able to
1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :
Students will be able to
1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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Course Title : Engineering Chemistry-Lab **Semester : II**
Course Code : AI2L002 **Course Type : Compulsory**
Pre-requisite : Basics of Chemistry Practical **L – T – P : 0 – 0– 2**
Stream :Theory subject **Credits : 1**

Course Objective:
Students will be able to
1. Students will explore new areas of research in both chemistry and allied fields of science and technology.
2. Students will understand safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will recognize common laboratory techniques including pH measurement, acid/base titrations, UV/Visible spectroscopy.

Course Outcome :
Students will be able to
1. Recall hardness of water, acid value, saponification number of oils.
2. Demonstrate an ability to make chemical measurements and understand the limits of precision in measurements.
3. Enhance the comprehensibility of the practical concepts and their application.
4. Apply the analytical techniques to the experimental data
5. Making judgments based on criteria and standards through checking and critiquing
6. Design and apply the practical knowledge of engineering chemistry in daily life

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Course Title	**: Engineering Graphics-Lab**		**Semester**	**:**	**II**
Course Code	**: AI2L003**		**Course Type**	**:**	**Compulsory**
Pre-requisite	**: Basics of Graphics Lab**		**L – T – P**	**:**	**0 – 0– 4**
Stream	**:Practical subject**		**Credits**	**:**	**2**

COURSE OBJECTIVES:

The objective of the course is to enable students to

1. Provide basic foundation in CAD software.
2. Understand the fundamentals used to create and manipulate geometric models.
3. Get acquainted with the basic CAD software for to design geometric modeling.

COURSE OUTCOMES:

1. Define basic structure of CAD workstation, CAD commands, Memory types, input/output devices and display devices to become professionally efficient to operate CAD software.
2. Explain drawing of simple machine component in CAD software.
3. Acquire the knowledge of geometric modeling in CAD software.
4. Analyze the steps required in CAD software for 2-dimensional and 3-dimensional models.
5. Assess the two dimensional and three dimensional drawing in CAD software.
6. Create the three dimensional engineering objects into two dimensional drawings and vice versa using CAD software.

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Course Title	**:**	**Introduction to Drones**	**Semester**	**:**	**II**
Course Code	**:**	**AI2T009**	**Course Type**	**:**	**Compulsory**
Pre-requisite	**:**	**Nil**	**L – T – P**	**:**	**2 – 0– 0**
Stream	**:**	**Theory subject**	**Credits**	**:**	**Audit**

Course Objectives

The main aim of this course is to understand the basics of Drones and its various applications. The course will also impart the knowledge of how to fly a drone by considering the rules and regulations to the specific country. Further the students will be introduced to the safety measures to be taken during flight.

Course Outcomes:

Student will be able to

CO1: To introduce the various types of frame design used for the UAV and to accommodate the electronics over the frame to fly UAV.

CO2: To make the students understand the basic working principal behind the electronic components used and its specification to build a drone from scratch.

CO3: To enable the students to identify and understand various functional modules of the controller using a preprogrammed controller used in the UAV.

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VISION

To be a center of excellence imparting professional education satisfying societal and global needs.

MISSION

1. Transforming students into lifelong learners through, quality teaching, training and exposure to concurrent technologies.
2. Fostering conducive atmosphere for research and development through well-equipped laboratories and qualified personnel in collaboration with global organizations.

