K L E F
DEPARTMENT OF MECHANICAL ENGINEERING
2018-2022 BATCH Course Outcomes (COs)

S No	Course Code	Course Title	CO NO	Description of the Course Outcome
1	18UC1101	Basic English	CO1	Apply the practical knowledge of using action words in sentence construction.
			CO2	Apply and analyse the right kind of pronunciation with regards to speech sounds and able to get different types of pronunciations.
			CO3	Apply the concept of fundamental principle of counting to solve the problems on linear, circular permutations and also for the problems on selections. Apply the concept of probability, while doing the problems on Leap year & Non-Leap year problems, coins, dice, balls and cards.
			CO4	Analyze the given conditions and finding out all the possible arrangements in linear & circular order. Analyze the given numbers or letters to find out the hidden analogy and apply that analogy to find solutions. Finding the odd man out by observing the principle which makes the others similar.
2	18UC1202	English Proficiency	CO1	Apply the concepts of accurate English while writing and become equally at ease in using good vocabulary and language skills.
			CO2	Understand the importance of pronunciation and apply the same day to day conversation.
			CO3	Apply the concepts of Ratios, Percentages, Averages and Analysing the given information, a student is required to understand the given information and thereafter answer the given questions on the basis of comparative analysis of the data in the form of tabulation, bar graphs, pie charts, line graphs. Analyse the given data to find whether it is sufficient or not.
			CO4	Apply the basic functionality of Clocks and Calendars to find the solutions for the problems. Analyze the given symbols to understand the hidden meaning of the given expression and finding the solutions. Analyze the given conditions and finding out all the possible arrangements in linear & circular order.
3	18UC2103	Professional Communication Skills	CO1	Able to spot the common grammatical errors related to Sentence Structure, Preposition, Concord, Relative and Conditional Clauses, and Parallel Structures. The learner should be efficient to construct a context-determined text in addition to learning Technical Writing Skills. One should be enabled to use English Language efficiently in the written medium to communicate Personal as well as Professional.
			CO2	Able to read, understand, and interpret a text intrinsically as well as extrinsically. The learner can browse a text quickly to come-up with a gist and personal interpretation. One is able to create a healthy work-environment and prove to be an asset or one of the most reliable resources to the Organization. As a professional, one is mature to bridge the gulf between the existing behavior/ lifestyle and the expected corporate behaviour cum lifestyle.
			CO3	Apply the concepts of Time and work, the students will be able to solve the questions related to Men-Time-Work, problems based on wages, pipes and cisterns. Apply the concepts of Time and Distance and solve the problems related to average speed, relative speed, problems based on trains, boats, circular tracks, races and games.
			CO4	Apply Venn diagrams to the given statements to find out whether the given conclusions can be deducted from the given statements. Apply the logical implications and also the negations of various connectives to find the solutions. Analyze the given data and representing the data in the form of Venn Diagrams to find relations between any given set of elements.
4	18UC2204	Aptitude Builder-1	CO1	Apply the concept of Critical Reading and Analytical Reading and comprehend the key ideas and gist of a passage. Understand the importance of the presentation skills, analyze the given topic, apply various strategies and the principles of grammar in written expression.
			CO2	Apply the concepts of grammar, various strategies and the usage of formal language in written expression. By using synonyms rewrite the same text in the same format and meaning. Write the gist of the given text.
			CO3	Apply the concepts of Numbers to solve the problems related to divisibility rules, problems based on Unit's digit, Remainders, Successive Division, Prime Factorization, LCM & HCF problems. Apply the concepts of Averages & Alligations, students will be able to solve the problems related to Averages as well as problems based on Mixtures.
			CO4	Apply the various concepts of cubes to find out how to cut a cube to get the maximum number of smaller identical pieces, how to minimize the number of cuts required to cut a cube into the given number of smaller identical pieces, how to count the number of smaller cubes which satisfy the given painting scheme. Apply the principles of binary logic to solve problems involving truth-tellers, liars and alternators. Analyze the given data to form an ordered arrangement from an unorganized raw data.

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5	18UC3105	Aptitude Builder-2	CO1	Apply the strategies and techniques learnt in carrying out conversations in different contexts. Analyse the different parameters and formats of written technical communication and apply in everyday work and life.
			CO2	Analyse the concepts of critical and analytical reading skills. Apply the strategies and techniques learnt in handling interviews in different contexts.
			CO3	Apply the concepts of Ratio & Proportion, Percentages, Profit &Loss, Simple & Compound Interest, students will be able to solve the problems based on Ratios, problems involving Percentages, problems related to cost price, selling price, profit, loss, marked price and discounts, problems involving interest.
			CO4	Analyze the given series of numbers to predict the next number in the series. Analyze the given set of numbers or letters to find the analogy. Analyze the given data to find the code which is used to encode a given word and use the same code in the process of decoding. Apply the given set of conditions to select a team from a group of members.
6	18UC0007	Indian Heritage	CO1	To familiarize with various aspects of the culture and heritage of India through ages.
