



# Koneru Lakshmaiah Education Foundation

(Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

Accredited by NAAC as 'A' Grade University ♦ Approved by AICTE ♦ ISO 9001-2015 Certified

Campus: Green Fields, Vaddeswaram - 522 502, Guntur District, Andhra Pradesh, INDIA.

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## DEPARTMENT OF MECHANICAL ENGINEERING


Program: B.Tech

Academic Year 2018-2019

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.


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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 deduced 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.
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.

  
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			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.


  
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 Vaddeswaram - 522 502

			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
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.

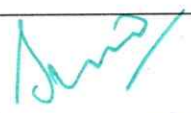
  
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15	18CY1002	Solid State Chemistry	CO1	Ability to understand the electronic structure, chemical bonding, and atomic order and arrangements.
			CO2	Ability to develop “chemical intuition” and quantitative understanding of chemical principles
			CO3	Ability 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	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
25	18ME2106	Measurements And Instrumentation	CO1	Understand the Basic fundamentals of a measurement system and various Mechanical measuring parameters, and apply different measuring techniques on various mechanical parameters using simulation and experimentation tools.


  
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			CO2	Understand various Electrical and Electronic measuring parameters, and apply different measuring techniques on various Electrical and Electronics parameters using simulation and experimentation tools.
			CO3	Understand various MEMS sensors and apply Fourier transforms, linear and nonlinear function fitting, and uncertainty analysis.
			CO4	Understand and apply various probability density functions and statistics, system identification, electrical impedance analysis and transfer functions, computer aided experimentation and technical reporting
			CO5	Apply the theoretical concepts to measure different parameters.
26	18ME2110	Machine Drawing	CO1	Draw different line types and various dimensioning, conventional representation of materials and machine components, sectioning, limits, fits and tolerances.
			CO2	Draft various types of screws, bolts and nuts, bolted joints, locking arrangements and also draft various types of couplings and their arrangements and model the same using Solid works
			CO3	Prepare the assembly drawing of engine parts, machine Components both in conventional form and then by using software.
			CO4	Generate detail drawings of individual parts of an assembled machine Component both in conventional form and then by using software.
27	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.
28	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

  
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			CO5	Apply the theoretical concepts to design mechanisms by using the simulation software and analyzing the data
29	18ME2213	Vibrations And Controls	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.
30	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 cycles 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.
31	18ME2108	Mechanics And Materials - Ii	CO1	Apply materials in mechanical design based on mechanical behavior of engineering materials.
			CO2	Emphasize the fundamentals of mechanical behavior of materials
			CO3	Determine the mechanical properties of materials to design.
			CO4	Select the material for mechanical application.
			CO5	Determine the properties of materials experimentally
32	18ME2211	Design And Manufacturing – I	CO1	Generate, analyze, and refine the design of electro-mechanical devices making use of physics and mathematics.
			CO2	Understand the function, performance and failure modes and manufacturing of common machine elements.
			CO3	Apply experimentation and data analytic principles relevant to mechanical design.
			CO4	Communicate a design and its analysis (written, oral, and graphical forms).
			CO5	Fabricate the parts using machine tools
33	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.

  
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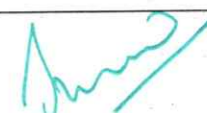


			CO2	Analyze the concepts of financial management includes present worth and future worth of invested money through cash flow diagram and differed annuities.
			CO3	Acquire knowledge in economic analysis and cost accountancy.
			CO4	Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures
34	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
			CO4	Apply the principles of heat transfer to analyze and design different heat exchangers. Understand the fundamentals of radiation and estimate the radiation heat exchange between two bodies.
			CO5	Experimental verification of various heat transfer parameters
35	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
36	18ME3116	Robotics And Control	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
37	18ME3115	Design And Manufacturing – Ii	CO1	Internalize the attributes along which the success or failure of a manufacturing process, machine, or system will be measured: quality, cost, rate, and flexibility.
			CO2	Apply physics to understand the factors that control the rate of production and influence the quality, cost and flexibility of processes.
			CO3	Understand the impact of manufacturing constraints on product design and process planning.

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			CO4	Apply an understanding of variation to the factors that control the production rate and influence the quality, cost and flexibility of processes and systems.
			CO5	Apply modern techniques to solve problems related to mechanical engineering
38	18ME3114	Machine Design	CO1	Model the machine elements such as bearings, bolts, belts and gears
			CO2	Analyze the machine elements to design a new component
			CO3	Characterize the mechanical system to a real world application
			CO4	Synthesize the modal to design a mechanical system
			CO5	Fabricate the design subject to engineering Constraints
39	18SC1106	Technical Skills -I(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.
40	18SC1207	Technical Skills -II(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
41	18TS701	Manufacturing Technology (Skilling For Engineers)	CO1	Analyze the Casting process to Estimate the cooling rate and residual stresses
			CO2	Analyze the welding process to estimate the temperature distribution profiles
			CO3	Analyze the Forming process to estimation the material flow
			CO4	Analyze the Machining process to estimation the cutting tool temperature and stresses
42	18TS702	Control Systems For Machines(Skilling For Engineers -Ii)	CO1	Understand the concept of control systems and actuation systems
			CO2	Apply the concepts of control systems in the field of automation
			CO3	Acquire ability to analyze and simulate response of a controlSystems
43	18TS703	Problem Solving	CO1	Understand the Flow Visualization, Analog Methods, Dimensional analysis and Basic concepts of drag and lift of an aerofoil.