MBA 2021-22

Name of Courses according to Semester & their Co's

Semester	Name of Course	Co	
Ist	MANAGERIAL ECONOMICS	**CO1**	Given the details regarding price and quantity, the future manager will be able to **calculate** and **interpret** price elasticity, income elasticity and cross-price elasticity of demand and will also be able **examine** the uses and abuses of demand forecasting techniques
		CO2	Given the information about scale of production, the future manager will be able to **analyze** various aspects of empirical production functions and also will be able to **comprehend** the difference sources of economies and diseconomies of scale.
		CO3	Given the information pertaining to market structure, the future manager will be able to **determine** the optimal price and output for firms under different market structures.
		CO4	Given the circular flow model of an economy, the future manager will be able to interpret the role and importance of each component with regard to factor market and product market and will also be able to **comment** on the implications and control of inflation.
		CO5	Given the information regarding expenses and income in an economy, the future manager will be able to **calculate** and **explicate** the gross domestic product using expenditure and income approaches and given the details about a phase of the business cycle, the future manager will be able to **depict** the symptoms, causes and effects on economic activities of a nation
Ist	MANAGEMENT INFORMATION SYSTEMS	**CO1**	The student will be able to **describe** different types of management information system from management activity point of view and will also be able to **identify** and **work out** KRAs, BOPs and BPPs for various organisations/systems.
		CO2	The student will be able to **identify** the master data, **draw** report format and interface matrix while making a **model** of DSS.
		CO3	The student will be able to **suggest** the conceptual model of PMS and will also be able to **draw** a system model of integrated system (PMS+SCM+Accounting and Billing)
		CO4	The student will be able to **describe** the key features of ERP, SCM and CRM and will also be able to **draw** functional flow and process flow diagrams for various transactions.
		CO5	The student will be able to **enumerate** the factors affecting system performance and will also be able to **comment** on the operational feasibility of IT system under consideration
	BUSINESS RESEARCH	**CO1**	In context of research, the student will be able to **define** business research problems and will also able to formulate an abbreviated version of research proposal.
		CO2	The student will be able to **describe** and **choose** appropriate sampling design and will also be able to **estimate** appropriate sample size.

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		CO3	The student will be able to develop measurement tools and construct appropriate scales therein.
		CO4	The student will be able to **select** suitable method of data collection and will be able to **make** questionnaire/e-questionnaire
		CO5	The student will be able to **derive** inferences by applying various techniques of interpretation and be and write various types of research reports.
Ist	ORGANIZATIONAL BEHAVIOUR	**CO1**	Students will be able to **explain** the concept of Organisation Design and **determine** the factors that affect Organisation Design.
		CO2	Students will be able to **identify** the components of Individual Behaviour and **apply** the concept of Learning, Perception, Attitudes and values.
		CO3	The student will be able to **distinguish** between the various theories of motivation and their application in organizations and also be able to **apply** these theories to practical problems in organizations. They will also be able to **distinguish** between a number of different leadership theories & styles and contribute to the effective performance of a team as the team leader or a group member.
		CO4	The future managers/ students will be able to **analyse** the behaviour of individuals and groups in organisations in terms of the key factors that influence organisational behaviour and demonstrate skills required for working in groups (team building).
		CO5	The students will be able to **justify** how organizational change and conflict affect working relationships within organizations and **demonstrate** how to apply relevant theories to solve problems of change and conflict within organizations
Ist	FINANCIAL REPORTING, STATEMENTS AND ANALYSIS	**CO1**	Given an accounting situation Students will be able to **evaluate** selected accounting standards and **perform**their application in actual practice
		CO2	Given the Trial Balance and accompanying financial adjustments the future manager shall be able to ***prepare*** the financial statements and ***calculate*** the profit or loss of a firm as at the end of the financial year.
		CO3	Given the financial statements a student will be able to ***Prepare*** Cash Flow statement to ***evaluate*** whether a firm is doing well financially and has sufficient cash to meet its obligations and support its growth or not.
		CO4	Given the financial statements a student will be able to ***perform*** Ratio analysis and comment on the performance of the firm. Whether a firm is doing well or not. (As compared to its peers or year on year basis.)