			CO2	To acquaint with the contributions of Indians in the areas of languages and literature, religion and philosophy
			CO3	To understand the Social structure and the spread of Indian culture abroad
			CO4	To know the development of Science and Technology in India through ages and to appreciate the contributions of some of the great Indian scientists
7	18UC0008	Indian Constitution	CO1	To understand Constitutional development after Independence
			CO2	To learn the fundamental features of the Indian Constitution
			CO3	To get a brief idea of the powers and functions of Union and State Governments
			CO4	To understand the basics of working of Indian Judiciary and the Election Commission
8	18UC0009	Ecology and Environment	CO1	Understand the importance of Environmental education and conservation of natural resources.
			CO2	Understand the importance of ecosystems and biodiversity.
			CO3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.
9	18UC0010	Universal Human Values and Professional Ethics	CO1	Understand and identify the basic aspiration of human beings
			CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.
			CO3	Analyze the profession and his role in this existence.
10	18SC1103	Single Variable Calculus and Matrix Algebra	CO1	Model the physical laws and relations mathematically as a first order differential equations, solve by analytical and numerical methods also interpret the solution.
			CO2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by analytical method and interpret the solution.
			CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve ordinary differential equations.
			CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values.
11	18SC1104	Foundations of Computational Mathematics	CO1	Identify the quantities of Real world problems by using the concepts of arithmetic.
			CO2	Computing the areas of regular and irregular solids of real world problems.
			CO3	Identifying the numbers by successive division also finding the solution of equations.
			CO4	Estimating the roots of an equations and find the unknown values from the data by numerical methods
12	18SC1105	Logic and Reasoning	CO1	Understand how to use Venn diagrams to find the conclusion of statements, solve puzzles using binary logic.
			CO2	Understand to solve problems on clocks, calendars and problems on Non verbal reasoning.
			CO3	Understand the available models for Venn diagrams with given data, solve problems relating to cubes and number and letter series.
			CO4	Understand the techniques used to solve problems puzzles using analytical reasoning on coding and decoding and blood relations

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13	18MT1201	Multivariate Calculus	CO1	Determine extreme values for functions of several variables
			CO2	Determine area, volume moment of inertia through multiple integrals in Cartesian or polar coordinates.
			CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length, areas of surfaces and volume of solids in practical problems
			CO4	Obtain analytical and numerical solutions of Heat and wave equations
14	18PH1010	Physics Elective (Mechanics)	CO1	Develop familiarity with the physical concepts and facility with the mathematical methods of classical mechanics
			CO2	Analyze planar and spatial systems and to Analyze the forces in the members of trusses, frames.
			CO3	Determine first moment and second moment for a given cross sections and problems related to friction
			CO4	Analyze the motion characteristics of a body subjected to a given force system
			CO5	Understand and analyze the engineering systems with the help of mechanics concept to solve the engineering problems.
15	18CY1002	Solid State Chemistry	CO1	Ability to understand the electronic structure, chemical bonding, and atomic order and arrangements.
			CO2	Ablity to develop "chemical intuition" and quantitative understanding of chemical principles
			CO3	Ability to Understand the crystal structure and its relationship to properties
			CO4	Ability to understand the Materials properties such as conductivity, optical transmission, stiffness, thermal expansion, and strength
			CO5	An ability to analyze and generate experimental skills
16	18BT1001	Biology for Engineers	CO1	Acquire the Knowledge of basic biology
			CO2	Acquire the Knowledge of Human Biological Systems
			CO3	Acquire Knowledge on Microorganisms and Biosensors
17	18MT2102	Theory of Differential Equations in Engineering and Mechanics	CO1	Obtain the response of a mechanical system having single degree-of-freedom for free and forced vibrations through linear differential equations.
			CO2	Model and solve free and forced vibrations of a two- degree-of-freedom system through system of linear differential equations.
			CO3	Obtain canonical forms of linear second order PDEs and Demonstrate the nature of the incompressible fluid flow using Euler and Bernoulli equations.
			CO4	Identify the heat and wave equations in different forms, obtain their responses and develop empirical relations.
			CO5	Determine the response of mechanical vibrating systems and heat equations which are modelled by ordinary or partial differential equations using MATLAB.
18	18SC1101	Problem Solving and Computer Programming	CO1	Illustrate how problems are solved using computers and programming
			CO2	Illustrate and use Control Flow Statements in C.
			CO3	Interpret & Illustrate user defined C functions and different operations on list of data.
			CO4	Implement Linear Data Structures and compare them
			CO5	Apply the knowledge obtained by the course to solve real world problems
19	18ME2205	Numerical Computation for Mechanical Engineers	CO1	Understand elementary programming concepts, and the basics in MATLAB
			CO2	Understand linear algebra, probability and statistics for solving engineering problems
			CO3	Solve a system through linear and nonlinear equations, and ordinary differential equations in Mechanical Engineering
			CO4	Select an appropriate numerical approach for solving engineering problems
			CO5	Ability to select bench marks to confirm the computational approach

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20	18ME1204	Introduction to Computational Thinking and Data Sciences	CO1	Perform basic computations in Python, including working with tabular data.
