Department	Mechanical Engineering
Course Code	BS-PH-101
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	44
Course Out Come	**CO1:** Ability to know the basic concepts of mechanics and oscillation. **CO2:** Elaborate the concept of optics and introduction to the principle of laser. **CO3:** Ability to understand electromagnetism, dielectric and magnetic properties of materials. **CO4:** Familiarize with the basic laws of quantum mechanics introduction to Schrodinger wave equation. **CO5:** Understand the basic concept of Statistical mechanics.

Department	Mechanical Engineering
Course Code	BS-M-102
Title of Course	Mathematics -IB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	42
Course Out Come	**CO1**: Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals. **CO2:** Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems. **CO3:** Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines.

	CO4: Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation. **CO5:** Understand the concept of determinant and learn different types of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems.

Department	Mechanical Engineering
Course Code	ES-EE101
Title of Course	Basic Electrical Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T= 3+1
Total Contact Hours	42
Course Out Come	**CO1:** To understand and analyze basic electric and magnetic circuits **CO2:** To study the working principles of electrical machines and power converters. **CO3:**To introduce the components of low voltage electrical installations

Department	Mechanical Engineering
Course Code	BS-PH-191
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1**: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. **CO2**: Ability to know optical property. **CO3**: Ability to learn electrical property. **CO4**: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell.

	CO5: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron

Department	Mechanical Engineering
Course Code	ES-EE191
Title of Course	Basic Electrical Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Laboratory
Contact Hours	P
Total Contact Hours	2
Course Out Come	CO1: To learn about the operation, calibration and application of different electrical elements, instruments respectively and observe the constructional details of different electrical machines. CO2: To learn about the RLC circuit behaviour under AC and DC excitation. CO3: To learn about the characteristics features of a single-phase transformer CO4: To learn about three phase circuitanalysis. CO5: To learn about the characteristic behaviours of different rotating electrical machines. CO6: To learn about the operation of different converters and LT switchgear.

Department	Mechanical Engineering
Course Code	ES-ME 192
Title of Course	Workshop/Manufacturing Practices
Nature of Course	Practical
Type of Course	Practical
Contact Hours	4P+1L
Total Contact Hours	48

Course Outcomes	CO1: Introduction to manufacturing processes and its application in society. CO2: Applying practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. CO3: Exposure of assembling different components.

Department	Mechanical Engineering
Course Code	BS-CH-201
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L3 + T1
Total Contact Hours	42
Course Out Come	CO1:Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. CO2:Rationalise bulk properties and processes using thermodynamic considerations. CO3: **:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. CO4:Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Mechanical Engineering
Course Code	BS-M-202
Title of Course	Mathematics -IIB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	40
Course Out Come	**CO1**: Learn the methods for evaluating multiple integral and their

	applications to different physical problems. **CO2:** Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences. **CO3:** Learn different tools of differentiation and integration of functions of a complex variable and application of different types of transformation between two 2- dimensional planes for analysis of engineering problems.

Department	Mechanical Engineering
Course Code	ES-CS201
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T= 3+0
Total Contact Hours	36
Course Out Come	**CO1:** To formulate simple algorithms for arithmetic and logical problems(in C language) **CO2:** To decompose a problem into functions and synthesize a complete program using **CO3:** To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. **CO4:** To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Department	Mechanical Engineering
Course Code	HM HU 201
Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	25
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	Mechanical Engineering
Course Code	BS-CH-291
Title of Course	Chemistry-1 Lab

Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	P 3
Total Contact Hours	30
Course Out Come	**CO1:**Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. **CO2:**Rationalise bulk properties and processes using thermodynamic considerations. **CO3:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. **CO4:**Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. **CO5:** List major chemical reactions that are used in the synthesis of molecules.

Department	Mechanical Engineering
Course Code	ES-CS291
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	48
Course Out Come	**CO1: To translate given algorithms to a working and correct program** **CO2: To be able to write iterative as well as recursive programs** **CO3**: **To be able to represent data in arrays, strings and structures and manipulate them through a program** **CO4**: **To be able to create, read and write to and from simple text files.** **CO5: To be able to create read and write to and from simple text files.**

Department	Mechanical Engineering
Course Code	ES-ME 291
Title of Course	Engineering Graphics & Design
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P+1L
Total Contact Hours	48
Course Outcomes	CO1: Introduction to engineering design and its place in society CO2: Exposure to the visual aspects of engineering design CO3: Exposure to engineering graphics standards CO4: Exposure to solid modelling

Department	Mechanical Engineering
Course Code	HM HU 291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	Mechanical Engineering
Course Code	BS-M-301
Title of Course	Mathematics – III
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L + T 3 + 1
Total Contact Hours	38
Course Out Come	**CO1:** Learn to solve field problems in engineering involving

	PDEs. **CO2:** Learn the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment. **CO3:** Apply statistical tools for analysing data samples and drawing inference on a given data set.