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		CO5	Given the financial statements a student will be able to **formulate** common size statement, trend analysis as well as inter-firm and intra firm comparison (As compared to its peers or year on year basis.)
	BUSINESS STATISTICS AND ANALYTICS FOR DECISION MAKING	**CO1**	For a given dataset, the student should be able **estimate** the dispersion / variance & symmetry of the data using various measures and **draw** inferences to facilitate decision making.
		CO2	For a given dataset, the student should be able **assess** the level of association between given variables in the data using various types of correlation analysis techniques. The students should also be able to **predict** the values of a variable using regression analysis techniques.
		CO3	For given situations a student should be able **determine** the various probabilities arising out of the situation and **make use of** probability theory and appropriate probability distributions for the purpose of decision making.
		CO4	For a given research problem, student should be able to **construct** appropriate hypotheses and **draw** conclusions by using a suitable hypothesis testing procedure so as to **address** the research problem in question.
		CO5	The student will be able to **differentiate** between various forms of analytics and will also be able to **choose** suitable analytics for decision making.
Ist	LEGAL AND BUSINESS ENVIRONMENT	**CO1**	Given the circumstances, the learner will be able to **infer** legal aspects of doing business &**plan** business activities. In a given situation, the learner will be able **make use of** provisions of the Contract Act to **evaluate** a contract used in commercial practice.
		CO2	In a given situation, learner will be able to **distinguish** between various types of Companies and **explain** their comparative advantages and disadvantages. The learner will be able to **explain** the legal process involved in formation of a company and **understand** the relationships amongst the various stakeholders of the company.
		CO3	In context of Intellectual Property Rights (IPR) the learner will **understand** various components of IPR and **differentiate** between them. The learner can also **identify** the uses of IPR in business
		CO4	Under the given scenario, the learner will be able to describe various provisions of IT Act and will be able to use various provisions of Consumer Protection Act.
		CO5	A learner will be able to analyze the elements of Social, political, economic environment around a firm.
	MANAGERIAL SKILLS FOR EFFECTIVENESS	**CO1**	The student will be able to **make proper use** of group of words, synonyms and antonyms, phrases, idioms, proverbs for effective verbal communication

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		CO2	The student will be able to **write** essays and CV using Word Processor
		CO3	The student will be able to **draft** business letters for given situations using Word Processor
		CO4	The student will be able to **apply** basic functions of PowerPoint and will also be able to **create** effective PowerPoint Presentations using templates
		CO5	The student will be able to **use** various spreadsheet functions and will also be **create** useful spreadsheets
IInd	FINANCIAL MANAGEMENT	**CO1**	Given financial cost parameters, the future manager will be able to **calculate** specific cost of capital (i.e. Cost of debt, preference, equity and retained earnings) and the weighted average cost of capital for any specific given firm.
		CO2	Given different financing options, the future manager will be able to analyze the effect of operating and financial leverage on EPS and **recommend** a suitable long term financing mix for an organization by **applying** EBIT-EPS analysis, Indifference Level of EBIT and Financial Break-even Analysis for given financing options.
		CO3	Given the cash-flows pertaining to a project, the future manager will be able to **estimate** projects' cash flows to **distinguish** between value creating and value destroying investments using time-value intensive DCF techniques (viz. NPV, IRR, discounted payback period, profitability index) and Non-DCF techniques (i.e. Payback Period and Average rate of return approach)
		CO4	Given the details pertaining to elements of working capital for a given level of activity, the future manager will be able to **ascertain** the components of current assets and current liabilities and **determine** the gross and net operating working capital requirement.
		CO5	Given the expected dividends, future price of shares, investor expectations and funding requirements; the future manager will be able to **compute** the value of a share using various dividend discount models and **illustrate** whether dividend is relevant for firm valuation or not.
IInd	MARKETING MANAGEMENT	**CO1**	For a given marketing objective of a company the student manager will be able **to develop** a suitable marketing mix.

		CO2	For a given product the student managers will be able **toapply** the three steps of target marketing: market segmentation, target marketing, and market positioning.
		CO3	For various stages in the life cycle of the product the student managers will be able **to recommend** a suitable pricing strategy.
		CO4	For a given company the student managers will be able **to evaluate** different distribution channel options and their suitability for the company's product.

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		CO5	For a given promotional objective of a company the student manager should be able **to develop** a suitable promotion mix (advertising, sales promotion, public relations, personal selling, and direct marketing etc.) for the product.
IInd	HUMAN RESOURCE MANAGEMENT	**CO1**	Students should be able to **explain** the importance of Human Resource Management for an organisation and also distinguish between Personnel and HR Management.
		CO2	For a given job profile, students should be able to **develop** a job analysis and produce a job description and job specification.
		CO3	Students should be able to **design** a Human Resource Plan for an organisation and **construct** its Selection Process
		CO4	Students should be able to **justify** the applicability of various techniques of Training
		CO5	Students should be able to **outline** the performance appraisal process and **identify** and **explain** the utility of various modern and traditional methods of Performance Appraisal.
IInd	OPERATIONS MANAGEMENT	**CO1**	At the end of the course the students can **apply** the concept of operations management in manufacturing and service sector and will be able to **plan** and **implement** production and service related decisions.
		CO2	At the end of the course the student will be able to **plan** production schedules and plan resources (material and machine) required for production
		CO3	At the end of the course the students can **design** maintenance schedules in manufacturing units, **identify** and **propose** material handling equipments and implement industrial safety rules
		CO4	At the end of the course the students will be able to **apply** the concepts of purchase, stores and inventory management and **analyze** and **evaluate** material requirement decisions
		CO5	At the end of the course the students can **measure** performance related to productivity and will be able to **conduct** basic industrial engineering study on men and machines.
IInd	INTERNATIONAL BUSINESS	**CO1**	Students should be able to **understand** various concepts and terminologies involved in International Business and importance of international trade