			CO2	Understand basic probabilistic simulations, statistical thinking and Stochastic Programs.
			CO3	Use good practices in Python programming using Computational Simulations.
			CO4	Implement Computational data modeling and clustering using Python programming.
			CO5	Apply the theoretical concepts to develop Python Programs to solve Optimization Problems and Computational Simulations with the applications of Solid and Fluid Mechanics concepts.
21	18ME1002	Engineering Graphics for Mechanical Engineers	CO1	Learn and practice the different views of representation of engineering drawings.
			CO2	Learn and practice dimensioning and section of engineering drawings.
			CO3	Learn and practice the assembly drawings.
			CO4	Make basic engineering drawings using both geometric instruments as well as graphics software with equal ease.
22	18ME1003	Workshop Practices for Mechanical Engineers	CO1	Understanding different manufacturing techniques and their relative advantages/ disadvantages with respect to different applications.
			CO2	Fabricate components with their own hands.
			CO3	Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
			CO4	Assemble different components and produce small devices of their interest
23	18EE2205	Circuits and Electronics	CO1	Understand the Basic of Electrical network elements
			CO2	Understand the behavior of semiconductor switches and its applications
			CO3	Apply Time & frequency domain analysis of first & second order networks
			CO4	Understand the Applications of Analog & Digital circuits
24	18SC1106	TECHNICAL SKILLS - 1(CODING)	CO1	Apply the concepts of basic programming to solve the basic problems, pattern based problems
			CO2	Build solutions for problems on Numbers and array based problems , functions, recursion
			CO3	Solve problems solutions for character/string based problems and pointers
			CO4	Build solutions to programs on Data structures concepts.
25	18SC1207	TECHNICAL SKILLS - I1(CODING)	CO1	Apply the concepts of basic programming to solve the basic problems, patternbased problems
			CO2	Build solutions for problems on Numbers and array based problems , functions,
			CO3	Solve problems solutions for character/string based problems and pointers
			CO4	Build solutions to programs on Data structures concepts
26	18PH2007	MATERIALS FOR MECHANICAL ENGINEERING APPLICATIONS(OPEN ELECTIVE)	CO1	Understand crystal structures and also to find lattice parameters using different XRD techniques
			CO2	Understand different heat treatment processes and also understand the properties of smart materials
			CO3	Understand different types of semiconducting materials and ceramic materials
			CO4	Understand different types of composite materials and nano materials and its applications
27	18ME1201	Mechanics and Materials-I	CO1	Analyze stresses in members with 1D axial loading or torsion
			CO2	Analyze shear force and bending moment diagrams
			CO3	Analyze deflections and stresses in beams
			CO4	Design Columns and pressure vessels
			CO5	Apply the theoretical concepts to conduct various experiments of strength of materials practically and analyze the data
28	18ME2106	Measurements and Instrumentation	CO1	Understand the basics of standards of measurement, limits, fits & tolerances industrial applications and identify the uses of gauges and comparators.
			CO2	Understand the significance of measurement system, errors, transducers, intermediate modifying and terminating devices.
			CO3	Interpret measurement of field variables like force, torque and pressure.
			CO4	Comprehend the fundamentals of thermocouple and strain measurement.
			CO5	Apply the theoretical concepts to conduct various experiments of Measurements practically.
29	18ME2107	Thermal-Fluids Engineering-I	CO1	Understand and apply the fundamental principles and definitions of thermodynamics, fluid mechanics, and heat transfer.
			CO2	Apply the laws of thermodynamics for thermal systems associated with heat transfer and work transfer, entropy generation and its influence on engineering systems.
			CO3	Elucidate the basic properties, principles and applications of fluids, fluid components, fluid statics and different types of fluid flows.
			CO4	Describe fluid boundary layers, turbulence and their implementation in flow of fluid in engineering systems.
			CO5	Apply the theoretical concepts to conduct various experiments of thermodynamics, fluid mechanics practically.
			CO1	Emphasize the fundamentals of mechanical behavior of materials
			CO2	Examine Fatigue failure of materials

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30	18ME2108	MECHANICS AND MATERIALS - II	CO3	Interpret Fracture and Creep behavior of materials
			CO4	Select the suitable material for mechanical applications
			CO5	Determine the properties of materials or analyze through ANSYS/MSC NASTRAN software.
31	18ME2109	KINEMATICS AND DYNAMICS OF MACHINES	CO1	Identify, select and analyze kinematically suitable mechanisms for required motion of machinery
			CO2	Develop velocity and acceleration diagrams and analyze the data
			CO3	Develop cam profiles and Analyze gears and gear trains kinematically
			CO4	Analyze mechanisms dynamically
			CO5	Apply the theoretical concepts to design mechanisms by using the simulation software and analyzing the data
32	18ME2110	Machine Drawing	CO1	Draft various parts of machine components and their assemblies. Conversion of part drawings to assembly drawing and vice versa in conventional form.
			CO2	Draw different line types and various dimensioning, conventional representation of materials and machine components, sectioning, limits, fits and tolerances.
			CO3	Develop and interpret production drawing for various machine elements
			CO4	Implement Computer Aided Drafting for various machine components using software.