Department	Mechanical Engineering
Course Code	BS-BIO-301
Title of Course	Biology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	33
Course Out Come	**CO1**: Describe how biological observations of 18th Century that lead to major discoveries. **CO2**: Convey that classification per section is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological. **CO**3: Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring. **CO4**: Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. **CO5**: Classify enzymes and distinguish between different mechanisms of enzyme action. **CO6**: Identify DNA as a genetic material in the molecular basis of information transfer. **CO7**: Analyse biological processes at the reductionistic level.

Department	Mechanical Engineering
Course Code	ES-ECE301
Title of Course	Basic Electronics Engineering
Nature of Course	Compulsory

Type of Course	Lecture
Contact Hours	L + T= 3+0
Total Contact Hours	36
Course Out Come	**CO1:** Understand the principles of semiconductor devices and their applications. **CO2:** Design an application using Operational amplifier. **CO3:** Understand the working of timing circuits and oscillators. **CO4:** Understand logic gates, flip flop as a building block of digital systems. **CO5**: Learn the basics of Electronic communication system.

Department	Mechanical Engineering
Course Code	ES-ME 301
Title of Course	Engineering Mechanics
Nature of Course	Compulsory
Type of Course	Engineering Science Courses(Theory)
Contact Hours	3L+1T
Total Contact Hours	4
Course Outcomes	CO1. **Apply** the knowledge of physics and Mathematics can determine analytically the forces and moments acting on statically determinate structure. Also **determine** the support reactions with or without friction and internal forces acting in the members. CO2. **Investigate** and **derive** the unknown active and reactive forces acting on a system or configuration of a system required for equilibrium using the Virtual work method. CO3. Can **compute** the centroid of lamina and centre of gravity of solids, area moment of inertia, and mass moment inertia of solids of regular shape. CO4. **Apply** the fundamental concept of Kinematics and kinetics can determine displacement, velocity and acceleration of particle and system of particles for linear and angular motion and extend the concept of Newton's law of motion to work energy principle and Impulse momentum principle to **determine** velocity and forces acting on the system CO5. Extend all concept of linear kinetics to the rigid body dynamics and can **determine** unknown parameters of dynamics by choosing an appropriate solution strategy. CO6. **Evaluate** the natural frequency, displacement, velocity, acceleration of free and forced vibrating system.

Department	Mechanical Engineering
Course Code	PC-ME 301
Title of Course	Thermodynamics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours/week	4
Total Contact Hours	40
Course Outcomes	CO1: Describe Fundamentals: System and Control Volume, Property, State, Process, Exact and inexact differentials. Analyse thermodynamic work with examples of Displacement work , Shaft work, Spring work. CO2: Describe temperature , thermal equilibrium, Zeroth law. AnalyseFirst law of thermodynamics with cyclic and non cyclic processes. Demonstrate the concept of energy, internal; energy and enthalpy. Investigate steady flow open system by first law. CO3: Describe Second law of thermodynamics.Demonstratethermal efficiency and COP of heat engines and refrigerator, reversible and irreversible processes. Analyse Carnot cycle. CO4: Describe Clausisus inequality. Demonstrate that entropy is a property. Investigate the value of entropy from steam tables. Understand irreversibility and Availability. Describe Availability function of systems and control volumes undergoing different processes. Analyseexergy analysis and exergy balance. CO5 : Describe pure substances, ideal gas mixture, real gas mixture and compressibility charts. Investigate steam tables and determination of properties from steam tables and mollier chart. CO6: Analyse thermodynamic cycles: Basic Rankine, Basic Brayton and basic VCRS cycles.

Department	Mechanical Engineering
Course Code	PC-ME 302
Title of Course	Manufacturing Processes
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	4 L

Total Contact Hours	42 h
Course Outcomes	PCME302.1: Employ fundamental techniques to manufacture an engineering component, Design core, core print and gating system in metal casting processes PCME302.2: Develop process-maps for metal forming processes using plasticity principles PCME302.3: Explain metal cutting tool theories and Implement it to solve simple numerical on related concepts. PCME302.4: Classify and analyse constructional features of various machine tools like lathe, shaper, drilling, milling, grinding etc. Describe automation and basic features and characteristics of NC and CNC machine tools. PCME302.5: Investigate and develop a methodology and establish a manufacturing sequence to fabricate engineering components

Department	Mechanical Engineering
Course Code	PC-ME 391
Title of Course	Manufacturing Process Lab
Nature of Course	Compulsory
Type of Course	Parctical
Contact Hours	3 h
Total Contact Hours	36 h
Course Outcomes	PC-ME 391.1: Practice of pattern &mould making. PC-ME 391.2: Practice of fitting operation using hand tools. PC-ME 391.3: Performing basic Forging operations like upsetting, drawing down. Making a typical product using sheet metal. PC-ME 391.4: Practicing GMAW, Shielded Metal Arc Welding and Gas Welding. PC-ME 391.5: Machining of typical products involving lathe, milling/shaping machines.