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		CO2	Students should be able to **evaluate** various modes of entry in to International business and should be able to **select** the best mode of entry given a situation.
		CO3	Students should be able to **relate and discuss** the presence of macro factors (PESTEL) on international business environment
		CO4	Students should be able to **examine** and **elaborate** the role of various Government institutions in India which support International trade.
		CO5	Students should be able to **perceive** the concepts in recent EXIM policy of India and **relate it** to the flow of FDI as well as direction of Indian foreign trade.
IInd	CORPORATE SOCIAL RESPONSIBILITY AND SUSTAINABILITY	**CO1**	Given the concept of CSR, the future manager will be able to **identify** the various activities which can benefit the organization under the banner of CSR.
		CO2	Given a chance, the future manager will be able to **frame** and **recommend** the CSR policy according to sustainable development.
		CO3	Given the framework, the future manager will be able to **plan** the CSR activity according to the various laws and regulations.
		CO4	Given the details pertaining to government and non government organizations, the future manager will be able to **ascertain** the role of various stakeholders in CSR activities and **incorporate** the guidelines issued by regulatory guidelines in CSR policy.
		CO5	Given the task of CSR , the future manager will be able to **plan and implement** various activities to be taken under CSR activity and evaluate its effectiveness.
IInd	COST ACCOUNTING	**CO1**	Given an information about basic conceptual framework of cost, the student will be able of **identify**/ **classify** different elements/ classification of cost and will be able to **prepare** cost sheet and prepare quotations for various business proposals
		CO2	Given an information about cost, volume and profit for specific product for mention time period, a student will able to **compute** Break-even point, Marine of safety, Profit volume ratio, desired profit / desired sales as well as able to **evaluate** the decision making proposals(suitable product mix / dropping a product line / fixation of selling price / make or buy decisions/Key Factor Analysis)
		CO3	Given information about relevant expenses, a student will be able to **classify** the cost by nature and **estimate** cost of operating a service

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		CO4	Given an information about Expenses & Income / Receipt & Payment / Projected Sales, a student will be able to **prepare** relevant functional level budgets for an organisation
		CO5	Given information about standard and actual performance, the student will be able to **determine** Direct Material and Direct Labour Variances.
IInd	MANAGEMENT CASE ANALYSIS	**CO1**	Given a situation a student will be able to **construct** SWOT for a concerned orgnaisation or situation as well as he/she will be able to indentify key actors/stakeholders in the given situation
		CO2	A student will be able to **evaluate** the dilemma (Problem/ Issues/ Concerns) in the case.
		CO3	A student will be able to **develop** suitable alternatives for the dilemma identified.
		CO4	A student will be able to **analyse** and **evaluate** the alternatives using the theoretical framework.
		CO5	A Student will be able to discuss **suggest** suitable roadmaps to overcome the identified dilemma.
IIIrd	SUMMER INTERNSHIP PROJECT	**CO1**	Student is able to **construct** the company profile by compiling the brief history, management structure, products / services offered, key achievements and market performance for his / her organization of internship.
		CO2	For his / her organization of internship, the student is able to **assess** its Strengths, Weaknesses, Opportunities and Threats (SWOT). Student is able to **determine** the challenges and future potential for his / her internship organization in particular and the sector in general.
		CO3	Student is able to **test** the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.
		CO4	Student is able to **apply** various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization.
		CO5	Student is able to **analyze** the functioning of internship organization and **recommend** changes for improvement in processes.
IIIrd	MM1: SALES AND DISTRIBUTION MANAGEMENT	**CO1**	Given a situation, student manager will be able to **identify** appropriate Sales Forecasting method to be adopted by a company.
		CO2	Given a situation of newly launched company, student manager will be able to **design** an effective Sales Compensation Plan for Sales Executive.
		CO3	Given a situation of distribution channel of a company, student manager will be able to **outline** different levels of Marketing channel used by the company.
		CO4	Given a situation, student manager will be able to **describe** the process ofSupply Chain and Reverse Logistics.