33	18ME2211	DESIGN AND MANUFACTURING – I	CO1	Understand and apply the casting processes
			CO2	Apply the welding processes and identify the faults in welding processes
			CO3	Apply principles of cold/hot forming processes
			CO4	Apply sheet metal processes and design sheet metal dies.
			CO5	Fabricate the parts using machine tools
34	18ME2212	Thermal-Fluids Engineering-II	CO1	Apply the principles of thermodynamics, heat transfer, and fluid mechanics to the design and analysis of engineering systems.
			CO2	Elucidate the thermodynamics and fluid mechanics steady flow components of thermodynamic plant as well Laminar and turbulent flow of fluids in channels and over surfaces.
			CO3	Identify thermodynamic state of a pure substance and determine the thermodynamic properties and explain the design approach to thermodynamic plants.
			CO4	Analyze Rankine, power cyles and explain refrigeration and air conditioning systems.
			CO5	Apply analytical cognitive skills of the theoretical concepts to conduct various experiments of thermodynamics and fluid mechanics practically.
35	18ME2213	VIBRATIONS AND CONTROL	CO1	Analyze one DOF free and forced undamped vibration systems
			CO2	Analyze and control of one DOF forced damped vibration systems
			CO3	Analyze and control of Two and Multi DOF vibration systems
			CO4	Analyze continuous systems and vibration measurement.
36	18ME3114	MACHINE DESIGN	CO1	Design of shafts and couplings
			CO2	Design of fasteners and power screws
			CO3	Design of belt drives and chain drives, brakes and lubrication system
			CO4	Design of gears for the given application
37	18ME3115	DESIGN AND MANUFACTURING – II	CO1	Understand and analyze the working of various machining processes.
			CO2	Implement NC and CNC programing for machining simple components
			CO3	Apply the automation of production lines.
			CO4	Design of various manufacturing processes.
			CO5	Implement modern manufacturing techniques
38	18ME3116	ROBOTICS AND CONTROLS	CO1	Implement direct kinematics for robot design
			CO2	Implement Inverse kinematics and Workspace analysis based robot design
			CO3	Implement Artificial Intelligence in Robotic Applications
			CO4	Implement the task programming for robots
39	18ME3117	PRODUCT DESIGN AND DEVELOPMENT	CO1	Identify and establish product specifications.
			CO2	Selection of concept and Product architecture.
			CO3	Apply Industrial design techniques.
			CO4	To develop a Prototype
40	18ME3218	ENGINEERING MANAGEMENT	CO1	Illustrate the primary concepts about management, its principles and functions and the types of business organizations and Demonstrate the knowledge to solve complex engineering problems in industrial scenario.
			CO2	Analyze the concepts of financial management includes present worth and future worth of invested money through cash flow diagram and differed annuities.
			CO3	Acquire knowledge in economic analysis and cost accountancy.
			CO4	Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures
41	18ME3219	HEAT TRANSFER	CO1	Apply Fourier law of conduction and combined conduction convection concepts to 1-D heat transfer problems.
			CO2	Analyze heat transfer using extended surfaces , unsteady state heat transfer and 2-D conduction mode of heat transfer
			CO3	Understand convection mode of heat transfer and heat transfer during phase change by applying the empirical correlations to solve convection problems

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			CO4	Apply the principles of heat transfer to analyze and design different heat exchangers.
			CO5	Experimental verification of various heat transfer parameters
42	18TS701	SKILLING FOR ENGINEERS-1 (MANUFACTURING TECHNOLOGIES)	CO1	Preparation of sand moulds with proper gating and riser system
			CO2	Machining using machine tools and preparation of CNC part program.
			CO3	Preparation of work piece for various welding operations and performing welding using different welding equipment
			CO4	Production of parts using rapid prototyping
			CO5	Hands on experience for performing experiments in Casting, Machining, Welding and Rapid prototyping
43	18TS702	SKILLING FOR ENGINEERS-2 (ARTIFICIAL INTELLIGENCE)	CO1	Problem solving by Search, Heuristic Search, Randomized search techniques and Finding Optimal paths
			CO2	Analyze the appropriate methodologies for problem decompositions, planning and constraint data constraint satisfactions.
			CO3	Understand Knowledge Representation using Predicate Logic, Representing Knowledge using Rules, Semantic Nets, Frames and Conceptual dependencies.
			CO4	Apply the theoretical concepts to conduct various experiments on Search Techniques and Language Representation using AI
44	18TS703	SKILLING FOR ENGINEERS-3 (PROBLEM SOLVING	CO1	Analyze fluid flow through pipes or channels (internal flow)
			CO2	Analyze fluid flow over different geometrical objects (external flow)
			CO3	Analyze steady and transient heat transfer through various systems
			CO4	Analyze fluid flow and heat transfer from various systems
45	18TS704	SKILLING FOR ENGINEERS-4 (PROBLEM SOLVING	CO1	To Perform static and dynamic analysis of 1-D structures
			CO2	To Perform static and dynamic analysis of 2-D structures
			CO3	To Perform static and dynamic analysis of 3-D structures
			CO4	Identifying and solving the real complex engineering problems
46	18TS705	TECHNICAL PROFICIENCY & TRAINING-1 (DATA ANALYTICS)	CO1	Gather enough relevant data, conduct data analytics using scientific methods, and make appropriate and powerful connections between quantitative analysis and real-world problems.