Department	Mechanical Engineering
Course Code	ES-ME401

Title of Course	Materials Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours/week	3
Total Contact Hours	36
Course Outcomes	CO1: Understanding of the correlation between the internal structure of materials, their mechanical properties and various methods to quantify their mechanical integrity and failure criteria. CO2:To provide a detailed interpretation of equilibrium phase diagrams CO3: Learning about different phases and heat treatment methods to tailor the properties of Fe-C alloys.

Department	Mechanical Engineering
Course Code	PC-ME401
Title of Course	Applied Thermodynamics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours/week	3P+1L
Total Contact Hours	48
Course Outcomes	CO1: To learn about of I law for reacting systems,heating value of fuels & gas and vapor cycles and their first law and second law efficiencies. CO2: To understand about the properties of dry and wet air and the principles of psychrometry. CO3: To learn about gas dynamics of air flow and steam through nozzles and reciprocating compressors with and without inter cooling. CO3:To analyze the performance of steam turbines

Department	Mechanical Engineering
Course Code	PC-ME402
Title of Course	Fluid Mechanics & Fluid Machines

Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours/week	3P+1L
Total Contact Hours	48
Course Outcomes	CO1: To learn about the application of mass and momentum conservation laws for fluid flows. CO2: To understand the importance of dimensional analysis. CO3: To obtain the velocity and pressure variations in various types of simple flows. CO4: To analyze the flow in water pumps and turbines.

Department	Mechanical Engineering
Course Code	PC-ME403
Title of Course	Strength of Materials
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours/week	3P+1L
Total Contact Hours	48
Course Outcomes	CO1: To understand the nature of stresses developed in simple geometries such as bars, cantilevers, beams, shafts, cylinders and spheres for various types of simple loads. CO2: To calculate the elastic deformation occurring in various simple geometries for different types of loading

Department	Mechanical Engineering
Course Code	PC-ME404
Title of Course	Metrology & Instrumentation

Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours/week	3P+1L
Total Contact Hours	48
Course Outcomes	CO1: To understand the working of linear and angular measuring instruments & familiarize with the working of optical measuring instruments and fundamentals of limits and limit gauges.. CO2 To give basic idea about various methods for measurement of screw thread and surface finish parameters & an exposure to advanced measuring devices and machine tool metrology. CO3: To provide students an overview of mechanical measurement systems and principle of instruments for motion and dimension measurement. CO4: To provide basic idea about working principle and applications of devices for measurement of force and torque; strain and stress and temperature.

Department	Mechanical Engineering
Course Code	MC401
Title of Course	Environmental Science
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours/week	2L
Total Contact Hours	24
Course Outcomes	CO1: Imparting **basic** knowledge about the **environment** and its allied problems. CO2: Developing an attitude of concern for the **environment.** CO3: Motivating public to participate in **environment** protection and **environment** improvement.

Department	Mechanical Engineering
Course Code	PC-ME491
Title of Course	Practice of Manufacturing Processes and Systems Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36 h
Course Outcomes	PC-ME 491.1: Practice of Laboratory modules of pneumatics and/or electro-pneumatics & hydraulics and/or electro-hydraulics. PC-ME 491.2: Study of working of Logic Gates practically & Simulation of designed pneumatics / hydraulics systems PC-ME 491.3: Practicing measuring the various parameters like length, height, angle, displacement, flatness etc., by using various instruments like bevel vernier protractor, micrometer, balls and rollers, Sine Bar etc. PC-ME 491.4: Practice of Measurement of surface roughness, gears & study of statistical process control system to apply to measured dimension of samples PC-ME 491.5: Practicing different gauges to assess angles, thread, internal and external radius, etc.

Department	Mechanical Engineering
Course Code	PC-ME492
Title of Course	Machine Drawing I
Nature of Course	Compulsory
Type of Course	Parctical
Contact Hours	3P
Total Contact Hours	36 h
Course Outcomes	PC-ME 492.1: Practice of standard components in mechanical, electrical and electronic systems, welding symbols and pipe joints. PC-ME 492.2: Practice of orthographic projections of machine elements, different sectional views- full, auxiliary sections; Isometric projection of components. PC-ME 492.3: Practice of assembly and detailed drawings of a mechanical assembly.

	PC-ME 492.4: Practicing AutoCAD or similar graphics softwares and making orthographic and isometric projections of different components.

Department	Mechanical Engineering
Course Code	PC-ME501
Title of Course	HEAT TRANSFER
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+1T
Total Contact Hours	48 h
Course Outcomes	1. After completing the course, the students will be able to formulate and analyze a heat transfer problem involving any of the three modes of heat transfer 2. The students will be able to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer 3. The students will be able to design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.

Department	Mechanical Engineering
Course Code	PC-ME502
Title of Course	Solid Mechanics
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	3L+1T

Total Contact Hours	48 h
Course Outcomes	Upon completion of this course, students will be able understand the deformation behavior of solids under different types of loading and obtain mathematical solutions for simple geometries.