  
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		Techniques In Thermal(Skilling For Engineers-Iii)	CO2	Analysis of Compressible Flow and Boundary layer theory
			CO3	Apply the fluid mechanics theoretical concepts to conduct various experiments by using ANSYS FLUENT
44	18TS704	Problem Solving Techniques In Design(Skilling For Engineers-Iv)	CO1	Identify stages in Design process and their implementation methods
			CO2	Identify methods of scheduling of design process
			CO3	Implementation of the design process to solve a design problem
45	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
46	18TS706	Technical Proficiency 7 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
47	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
48	18ME4051	Finite Element Method	CO1	Analyze 3D stresses & strains for general loading problems
			CO2	Analyze 1D structural problems using FEM
			CO3	Analyze 2D problems including CST and axi-symmetric solids subjected to axi-symmetric loading using FEM
			CO4	Analyze structural dynamic problems and thermal problems using FEM
			CO5	Analyze the structural members using ANSYS software.

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49	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
50	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.
51	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
52	18ME4055	Creep Fatigue 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
53	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
54	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
55	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.

  
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			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.
56	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
57	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.
58	18ME4066	Geometric Dimensioning And Tolerancing	CO1	Understand the Application of Dimensioning
			CO2	Understand the application of Tolerances.
			CO3	Read and interpret the industrial drawings.
59	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
60	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.
61	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.


  
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62	18ME4071	Automobile Engineering	CO1	Understand working of engine and cooling system
			CO2	Understand transmission and vehicle control systems
63	18ME4072	Automobile Engine Design	CO1	Understand the thermodynamics first principles and design major components of an I. C. engine
			CO2	Design cooling, lubrication and engine component systems
			CO3	Simulate and Analyze the designed engine components for stresses
			CO4	Design various automobile engine components experimentally
64	18ME4073	Automotive Transmission	CO1	Understand functionality of clutches and gear box
			CO2	Principle of working of drive line system and automatic transmission
			CO3	Understand various Automotive Transmission mechanisms experimentally
65	18ME4074	Autotronics & Safety	CO1	Understand working principles of batteries and ignition system
			CO2	Understand auto wiring electrical systems and safety concept and equipments
66	18ME4075	Alternative Energy Sources For Automobiles	CO1	Study and comprehend the application of Hydrogen fuel, Solar Energy and Biofuels for automobiles.
			CO2	Analyze and estimate the performance of Hybrid and Plug-in vehicles, Natural Gas and Propane vehicles, Emerging and future source of alternative fuels.
			CO3	Experimental and Simulations of Alternative energy sources using Software tools
67	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.
68	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
69	18ME4081	Automotive Sensor And	CO1	Learn the sensor classification and sensor product selection guide.


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		Applications	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
70	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
71	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
72	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
73	18ME4085	Autotronics And Vehicle Intelligence	CO1	Analyze various electronics systems like sensors, fuel injection system.
			CO2	Design of intelligence vehicle systems
74	18ME4086	Automotive Systems	CO1	Understand the importance of automotive systems
			CO2	Analyse control system for Automotive systems
75	18ME4087	Programmable Logic Controllers	CO1	Understand the functions and operations of PLC
			CO2	Analyze PLC for the control of industrial processes
76	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

  
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			CO4	Analyze AI in Robotics
77	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
78	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
79	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
80	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
81	18ME4096	Microcontroller And Plc	CO1	Understand the concept of 8051 microcontroller
			CO2	Write ladder logic in Programmable logic controllers.
82	18ME4097	Mechatronics System Design	CO1	Understand the approach used for mechatronic system design and relevant considerations
			CO2	Apply the 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
83	18ME4101	Programming Skills	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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			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.
84	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.
85	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.
86	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.
87	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.
88	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

  
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			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
89	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
90	18MB4051	Paradigms In Management Thought	CO1	Understand the basic management concepts along with an insight into levels of management.
			CO2	Understand the key contributions of classical approach to Management
			CO3	Understand and apply Quantitative methods to improve Management performance.
			CO4	Understand the key contributions of Behavioral and contemporary approaches to Management.
91	18MB4052	Indian Economy	CO1	Understand the structure of Indian Economy
			CO2	Understand the structural problems encountered by India
			CO3	Develop a perspective approaches to economic planning and development in India
			CO4	Understand the role of the Indian Economy in the global context
91	18MB4053	Managing Personal Finances	CO1	Understand the need for effective financial planning
			CO2	Analyze the basic concepts of money management, tax planning, consumer credit, housing and other consumer decisions, insurance, investments, retirement planning etc.
			CO3	Evaluate various financial tax saving schemes to save money to get tax benefits.
			CO4	Design savings and investment plans.
92	18MB4054	Basics Of Marketing For Engineers	CO1	Understand the basic concepts of marketing management
			CO2	Analyze the markets and consumers, the changing environmental factors with special focus on technology products
			CO3	Understand the basics of marketing mix
			CO4	Create an appropriate strategy for the marketing of high tech products and services
93	18MB4055	Organization Management	CO1	Understand the theories and approaches of organizational management

  
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			CO2	Understand the basics of organization structure
			CO3	Understand the methods for motivating in competitive business environment.
			CO4	Understand the basic modes of maintaining good industrial relations
94	18MB4056	Resource, Safety And Quality Management	CO1	Understand the basics systems of man power and materials management
			CO2	Understand the basics systems of machinery management
			CO3	Understand the basics systems of safety management
			CO4	Understand the basics systems of quality management



**Professor I/C Academics**



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