			CO2	Demonstrate a sophisticated understanding of the concepts and methods; know the exact scopes and possible limitations of each method; and show capability of using data analytics skills to provide constructive guidance in decision making.
			CO3	Use advanced techniques to conduct thorough and insightful analysis and interpret the results correctly with detailed and useful information.
			CO4	Show substantial understanding of the real problems; conduct deep data analytics using correct methods; and draw reasonable conclusions with sufficient explanation and elaboration. Make better decisions by using advanced techniques in data analytics
47	18TS706	TECHNICAL PROFICIENCY & TRAINING-2 (MACHINE LEARNING)	CO1	Understand the basic Python Programming and basic computations using Python
			CO2	Understand and apply the basic Machine Learning and Pre-processing techniques in Machine Learning
			CO3	Understand and apply Supervised Machine Learning techniques- Regression Techniques
			CO4	Understand and apply Supervised Machine Learning techniques – Classification Techniques
48	18GN1107	Cocurricular Activity -1	CO1	Communicate effectively in the gathering.
			CO2	Demonstrate their interpersonal and communication skills.
			CO3	Understand and work effectively as an individual in a Team.
			CO4	Improve their creativity in developing useful models.
49	18GN1208	Cocurricular Activity -2	CO1	Communicate effectively in the gathering.
			CO2	Demonstrate their interpersonal and communication skills.
			CO3	Understand and work effectively as an individual in a Team.
			CO4	Improve their creativity in developing useful models.
50	18GN2109	Cocurricular Activity -3	CO1	Communicate effectively in the gathering.
			CO2	Demonstrate their interpersonal and communication skills.
			CO3	Understand and work effectively as an individual in a Team.
			CO4	Improve their creativity in developing useful models.
51	18GN2210	Cocurricular Activity -4	CO1	Communicate effectively in the gathering.
			CO2	Demonstrate their interpersonal and communication skills.
			CO3	Understand and work effectively as an individual in a Team.
			CO4	Improve their creativity in developing useful models.
52	18GN3111	Cocurricular Activity -5	CO1	Communicate effectively in the gathering.
			CO2	Demonstrate their interpersonal and communication skills.
			CO3	Understand and work effectively as an individual in a Team.
			CO4	Improve their creativity in developing useful models.
53	18GN3212	Cocurricular Activity -6	CO1	Communicate effectively in the gathering.
			CO2	Demonstrate their interpersonal and communication skills.
			CO3	Understand and work effectively as an individual in a Team.

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			CO4	Improve their creativity in developing useful models.
54	18ME4051	DESIGN OF TRANSMISSION ELEMENTS	CO1	Design and selection of various belt and chain drives
			CO2	Design and Selection of the suitable bearing for the given loading condition
			CO3	Analyze kinematic and dynamic aspects in design of brakes, clutches
			CO4	Design and analysis of different types of gear drives
			CO5	Analyze machine elements using analysis software
55	18ME4052	THEORY OF ELASTICITY AND PLASTICITY	CO1	Analyze stresses and strains in planes in elastic or plastic region
			CO2	Solve 2-D problems in rectangular Components
			CO3	Analyze stresses and strains in 3-D problems
			CO4	Analyze Beams and frames in plasticity applications
56	18ME4053	ADVANCED VIBRATIONS AND NOISE CONTROL	CO1	Understand the concepts of acoustics and vibrations
			CO2	Determine the sources of vibrations
			CO3	Measure the level of vibration and control the vibrations
			CO4	Measure and control the noise observed from vehicles.
57	18ME4054	COMPUTER AIDED DESIGN	CO1	Understand the Fundamentals of CAD and display devices
			CO2	Apply the concept of geometric modelling
			CO3	Able to apply concept of Surface and solid modelling
			CO4	Application of various Geometric transformations
58	18ME4055	CREEP FATIQUE AND FRACTURE MECHANICS	CO1	Assess the failure of unflawed structural components
			CO2	Assess the fatigue life of structural components under the specified load spectrum
			CO3	Evaluate the fracture toughness and assess the life of flawed structural components
			CO4	Assess the life of structural components under creep
59	18ME4056	ADVANCED STRENGTH OF MATERIALS	CO1	Analyze statically indeterminate beams
			CO2	Analyze stresses in curved beams and Examine the Shear Centre for various cross sections of beams
			CO3	Apply unit load method to find deflections in beams and structures
			CO4	Analyze stresses in rotating members and thick cylinders
			CO5	To simulate the structural members using ANSYS and validate the results with analytical methods
60	18ME4057	MECHANICS OF COMPOSITE MATERIALS	CO1	Know the composite materials and manufacturing methods
			CO2	Understand the behaviour of composite Lamina
			CO3	Know the properties of various types composite materials
			CO4	Apply Failure theories to calculate stresses in composite materials
61	18ME4061	MODREN MANUFACTURING PROCESSES	CO1	To classify and understand the need of Non-Traditional Manufacturing Processes.