Department	Mechanical Engineering
Course Code	PC-ME503
Title of Course	Kinematics and Theory of Machines
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	3L+1T
Total Contact Hours	48 h
Course Outcomes	After completing this course, the students can design various types of linkage mechanisms for obtaining specific motion and analyze them for optimal functioning

Department	Mechanical Engineering
Course Code	HM-HU501
Title of Course	Humanities I (Effective Technical Communication)
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36 h

Course Outcomes	After completing this course, the students will be able to 1. Understand the dynamics of Verbal and Non Verbal aspects of technical communication 2. Practice multi-step writing process to plan, draft, and revise reports, correspondence, and presentations. 3. Illustrate and examine the knowledge of ethical aspects of engineering 4. Demonstrate and explain social and professional etiquettes 5. Plan self-development and practice self-assessment to function on multi-disciplinary teams.

Department	Mechanical Engineering
Course Code	MC501
Title of Course	Essence of Indian Knowledge Tradition
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	2T
Total Contact Hours	24 h
Course Outcomes	After completion of the course, students will be able to: 1. Understand the concept of Traditional knowledge and its importance 2. Know the need and importance of protecting traditional knowledge. 3. Know the various enactments related to the protection of traditional knowledge. 4. Understand the concepts of Intellectual property to protect the traditional knowledge.

Department	Mechanical Engineering
Course Code	PC-ME591
Title of Course	Mechanical Engineering Laboratory (Thermal) I
Nature of Course	Compulsory
Type of Course	PRACTICAL
Contact Hours	3P
Total Contact Hours	36 h

Course Outcomes	The students who have undergone the course will be able to measure various properties of fluids and characterize the performance of fluid/thermal machinery

Department	Mechanical Engineering
Course Code	PC-ME592
Title of Course	Machine Drawing
Nature of Course	Compulsory
Type of Course	PRACTICAL
Contact Hours	3P
Total Contact Hours	36 h
Course Outcomes	1. Understand and apply the knowledge of machine drawing as a system of Communication in which ideas are expressed clearly and all information fully conveyed. 2. To understand the design a system, component or process to meet desired needs within, realistic constraints such as manufacturability, economic, environmental, safety & sustainability etc., to represent a part drawing and assembly drawings. 3. To identify, formulates, analyzes and solve Engineering Problems in Optimum time.

Department	Mechanical Engineering
Course Code	PW-ME581
Title of Course	Project-I
Nature of Course	Compulsory
Type of Course	PROJECT
Contact Hours	2P
Total Contact Hours	24 h

Course Outcomes	Students will be able to gather some exposure on some projects, may be designing some innovative ideas, fabricating and/or demonstrating an innovative machine or product, etc.

Department	Mechanical Engineering
Course Code	PCME601
Title of Course	Manufacturing Technology
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	4L
Total Contact Hours	48 h
Course Outcomes	1. To describe machines and related tools for manufacturing various components. 2. To understand the relationship between process and system in manufacturing domain. 3. To experiment on CNC machine tools. 4. To demonstrate rapid prototyping methods.

Department	Mechanical Engineering
Course Code	PC-ME602
Title of Course	Manufacturing Technology
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	3L+1T
Total Contact Hours	48 h

Course Outcomes	Upon completion of this course, students will get an overview of the design methodologies employed for the design of various machine components.

Department	Mechanical Engineering
Course Code	HM-HU601
Title of Course	Humanities II (Operations Research)
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36 h
Course Outcomes	At the end of this course students will be able to 1. Apply forecasting methods for predicting demands. 2. Make decisions under certainty, uncertainty and conflicting situations. 3. Apply linear programming tools for optimal utilization of resources in various types of industries. 4. Solve transportation problems to minimize cost and understand the principles of assignment of jobs and recruitment polices. 5. Understand the basic elements of a Queuing model

Department	Mechanical Engineering
Course Code	MC601
Title of Course	Constitution of India
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	2T
Total Contact Hours	24 h

Course Outcomes	On completion of the course student will 1. Have general knowledge and legal literacy and thereby to take up competitive examinations. 2. Understand state and central policies, fundamental duties. 3. Understand Electoral Process, special provisions. 4. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies,

Department	Mechanical Engineering
Course Code	PC-ME691
Title of Course	Mechanical Engineering Laboratory (Design-II)
Nature of Course	Compulsory
Type of Course	PRACTICAL
Contact Hours	3P
Total Contact Hours	36 h
Course Outcomes	Students who have undergone the course will be able to understand the measurement of mechanical properties of materials and will be able to characterize the dynamic behavior of mechanical system.

Department	Mechanical Engineering
Course Code	PW-ME681
Title of Course	Project-II
Nature of Course	Compulsory
Type of Course	PRACTICAL
Contact Hours	4P
Total Contact Hours	48 h

Course Outcomes	Students will be able to understand the procedure to carry out practical projects related to any technical event/ competition to fabricate and demonstrate an innovative machine or product, etc.