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		CO5	Given a situation, student manager will be able to **develop** e-retailing strategy as a channel of distribution.
IIIrd	MM2: DIGITAL AND SOCIAL MEDIA MARKETING	**CO1**	On studying this module, the students will be able to **understand** the concept of marketing in digital environment. They will also be able to **relate** traditional marketing concepts with digital marketing and evaluate the use of various channel options available for digital marketing
		CO2	On completing this module, the students will **develop** the concept of digital marketing research. They will also be able to **examine** online consumer behaviour and imagine its utility in online/offline marketing strategies
		CO3	Upon studying this module, the students will be able to **build** an understanding of search engines and their utility in digital marketing area. They will also **comprehend** optimization and the keyword search methodology.
		CO4	On properly studying this module, the student will be able to **examine** the utility of different social media in digital marketing and **evaluate** their use, as future managers, in actual marketing campaigns.
		CO5	On studying this module, the student will be able to **create** favourable online reputation, later, as future managers, for organizations they serve. Students will also be able to **form** opinion on current trends in digital marketing area and **estimate** future trends therein.
IIIrd	MM3: INTEGRATED MARKETING COMMUNICATION AND BRAND MANAGEMENT	**CO1**	At the end of the course the student manager shall be able to **Design** the Integrated marketing communication Process for a company/product
		CO2	At the end of the course the student manager shall be able to **develop** a creative message strategy for a product and execute it.
		CO3	At the end of the course the student manager shall be able to **implement** and evaluate a IMC campaign.
		CO4	At the end of the course the student manager shall be able to **Identify&Establish** Brand Positioning for a given product

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		CO5	At the end of the course the student manager shall be able to **design/develop** branding strategies for a product/company, brand marketing program and shall be able to evaluate a branding program.
IIIrd	FM1: INVESTMENT ANALYSIS & PORTFOLIO MANAGEMENT	**CO1**	The student will be able to **apply** concept oftime value of money in computing the value of fixed income securities. The student will also be able to **understand** the relationship between interest rates, yield and bond prices.
		CO2	The student will be able to **compute and compare** the value of a company's equity share with other company's equity by using various methods and tools of equity valuation
		CO3	The student will be able to **build and evaluate** the relationship between the concept of risk and return and will be able to **relate** its implication on creating portfolio.
		CO4	The student will be able to **learn** the theoretical concepts of underlying the portfolio creation
		CO5	The student will be able to **assess** the tools and strategies for portfolio creation and evaluation and will also be able to **evaluate** the portfolios of mutual funds by using the tools of portfolio evaluation
IIIrd	FM2: PROJECT APPRAISAL AND FINANCE	**CO1**	The student will be able to **assess** capital budgeting decisions under uncertain and risk bearing situation and will also be able to **build** and **interpret** the decision tree approach for decision making
		CO2	The student will be able to **choose** between acquisition of long term assets either through lease or financing methods and will also be able to **learn** process of Private Equity and Venture Capital
		CO3	The student will be able to **compare** the various theories of capital structure and will be able to **determine** the impact of debt equity mix on value of firm
		CO4	The student will be able to **evaluate** and **compare** the pre and post merger financial position of the firms.
		CO5	The student will be able to **determine/ estimate** the cash requirement in a firm and will also be able to **evaluate** the impact of trade receivable policy of a firm on its profitability.
IIIrd	FM3: FINANCIAL DERIVATIVES	**CO1**	The student will be able to **describe** the concepts of derivatives and its trading and settlement procedures
		CO2	The student will be able to **calculate** the value of Futures and **apply** it for risk managed trading strategies.
		CO3	The student will be able to **compute** the value of Options and **plan** various option strategies.