			CO2	To understand the working principle, mechanism of metal removal and the effect of various process parameters on its performance of various Non-Traditional Machining Processes.
			CO3	To understand the working principle and the effect of various process parameters on its performance of various Non-Traditional Welding Processes.
			CO4	To understand the working principle of various Non-Traditional Forming Processes.
			CO5	Apply the modern manufacturing techniques
62	18ME4062	ADVANCED MATERIALS	CO1	Ability to identify different types of optimization problems
			CO2	Understand basic concepts in solving nonlinear optimization problems
			CO3	Understand optimality conditions for unconstrained and constrained optimization problems and be able to apply them in verifying the optimality of a solution
			CO4	Understand basics of choosing and implementing optimization methods
63	18ME4063	ADDITIVE MANUFACTURING	CO1	To be able to properly distinguish between the hype and realities of additive manufacturing
			CO2	To understand the basic AM processes, and the limitations and advantages of each.
			CO3	To understand the differences between traditional processes and additive manufacturing production, including the differences in design methodology.
			CO4	To use AM terminology properly and understand the role and importance of standards in the additive manufacturing industry.
64	18ME4064	TOOL ENGINEERING AND DESIGN	CO1	Develop the ability to design cutting tools for given single component.
			CO2	Design and development of various die configurations.
			CO3	Design and development of jigs for given component.
			CO4	Design and development of fixtures for given component.
			CO5	Gain practice on designing the tools and dies using a software package.
65	18ME4065	FLEXIBLE MANUFACTURING SYSTEMS	CO1	Analyze various production schedules and plant layouts.
			CO2	Apply the concept of group technology to the development of FMS.
			CO3	Identify hardware and software components of FMS.
			CO4	Analyze materials handling and storage system in FMS.
			CO5	Conduct experiments & hands on experience related to NC part programming
66	18ME4066	GEOMETRIC DIMENSIONING AND TOLERANCING	CO1	Understand the Application of Dimensioning
			CO2	Understand the application of Tolerances.
			CO3	Read and interpret the industrial drawings.
			CO4	Development of a Dimensional Inspection Plan

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67	18ME4067	REVERSE ENGINEERING AND RAPID PROTOTYPING	CO1	Understand the need of reverse engineering
			CO2	Understand working principles of RP techniques
			CO3	Understand Rapid tooling and RP case studies
			CO4	Understand applications of RP techniques
68	18ME4071	AUTOMOBILE ENGINEERING	CO1	Understand various principles, components, classification of automobiles.
			CO2	Understand working of Engine cooling system, coolant properties and combustion chambers.
			CO3	Understand various lubricating systems, its properties and Transmission systems of an Automobile.
			CO4	Understand the concepts of Suspension system and Vehicle control in an Automobile.
			CO5	Able to apply the various concepts of Automobile engineering using simulation and analysis through suitable software
69	18ME4072	AUTOMOBILE ENGINE DESIGN	CO1	Understand the basic knowledge on automobile engine nomenclatures and its performance parameters involved in developing an engine
			CO2	Apply knowledge to explore different types of design models and factors involved in modeling an engine component in details with real time application.
			CO3	Comprehend different functional aspects for good performance of an engine and factors causing failure of an engine
			CO4	Understand different types of maintenance activities involved and study of faultfinding equipment in detail.
			CO5	Modeling and analysis of engine components of an automobile using CAD software tools-Laboratory
70	18ME4073	AUTOMOTIVE TRANSMISSION	CO1	Understand the importance of construction and working of a clutch in automobile industry and troubleshooting of clutch
			CO2	Understand the importance of construction and working of gear box and total resistance to motions
			CO3	Understand different mechanisms used while adopting a torque converter and various Automotive Transmission mechanisms
			CO4	Understand working principle of drive line system components
			CO5	Apply contemporary issues and their impact on provided solution in addition to that students will be able to solve open-ended problem related to design the transmission components using CAD
71	18ME4074	AUTOTRONICS & SAFETY	CO1	Understand various principles, characteristics, testing, maintenance, and servicing of batteries.
			CO2	Understand working of ignition system of an S I engine, its maintenance and service.
			CO3	Understand wiring for Auto electrical systems for I C Engines
			CO4	Understand the concepts of safety for various domains in automobiles.
			CO5	Apply the various concepts of Automobile engineering using electronics through suitable software
72	18ME4075	ALTERNATIVE ENERGY SOURCES FOR AUTOMOBILES	CO1	Acquire comprehensive knowledge on Electric Vehicles and Hybridization of automobiles with applications.
			CO2	Understand the technology of Hydrogen driven vehicles and fuel properties along with application in engine performance.
			CO3	Comprehend about Solar powered automobiles and estimate the performance of engines driven by alternative liquid fuels (Biofuels) and gaseous fuels (Natural Gas and Propane vehicles).
			CO4	Explore and conjecture the emerging technologies and future source of alternative fuels in automobiles.