Department	Mechanical Engineering
Course Code	PC-ME701
Title of Course	Advanced Manufacturing Technology
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36 h
Course Outcomes	Student will be able 1. To understand non- traditional machining processes and the effect of process parameters 2. To differentiate the various non-traditional machining processes 3. To demonstrate micromachining technology Learning.

Department	Mechanical Engineering
Course Code	HM-HU701
Title of Course	Economics for Engineers
Nature of Course	Compulsory
Type of Course	LECTURE
Contact Hours	2L
Total Contact Hours	24 h

Course Outcomes	Student will be able 1. To understand Economic Decisions Making criteria 2. To know basic principles of engineering costs, estimation and depreciation analysis. 3. To understand basic accounting principles.

Department	Mechanical Engineering
Course Code	PC-ME791
Title of Course	Mechanical Engineering Laboratory III (Manufacturing)
Nature of Course	Compulsory
Type of Course	PRACTICAL
Contact Hours	3P
Total Contact Hours	36 h
Course Outcomes	At the end of the course, a student will be able to: 1. Study cutting forces in machining processes 2. Test the quality of weld and moulding sands 3. Develop a practical understanding of advanced manufacturing processes. 4. Understand the working of a robot and its programming 5. Identify and rectify defects in parts and manufacturing processes related problems.

Department	Mechanical Engineering
Course Code	PW-ME781
Title of Course	Project-III
Nature of Course	Compulsory
Type of Course	PROJECT
Contact Hours	6P
Total Contact Hours	72 h

Course Outcomes	Student will be able to carry out some project works based on some design or fabrication or experimental problems in a group building up team spirit and would get sufficient exposure for the way to proceed to solve a practical or design problem.

Department	Mechanical Engineering
Course Code	PW-ME881
Title of Course	Project- IV
Nature of Course	Compulsory
Type of Course	PROJECT
Contact Hours	10P
Total Contact Hours	120 h
Course Outcomes	Student will be able to carry out some project works based on some design or fabrication or experimental problems in a group building up team spirit and would get sufficient exposure for the way to proceed to solve a practical or design problem.

Department	Mechanical Engineering
Course Code	PW-ME882
Title of Course	Comprehensive Viva-Voce
Nature of Course	Compulsory
Type of Course	Seasonal
Contact Hours	0
Total Contact Hours	0

Course Outcomes	Student will be able to prepare for the interview in a better way by brushing up different course papers so that overall knowledge on Mechanical Engineering areas would be sharpened.

Department	Mechanical Engineering
Course Code	A1
Title of Course	Internal Combustion Engines and Gas Turbines
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	1. Explained basic concepts of actual cycles with analysis and to describe the fundamental concepts of IC engines along with its working principles. 2. Described the combustion phenomenon in SI and CI engines. 3. Evaluated the performance of IC engines and the importance of alternate fuels. 4. Classified the essential components of gas turbine along with its performance improving methods. 5. Illustrated the working principle of different types of Jet propulsive engines and Rockets.

Department	Mechanical Engineering
Course Code	A2
Title of Course	Automobile Engineering
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, the student will be able to: 1. Understand the basic lay-out of an automobile. 2. Explain the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems. 3. Illustrate the principles of transmission, suspension, steering and braking systems. 4. Demonstrate automotive electronics. 5. Study latest developments in automobiles.

Department	Mechanical Engineering
Course Code	A3
Title of Course	Gas Dynamics and Jet Propulsion
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	Upon completion of this course, student will be able to: 1. Understand basic concepts of gas dynamics and describe the basic fundamental equations of one dimensional flow of compressible fluid and isentropic flow of an ideal gas. 2. Analyze the steady one-dimensional is entropic flow, frictional flow and isothermal flow and express the concepts of steady one dimensional flow with heat transfer. 3. Explain the effect of heat transfer on flow parameters. 4. Illustrate the jet propulsion engines 5. Describe the basic concepts of rocket propulsion

Department	Mechanical Engineering
Course Code	A4
Title of Course	Refrigeration & Air Conditioning
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 1. know about the systems of Refrigeration, Air-Conditioning and Ventilation. 2. learn about different components of these systems. 3. know about designing a Refrigeration and Air-Conditioning system.

Department	Mechanical Engineering
Course Code	A5
Title of Course	Turbo Machinery
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	After completing this course, the students will 1. know basic characteristics of compressible and incompressible flow machines. 2. learn how to derive dimensionless numbers using dimensional analysis. 3. know about the method of testing and performance analysis of turbo machines.

Department	Mechanical Engineering
Course Code	A6
Title of Course	Fluid Power Control
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 1. know about different types of fluid power control systems and their applications. 2. learn working principles of different components of a pneumatic and hydraulic system. 3. learn about drawing fluid power control circuits to suit an application.