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		CO4	The student will be able to **analyse and use** the concept of Swaps and will also be able to make Swaps related decisions.

		CO5	The student will be able to **relate** concept of foreign exchange in currency conversion and **apply** currency forward rate agreements for hedging.
IIIrd	HRM1: MANPOWER PLANNING, RECRUITMENT AND SELECTION	**CO1**	Students should be able to **explain** the factors affecting HRP and HRP process of an organisation.
		CO2	Students should be able to **determine** the process of demand and supply forecasting while doing human resource planning.
		CO3	Students should be able to **devise** the manpower plan for an organisation.
		CO4	Students should be able to **formulate** Recruitment and Selection process on the basis of HRP.
		CO5	Students should be able to **outline** the Recent Trends in Manpower Development and Planning
IIIrd	HRM2: PERFORMANCE MEASUREMENT SYSTEM	**CO1**	Students should be able to **distinguish** the concept of Performance appraisal & Performance Management and also should be able to establish relationship of performance management with Strategic Planning.
		CO2	Students should be able to **determine** the Mechanism of Performance Management, and also explain the various steps in performance planning and performance execution.
		CO3	Students should be able to **justify** the use of various modern and traditional methods of Performance Appraisal under given situation.
		CO4	Students should be able to **justify** the use of various Performance Assessment Models under given situations; also the student should be able to determine the steps of giving a constructive feedback.
		CO5	Students should be able to **discuss** the importance and Principles of ethics in performance management.
IIIrd	HRM3: COMPENSATION AND BENEFITS MANAGEMENT	**CO1**	Students should be able to **compare** the applicability of various Job Evaluation methods under given situations.
		CO2	Students should be able to **determine** the importance of Wage Differentials and **Differentiate** between different types of wages

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		CO3	Students should be able to **align** the compensation strategy with business strategy
		CO4	Students should be able to **design and develop** the incentive and benefits plans
		CO5	Students should be able to **outline** the various Statutory Provisions related to Compensation
IIIrd	BA1: DATA VISUALIZATION FOR MANAGERS	**CO1**	The student will be able to **identify** and **use**Interactive data visualization software desktop tools and will also be able to **create**Interactive data visualization software desktop workspace
		CO2	The student will be able to **connect** data and will also be able to **use**Interactive data visualization software's File Types effectively.
		CO3	The student will be able to create analytics pane and will also be able to use Sort, Filters, Sets, Groups and Hierarchy functions
		CO4	The student will be able to **create** calculations to enhance the data visualisation
		CO5	The student will be able to **build** effective dashboard
IIIrd	BA2: DATA MINING	**CO1**	Given overview of Data Mining and Data pre-processing, the future manager will be able to **outline** major research challenges of data mining, Kinds of data and applications, Data Cleaning; Data Integration; Data Reduction; Data Transformation and Data Discretization.
		CO2	Given the overview of Data Warehousing, the future manager will be able to classify the Concept of Data Warehousing using Data Cube and OLAP and also able to identify the process of Data Generalisation
		CO3	Given the details pertaining to Pattern Mining, the future manager will be able to evaluate Patterns using colossal patterns, mining compressed or approximate patterns; explore patterns and its applications.
		CO4	Given the details pertaining to Pattern Mining, the future manager will be able to analyse clusters using partitioning method, hierarchical method, density based method and grid based method
		CO5	Given the details pertaining to Pattern Mining, the future manager will be able to correlate the use of data mining to the society and also will be able to explain the trend in data mining.
IIIrd	BA3: DATA SCIENCE USING R	**CO1**	Given overview of types of Data, the future manager will be able to **read** data from different files and create matrices and data frames using R
		CO2	Given the overview of functions, subset and loop; the future manager will be able to **explain** the character functions, date function, package, control statement and do loop.
		CO3	Given the basic statistical data, the future manager will be able to **draw** charts, histogram and plots, and measure central tendencies.