			CO5	Practically study the various technologies of alternative energy sources applied in the advanced scenario of automobile engineering.
73	18ME4076	AUTOMOTIVE ELECTRICAL AND ELECTRONICS SYSTEM	CO1	Understanding battery, Cranking motor construction and testing methods.
			CO2	Understand the principle of alternator and to test the alternator.
			CO3	Understand the Electronic Controls in Gasoline Engine.
			CO4	Understand the basics of Vehicle Motion Control and telematics system
			CO5	Perform OBD II test on vehicle and Program MYRIO hardware using Lab view.
74	18ME4077	AUTOMOBILE ENGINE SYSTEM AND PERFORMANCE	CO1	Apply the knowledge of basic engine technology along with principle. Summaries of Engine Cycles.
			CO2	Apply the concept performance aspect of mixture preparation and ignition system for SI and CI Engines and Combustion in Engines.
			CO3	Pollutant Formation, Emission control methods and Emission norms
			CO4	Engine Testing, Performance analysis and Emerging Engine Technologies
			CO5	Experiments on I C Engines for performance calculation
75	18ME4081	AUTOMOTIVE SENSOR AND APPLICATIONS	CO1	Learn the sensor classification and sensor product selection guide.
			CO2	Analyze the measurement of engine parameter using sensor.
			CO3	Apply required sensors and actuators for automotive applications
			CO4	Analyze the sensors for intelligent transport systems

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76	18ME4082	AUTOTRONICS	CO1	Understand the automotive electronics for engine management system
			CO2	Analyze required sensors and actuators for an automotive application
			CO3	Apply the suitability of a control system for automotive application
			CO4	Ability to analyze of electronic system for automotive applications
77	18ME4083	ELECTRONIC ENGINE MANAGEMENT SYSTEM	CO1	Understand the automotive instruments and automotive sensors
			CO2	Learn the measurement of engine parameter by using sensor.
			CO3	Acquire ability to analyze the electronic fuel injection system
			CO4	Apply the principles of digital control techniques and the application of on board diagnosis
			CO5	Experiments on computerized Diesel Engine and Lab view based Engine control unit
78	18ME4084	INSTRUMENTATION IN AUTOMOTIVE INDUSTRIES	CO1	Understand the knowledge of various Measuring Instruments to design a simple Instrumentation system
			CO2	Analyze the various instruments and use them in various fields
			CO3	Learn and apply the measuring instruments in various industries application
			CO4	Analyze suitable instrument for a given application
79	18ME4085	AUTOTRONICS AND VEHICLE INTELLIGENCE	CO1	Analyze various electronics systems like sensors
			CO2	Understand Fuel injection and Ignition system
			CO3	Understand Electric vehicles and hybrid vehicles
			CO4	Design of intelligence vehicle systems
80	18ME4086	AUTOMOTIVE SYSTEMS	CO1	Understand the importance of automotive systems
			CO2	Understand the Two-wheel drive, four-wheel drive vehicles
			CO3	Analyze the transmission system
			CO4	Analyze control system for Automotive systems
81	18ME4087	PROGRAMMABLE LOGIC CONTROLLERS	CO1	Understand the importance of Factory Automation
			CO2	Understand the functions and operations of PLC
			CO3	Understand the Installation and maintenance procedures for PLC
			CO4	Analyze PLC for the control of industrial processes
82	18ME4091	ARTIFICIAL INTELLIGENCE FOR ROBOTICS	CO1	Understand the concepts of AI
			CO2	Apply basic principles of AI in solutions that require problem solving and planning.
			CO3	Apply basic principles of AI in solutions that require problem solving, planning, reasoning and learning
			CO4	Analyze AI in Robotics
83	18ME4092	AUTOMATION SYSTEM DESIGN	CO1	Understand the design principles of automation and its application in an automated manufacturing system
			CO2	Analyze pneumatic sub-systems of an automated manufacturing system in terms of design, operation and control aspects
			CO3	Analyze hydraulic sub-systems of an automated manufacturing system in terms of design, operation and control aspects
			CO4	Understand programmable automation with regard to the computer integrated manufacturing system
84	18ME4093	INDUSTRIAL AUTOMATION AND CONTROL	CO1	Understand the concepts industrial automation and measurement systems
			CO2	Apply the controllers in automation
			CO3	Analyze and select a suitable PLC system for the given application
			CO4	Apply the concepts of control systems for industrial automation
85	18ME4094	INDUSTRIAL HYDRAULIC AND PNEUMATIC SYSTEMS	CO1	Learn the concepts hydraulic or pneumatic actuation system
			CO2	Analyze diagnose maintenance problems of hydraulic and pneumatic system
			CO3	Analyze required components to develop an automation system using pneumatics and hydraulic system
			CO4	Develop circuits for controlling hydraulic and pneumatic using PLC
86	18ME4095	INDUSTRIAL ROBOTICS AND MATERIAL HANDLING SYSTEMS	CO1	Understand the concepts of robot, sensors and their applications in robots
			CO2	Learn material handling equipment used both in automated and non-automated systems
			CO3	Analyze and select a suitable material handling system for the given application
			CO4	Apply the various applications of robots in material handling
87	18ME4096	MICROCONTROLLER AND PLC	CO1	Understand the concept of 8051 microcontroller
			CO2	Design the 8051 microcontroller
			CO3	Understand the concept of PLC
			CO4	Write ladder logic in Programmable logic controllers.