Department	Mechanical Engineering
Course Code	A7
Title of Course	Advanced Fluid Mechanics
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	After completing this course, the students will 1. know about compressible fluid flow. 2. learn about ideal fluid flow. 3. know about free surface flow. 4. know about unsteady flow.

Department	Mechanical Engineering
Course Code	A8
Title of Course	Analysis and Performance of Fluid Machines
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 1. know about the dimensional analysis for fluid machinery. 2. learn about different heads, losses and efficiencies for pumps, fans and turbines. 3. know about the Interaction of pumps and Turbines and systems. 4. know about the Performance characteristics of pumps and turbines. 5. learn about Cavitation: NPSH, Thoma's cavitation parameter and suction specific speed. 6. know about the Analysis of flow through propellers and windmills and jet propulsion.

Department	Mechanical Engineering
Course Code	A9
Title of Course	Computational Fluid Dynamics
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, student will be able to: 1. Understand the differential equations for flow phenomena and numerical methods for their solution. 2. Analyze different mathematical models and computational methods for fluid flow and heat transfer simulations. 3. Formulate computational problems related to fluid flows and heat transfer. 4. Estimate the accuracy of a numerical solution by comparison to known solutions of simple test problems and by mesh refinement studies. 5. Evaluate forces in both internal and external flows.

Department	Mechanical Engineering
Course Code	A10
Title of Course	Power Plant Engineering
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, student will be able to 1. Understand functions of the various components of power plant. 2. Illustrate the working of nuclear, thermal and gas based power plants. 3. Evaluate the design layout and working of hydroelectric power plants. 4. Estimate the feasibility and its implications on power generating units.

Department	Mechanical Engineering
Course Code	A11
Title of Course	Cryogenics
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	Students will 1. Understand principles of cryogenic systems. 2. Understand air and helium liquefaction processes. 3. Be able to classify cascade refrigeration systems. 4. Understand principles of ultra-low temperature systems and their applications. 5. Be able to evaluate storage systems used in cryogenic applications.

Department	Mechanical Engineering
Course Code	A12
Title of Course	Introduction to Wind Engineering
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 1. know about the basic concepts of wind engineering. 2. learn about bluff body aerodynamics as applied to wind engineering. 3. know about the structural dynamics related to wind engineering. 4. know about the aero-elastic phenomena caused due to wind flows. 5. learn about wind tunnel simulation of aerodynamic and aero–elastic behaviour of bluff bodies. 6. know about the application of wind engineering to design tall structures and stacks.

Department	Mechanical Engineering
Course Code	A13
Title of Course	Elements of Atmospheric Fluid Dynamics
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	After completing this course, the students will 1. know about the general structure of the atmosphere and its behaviour. 2. learn about various types of atmospheric circulations. 3. know about the effects of earth's rotation and friction on wind movements. 4. know about the structure of atmospheric boundary layer and turbulence. 5. learn about smoke dispersion patterns and chimney height determination. 6. know about the similarity analysis and scaling and wind tunnel simulation & testing.

Department	Mechanical Engineering
Course Code	B1
Title of Course	Composite Materials
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L

Total Contact Hours	36h
Course Outcomes	Upon completion of this course, the students will have an overview of the mechanical behaviour and application of composite materials

Department	Mechanical Engineering
Course Code	B2
Title of Course	Selection and Testing of Materials
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	1. To understand importance of engineering materials. 2. To choose materials for engineering applications. 3. To identify the material properties. 4. To identify suitable testing technique to inspect industrial component. 5. To use different techniques and know its applications and limitations.

Department	Mechanical Engineering
Course Code	B3
Title of Course	Mechanical Vibration
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	Upon completion of this course, the students will be able to 1. Understand the causes and effects of vibration in mechanical systems. 2. Demonstrate schematic models for physical systems and formulate governing equations of motion. 3. Explain the role of damping, stiffness and inertia in mechanical systems 4. Analyze rotating and reciprocating systems and compute critical speeds. 5. Evaluate and design machine supporting structures, vibration isolators and absorbers.

Department	Mechanical Engineering
Course Code	B4
Title of Course	Tribology
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	Lerner will be able to 1. Apply knowledge of tribology for industrial component design. 2. Apply design concepts practically for automotive lubrication systems.

Department	Mechanical Engineering
Course Code	B5
Title of Course	Finite Element Analysis
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	Student will be able to 1. Apply finite element method to solve problems in solid mechanics and heat transfer. 2. Formulate and solve problems in one dimensional structures including trusses, beams and frames. 3. Formulate FE characteristic equations for two dimensional elements and analyse plain stress, plain strain, and axi-symmetric and plate bending problems. 4. To learn and apply finite element solutions to structural, thermal, fluid mechanics problem 5. To develop the knowledge and skills needed to effectively evaluate finite element analyses

Department	Mechanical Engineering
Course Code	B6
Title of Course	Mechatronics
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to 1. Model and analyze mechatronic systems for an engineering application 2. Identify sensors, transducers and actuators to monitor and control the behavior of process or product. 3. Develop PLC programs for an engineering application. 4. Evaluate the performance of mechatronic systems.