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		CO4	Given the data for testing of hypothesis, the future manager will be able to **test** the hypothesis by applying t-test, ANOVA and Chi-square test
		CO5	Given the data of variables, the future manager will be able to **apply** Linear Regression, Logistic regression, Cluster Analysis, Time Series, Decision Tree and Random Forest
IIIrd	STRATEGIC MANAGEMENT	**CO1**	The student will be able to **evaluate** alternative paradigms of strategy and their influence on strategic decision making.
		CO2	The student will be able to analyse and develop the vision and mission statement for given organisations and will also be able to differentiate between the external and internal components of environment while performing SWOT analysis.
		CO3	The student will be able to design and develop corporate level strategies for any organization.
		CO4	The student will be able to design/develop business level strategies for any organization.
		CO5	The student will be able to evaluateall levels strategies and will also be design/develop functional level strategies for any organization.
IV	MM4: RETAIL SALES MANAGEMENT AND SERVICES MARKETING	**CO1**	On completion of this module the students will be able to **utilise** the knowledge gained on Retail Industry and the existing retail environment. The student will also be able to **plan** their retail business as future manager by **applying** retail segmentation.
		CO2	On completing this module, the students will be able to **take part in** the decisions involved in running a retail firm. They will also be able to form their own **opinion** on various retail formats and **recommend** strategies for retail planning.
		CO3	On completing this module, the students will be able to draw **relationship** between retail merchandising, marketing communication, CRM and retail success· They will also be in a position to **predict** impact of changing trends in Indian market scenario on retail business.
		CO4	On completion of this module, the students will be able to **analyse** concepts, functions, and techniques of the craft of service marketing services and will also be able to **identify** critical issues in service design & delivery. As future managers they will also be able to **adapt** a particular model of service marketing to a firm they work with.
		CO5	On completing this module, the students will be able to **examine** the **application** of integrated marketing communication (IMC) to retail business and **develop** an effective service marketing system for retail business. Students will also be in a position to **recommend** ethical rules for conduct of retail business in India.

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IV	FM4: MANAGING BANKS AND FINANCIAL INSTITUTIONS	**CO1**	The student will be able to **identify** role of banking in economic development of country.
		CO2	The student will be able to **assess** the impact of monetary policy and its instruments on banking sector
		CO3	The student will be able to **analyse** the health and risk of bank balance sheet and will also be able to **appraise** credit management parameters of a bank
		CO4	The student will be able to **identify** the NPAs and will also be able to **appraise** the process of securitisation.
		CO5	The student will be able to **distinguish** the utility of various non banking institutions like insurance, housing finance and credit rating
IV	HRM4: TEAM DYNAMICS	**CO1**	Students should be able to **justify** the applicability of various theories of Motivation in given situation and appraise the role of motivation in Team Behavior
		CO2	Students should be able to **determine** the importance of Interpersonal Communication and application of FIRO-B and Johari Window.
		CO3	Student should be able to explain the various steps of Group Formation and types of team
		CO4	In a given situation, Students should be able to justify the Conflict resolution strategy.
		CO5	Students should be able to apply various OD Intervention tools under given situation.
IV	BA4: WEB AND SOCIAL MEDIA ANALYTICS	**CO1**	The student will be able to **choose** the right tools for website design for measured outcomes.
		CO2	The student will be able to **construct** a modern metrics of better performance from eight specific metrics for web performance.
		CO3	The student will be able to **develop** a model for moving quickly from data to actions on a particular website.
		CO4	The student will be able to **develop** the model for measuring the success of a Mobile & Social Media Campaign..

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		CO5	The student will be able to **develop** a model for the website Outcome.
IV	PROJECT WORK AND VIVA VOCE	**CO1**	In a specialization domain of his / her choice, student manager will be able to choose an appropriate topic for study and will be able to clearly formulate& state a research problem
		CO2	For a selected research topic, student manager will be able to compile the relevant literature and frame hypotheses for research as applicable
		CO3	For a selected research topic, student manager will be able to plan a research design including the sampling, observational, statistical and operational designs if any
		CO4	For a selected research topic, student manager will be able to compile relevant data, interpret & analyze it and test the hypotheses wherever applicable
		CO5	Based on the analysis and interpretation of the data collected, student manager will be able to arrive at logical conclusions and propose suitable recommendations on the research problem
		CO6	Student manager will be able to create a logically coherent project report and will be able to defend his / her work in front of a panel of examiners

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