88	18ME4097	MECHATRONICS SYSTEM DESIGN	CO1	Understand the approach used for mechatronic system design and relevant considerations
			CO2	Applythe suitable sensors and actuators used in a Mechatronic system
			CO3	Analyze signal conditioning interface in a Mechatronic system and implementation of control systems
			CO4	Modeling and Simulation for the Mechatronic System design perspective
			CO1	Able to know the Basics of Computation, Algorithms, and Functional Programming.
			CO2	Able understand the Iterative style, recursive style, and efficiency issues in programming.

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89	18ME4101	PROGRAMMING SKILLS	CO3	Able to understand the Basics of imperative style programming, Assertions, and Loop invariants.
			CO4	Able to understand Top down design, Step-wise refinement, structures, encapsulation, and object-oriented programming.
			CO5	Able to Apply the theoretical concepts of programming to develop and execute the programs.
90	18ME4102	DATA ANALYTICS	CO1	Able to know the Basics of Descriptive Statistics.
			CO2	Able understand the Inferential Statistics.
			CO3	Able to understand the Basics of Regression & ANOVA.
			CO4	Able to understand Prescriptive analytics.
			CO5	Able to Apply the theoretical concepts of data analytics to solve problems.
91	18ME4103	PYTHON	CO1	Able to know the Basics of Programming, and Python.
			CO2	Able understand Lists, Function definition, Sorting, Passing functions.
			CO3	Able to understand Exception handling, Input / output, File handling, String processing, Backtracking, Scope, Data structures.
			CO4	Able to understandClasses, Objects and user defines data types.
			CO5	Able to Apply the theoretical concepts of python to develop and execute the programs.
92	18ME4104	MACHINE LEARNING	CO1	Able to know the Basics of Machine Learning.
			CO2	Able understand Model Validation Approaches, Discriminant Analysis.
			CO3	Able to understand Random Forest, Neural Networks Deep learning.
			CO4	Able to understand Clustering, Associative Rule Mining, and Challenges for big data analytics.
			CO5	Able to Apply the theoretical concepts of Machine Learning to solve problems.
93	18ME4105	ARTIFICIAL INTELLIGENCE	CO1	Introduction to AI, Understand about intelligence, knowledge and Artificial Intelligence, techniques of AI as a State space search, Production Systems.
			CO2	Problem solving by Search, Heuristic Search, Randomized search techniques and Finding Optimal paths
			CO3	Analyze the appropriate methodologies for problem decompositions, planning and constraint data constraint satisfactions.
			CO4	Understand Knowledge Representation using Predicate Logic, Representing Knowledge using Rules, Semantics Nets,Frames and Conceptual dependencies.
94	18ME4106	FUZZY LOGIC AND NEURAL NETWORKS	CO1	Understanding the Concepts of Fuzzy sets, Fuzzy Logic, importance of membership functions, Fuzzy Rule, and operations on fuzzy sets, Principles of Fuzzy Logic System in solving the complex engineering problems
			CO2	Applications of Fuzzy sets for real time problems of various domains using Fuzzy Logic control system
			CO3	Understand Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Back propagation, Associative Learning,
			CO4	Understanding Neuro Fuzzy Approaches, Computing with Neural Nets and Applications of Neural Network in various Domains
95	18ME4107	ROBOTICS	CO1	Understand the concept of robotics with respect to their anatomy, Sensors and Controllers.
			CO2	Understand the image processing techniques in Robot vision
			CO3	Understand the working of Robots in various mechanical applications
			CO4	Understand the various Robot Languages
96	18ME40B4	Mechatronics	CO1	Identify appropriate sensor, Identify appropriate actuation system for a given application.
			CO2	Identify appropriate microcontroller for a given application and to build a mathematical Model of system for evaluating open loop system performance and behaviour.
			CO3	Identify an appropriate closed loop control strategy to attain the desired system behaviour.
			CO4	Suggest a Mechatronic product design for a given application and evaluate its performance.
97	18ME40B5	Robotics	CO1	Analyze the anatomy of existing robotic systems and their performance specifications, end effectors etc
			CO2	Analyze a robotic system with respect to the suitable sensors, actuators for its performance.
			CO3	Understand manipulator kinematic analysis and joint trajectory plan for a given end effector.
			CO4	Classification of Robot Languages, Comprehensive identification of suitable Robotic system for various applications.

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98	18ME40B6	Operations Research	CO1	Model and Solve for the optimum solutions using LPP
			CO2	Model and Find the Optimized solutions for the problems in the field of Transportation and Management / Assignments.
			CO3	Model and Optimize Game theory, Dynamic Part Programming, Queuing Theory, Inventory Control & Simulation Problems
			CO4	Understand and solve the Concepts related to PERT/CPM

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