Department	Mechanical Engineering
Course Code	C1
Title of Course	Advanced Welding Technology
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	1. To familiarize different types of welding processes. 2. To familiarize the basic mechanism behind weld joint and influencing factors. 3. To impart the knowledge different tests to judge soundness of the weld joint.

Department	Mechanical Engineering
Course Code	C2
Title of Course	Quantity Production Method
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 1. Gather knowledge about different quantity production methods practised in industry. 2. Understand planning and scheduling methods usually used in industry to have high productivity and to enhance quality.

Department	Mechanical Engineering
Course Code	C3
Title of Course	3D Printing and Design
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, the student will be able to: 1. Develop CAD models for 3D printing, import and export CAD data to 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.

Department	Mechanical Engineering
Course Code	C4
Title of Course	Micro and Nano Manufacturing
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	After completing this course, the students will 1. Know different micromachining and micro-manufacturing technologies and their applications. 2. Gain some knowledge about nanotechnology by molecular or atomic manipulation and to make nano-features. 3. Get an idea about various application areas of some nanomaterials.

Department	Mechanical Engineering
Course Code	C5
Title of Course	CAD/CAM
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	1. To familiarize the basics of computer aided design- geometric modeling, stress analysis. 2. To familiarize the basics of computer aided manufacturing. 3. To familiarize the components of computer aided manufacturing system including application of robot and control systems.

Department	Mechanical Engineering
Course Code	C6
Title of Course	Robotics
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	1. To familiarize the Basics of robots Control system. 2. To familiarize the end effectors, Sensor technology and Industrial application of robot.

Department	Mechanical Engineering
Course Code	C7
Title of Course	Material Handling
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 1. know about constructional features, working principle and specific applications of each of the material handling system. 2. learn about unit load calculation and selecting specification of some material handling system.

Department	Mechanical Engineering
Course Code	C8
Title of Course	Principles & Practices of Management
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 1. Understand the evolutionary development of management thought and general principles of management. 2. Understand the management functions in an organization

Department	Mechanical Engineering
Course Code	C9
Title of Course	Process Planning and Cost Estimation
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	Upon completion of this course, the students will be able to use the concepts of process planning and cost estimation for various products

Department	Mechanical Engineering
Course Code	C10
Title of Course	Maintenance Engineering
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 1. Know different types of repair and maintenance procedures practised in industry. 2. Understand different repair and maintenance strategies used in industry. 3. Understand the organizational structure of an industry for maintenance management and the economy involved in this.

Department	Mechanical Engineering
Course Code	A
Title of Course	Industrial Engineering
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L

Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 1. Understand the concepts of Industrial Engineering. 2. Explain production systems and their characteristics. 3. Understand the role of productivity in streamlining a production system. 4. Describe different aspects of work system design and facilities design pertinent to manufacturing industries 5. Apply forecasting and scheduling techniques to production systems. 6. Apply the inventory management tools in managing inventory

Department	Mechanical Engineering
Course Code	B
Title of Course	Total Quality Management
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 3. Understand quality management philosophies, techniques, and frameworks 4. Apply tools and techniques of TQM in manufacturing and service sectors. 5. Understand the implications of quality management standards and systems

Department	Mechanical Engineering
Course Code	C
Title of Course	Project Management
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, the student will be able to: 1. Understand the concept of projects and its phases. 2. Analyze project from marketing, operational and financial perspective. 3. Develop network diagrams for planning and execution of a given project.

Department	Mechanical Engineering
Course Code	D
Title of Course	Entrepreneurship Development
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	Upon completion of this course, the students will be able to: 1. Gain knowledge and skills needed to run a business successfully. 2. Interpret key regulations and legal aspects of entrepreneurship in India. 3. Understand the concept of business plan and ownerships.

Department	Mechanical Engineering
Course Code	E
Title of Course	Introduction to Product Design and Development
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will be 1. Identify and analyse the product design and development processes industry. 2. Define the components and their functions of product design and development processes 3. Analyse, evaluate and apply the methodologies for product design, development and management. 4. Undertake a methodical approach to the management of product development to satisfy customer needs. 5. Carry out cost and benefit analysis through various cost models.

Department	Mechanical Engineering
Course Code	F
Title of Course	Safety and Occupational Health
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	1. To have knowledge about various aspects of industrial safety and occupational health. 2. To have understanding about the reasoning behind an accident and steps for their prevention. 3. To have awareness about legislation related to health and safety management.

Department	Mechanical Engineering
Course Code	G
Title of Course	Industrial Pollution and Control
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 1. know about the various types of pollution caused by the industries and their effects on the environment. 2. know specifically about the causes, processes and control techniques of air pollution. 3. know specifically about the causes, processes and control techniques of water pollution. 4. know specifically about the causes, processes and control techniques of noise pollution.

Department	Mechanical Engineering
Course Code	H
Title of Course	Energy Conservation and Management
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	Upon completion of this course, the students will be able to 1. Understand principles of energy management and its influence on environment. 2. Comprehend methods of energy production for improved utilization. 3. Improve the performance of thermal systems using of energy management principles 4. Analyse the methods of energy conservation for air conditioning, heat recovery and thermal energy storage systems. 5. Prepare energy audit report of energy consumption for industries.

Department	Mechanical Engineering
Course Code	I
Title of Course	Non-Conventional Energy Resources
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 5. know about the energy scenario at present and the need of using renewable energy for sustainability. 6. know specifically the use of solar energy for heating as well as photovoltaic generation.

Department	Mechanical Engineering
Course Code	J
Title of Course	Waste to Energy- An Overview
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	After completing this course, the students will 1. know about the various types of bio-wastes. 2. learn about biomass pyrolysis, gasification and gasifiers. 3. know about biomass combustion and combustors, biogas plants and production.

Department	Mechanical Engineering
Course Code	K
Title of Course	Biomechanics and Bio materials
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	Upon completion of this course, the students will be able to: 1. Understand dynamics of human motion with the knowledge of musculoskeletal anatomy and biomaterial interfaces. 2. Understand fundamental characteristics and properties of biomaterials and their testing techniques.

Department	Mechanical Engineering
Course Code	L
Title of Course	Computational Methods in Engineering
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	On completion of this course the students will be able to 1. understand the concept of truncation and round off errors; fixed and floating point arithmetic and propagation of error and interpolation or extrapolation. 2. integrate different functions numerically and understand the error expressions. 3. solve systems of linear, algebraic and ordinary differential equations. 4. apply Laplace and Fourier transformation techniques. 5. use linear and non-linear regression techniques and do analysis of variance (ANOVA).

Department	Mechanical Engineering
Course Code	M
Title of Course	Automation and Control
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	After completing this course, the students will 1. know about the various types of control systems. 2. learn about modeling control systems.

Department	Mechanical Engineering
Course Code	N
Title of Course	Internet of Things
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 5. Understand internet of Things and its hardware and software components 6. Interface I/O devices, sensors & communication modules 7. Remotely monitor data and control devices, and develop real life IoT based projects

Department	Mechanical Engineering
Course Code	O
Title of Course	Artificial Intelligence (AI)
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, the student will be able to: 1. Build intelligent agents for search and games. 2. Solve AI problems through programming with Python. 3. Learning optimization and inference algorithms for model learning. 4. Design and develop programs for an agent to learn and act in a structured environment.

Department	Mechanical Engineering
Course Code	P
Title of Course	Block Chain
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 1. Understand block chain technology. 2. Develop block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks. 3. Build and deploy block chain application for on premise and cloud based architecture. 4. Integrate ideas from various domains and implement them using block chain technology in different perspectives.

Department	Mechanical Engineering
Course Code	Q
Title of Course	Cyber Security
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, the student will be able to: 1. Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information. 2. Identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios. 3. Identify common trade-offs and compromises that are made in the design and development process of Information Systems. 4. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.

Department	Mechanical Engineering
Course Code	R
Title of Course	Quantum Computing
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 1. Explain the working of a Quantum Computing program, its architecture and programmodel 2. Develop quantum logic gate circuits 3. Develop quantum algorithm 4. Program quantum algorithm on major toolkits

Department	Mechanical Engineering
Course Code	S
Title of Course	Data Sciences
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, the student will be able to: 1. Demonstrate understanding of the mathematical foundations needed for data science. 2. Collect, explore, clean, munge and manipulate data. 3. Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering. 4. Build data science applications using Python based toolkits.

Department	Mechanical Engineering
Course Code	T
Title of Course	Machine Learning
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	Upon completion of this course, the students will be able to: 1. Distinguish between, supervised, unsupervised and semi-supervised learning 2. Apply the appropriate machine learning strategy for any given problem 3. Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem 4. Design systems that uses the appropriate graph models of machine learning 5. Modify existing machine learning algorithms to improve classification efficiency

Department	Mechanical Engineering
Course Code	U
Title of Course	Virtual Reality
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h

Course Outcomes	At the end of the course, the student will be able to: 1. Understand geometric modelling and Virtual environment. 2. Study about Virtual Hardware and Software 3. Develop Virtual Reality applications.

Department	Mechanical Engineering
Course Code	V
Title of Course	Water Resource Engineering
Nature of Course	ELECTIVE
Type of Course	LECTURE
Contact Hours	3L
Total Contact Hours	36h
Course Outcomes	At the end of the course, the student will be able to: 1. Understand characteristic features of closed conduit flow and open channel flow. 2. Know different features of surface water hydrology and rainfall. 3. Study about groundwater hydrology and its characteristic relationships.