



**MALLAREDDY ENGINEERING COLLEGE AND MANAGEMENT SCIENCES**  
 (Approved by AICTE New Delhi & Affiliated to JNTU Hyderabad)

**Kistapur Village, Medchal, Medchal District-501401**

Department of Mechanical Engineering						
R18 -COURSE OUTCOMES						
Sr. No.	Class	Regulation	Subjects	Course code	Co's	Course Outcomes
1	I/I	R18	Mathematics - I	MA101BS	Co-1	Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
					Co-2	Find the Eigenvalues and Eigen vectors
					Co-3	Reduce the quadratic form to canonical form using orthogonal transformations
					Co-4	Analyse the nature of sequence and series.
					Co-5	Solve the applications on the mean value theorems.
2	I/I	R18	Engineering Physics	PH102BS	Co-1	The knowledge of Physics relevant to engineering is critical for converting ideas into technology.
					Co-2	An understanding of Physics also helps engineers understand the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements
					Co-3	In the present course, the students can gain knowledge on the mechanism of physical bodies upon the action of forces on them, the generation, transmission and the detection of the waves, Optical Phenomena like Interference, diffraction, the principles of lasers and Fibre Optics.
					Co-4	Various chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering applications.
3	I/I	R18	Programming for Problem Solving	CS103ES	Co-1	To write algorithms and to draw flowcharts for solving problems
					Co-2	To convert the algorithms/flowcharts to C programs.
					Co-3	To code and test a given logic in C programming language.
					Co-4	To decompose a problem into functions and to develop modular reusable code.
					Co-5	To use arrays, pointers, strings and structures to write C programs.
					Co-6	Searching and sorting problems.



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<b>4</b>	<b>I/I</b>	<b>R18</b>	Engineering Graphics	ME104ES	<b>Co-1</b>	Make use of the knowledge of geometry and Engineering curves for constructions.
					<b>Co-2</b>	Construct various types of scales
					<b>Co-3</b>	Analyze the objects such as points, lines and regular planes held in different orientations using conventional drawing and CAD tools.
					<b>Co-4</b>	Develop the lateral surface for sheet metal work.
					<b>Co-5</b>	Convert isometric views to orthographic views and vice versa
<b>5</b>	<b>I/I</b>	<b>R18</b>	Engineering Physics Lab	PH105BS	<b>Co-1</b>	Develop skills to impart practical knowledge in real time solution.
					<b>Co-2</b>	Understand principle , concept ,working and application of new technology and comparison of results with theoretical calculations
					<b>Co-3</b>	Design new instruments with practical knowledge.
					<b>Co-4</b>	Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems
					<b>Co-5</b>	Understand measurement technology, usage of new instruments and real time applications in engineering studies.
<b>6</b>	<b>I/I</b>	<b>R18</b>	Programming for Problem Solving Lab	CS106ES	<b>Co-1</b>	formulate the algorithms for simple problems
					<b>Co-2</b>	translate given algorithms to a working and correct program
					<b>Co-3</b>	correct syntax errors as reported by the compilers
					<b>Co-4</b>	identify and correct logical errors encountered during execution
					<b>Co-5</b>	represent and manipulate data with arrays, strings and structures
<b>Co-8</b>	modularize the code with functions so that they can be reused					
<b>7</b>	<b>I/I</b>	<b>R18</b>	Environmental Science	*MC109ES	<b>Co-1</b>	Define basic definitions and can explain complex relationship between Predators, Prey and the plant community.
					<b>Co-2</b>	Categorize resources in natural environment and its relationships with human activities as well as human impacts.
					<b>Co-3</b>	Demonstrate an awareness, knowledge and appreciation of the intrinsic values of ecological processes and communities.
					<b>Co-4</b>	Assess different scientific research strategies, including collection,



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						management, evaluation and interpretation of environmental data and role of information technology in environment.
					<b>Co-5</b>	Examine the transnational character of environmental problems, protection acts and ways of addressing them, including interactions across local to global scales. Formulate an action plan for suitable alternatives that integrate science, humanist and social perspectives, for the remediation or restoration of degraded environment.
<b>8</b>	<b>I/II</b>	<b>R18</b>	Mathematics - II	MA201BS	<b>Co-1</b>	Identify whether the given differential equation of first order is exact or not
					<b>Co-2</b>	Solve higher differential equation and apply the concept of differential equation to real world problems
					<b>Co-3</b>	Use the Laplace transforms techniques for solving ODE's
					<b>Co-4</b>	The physical quantities involved in engineering field related to vector valued functions.
					<b>Co-5</b>	Evaluate the line, surface and volume integrals and converting them from one to another
<b>9</b>	<b>I/II</b>	<b>R18</b>	Chemistry	CH202BS	<b>Co-1</b>	The knowledge of atomic, molecular and electronic changes, band theory related to conductivity
					<b>Co-2</b>	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost
					<b>Co-3</b>	The required principles and concepts of electro chemistry, corrosion and in understanding the problem of water and its treatments. electrochemistry
					<b>Co-4</b>	The knowledge of configurationally and conformational analysis of molecules and reaction mechanisms
					<b>Co-5</b>	The required skills to get clear concepts on basic spectroscopy and application to medical and other fields
<b>10</b>	<b>I/II</b>	<b>R18</b>	Engineering Mechanics	ME203ES	<b>Co-1</b>	Apply computer aided drafting tools to create 2D and 3D objects
					<b>Co-2</b>	sketch conics and different types of solids
					<b>Co-3</b>	Appreciate the need of Sectional views of solids and Development of surfaces of solids



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					<b>Co-4</b>	Read and interpret engineering drawings
					<b>Co-5</b>	Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting
<b>11</b>	<b>I/II</b>	<b>R18</b>	Engineering Workshop	ME205ES	<b>Co-1</b>	Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces
					<b>Co-2</b>	Solve problem of bodies subjected to friction
					<b>Co-3</b>	Find the location of centroid and calculate moment of inertia of a given section.
					<b>Co-4</b>	Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
					<b>Co-5</b>	Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration
<b>12</b>	<b>I/II</b>	<b>R18</b>	English	EN205HS	<b>Co-1</b>	Use English Language effectively in spoken and written forms.
					<b>Co-2</b>	Comprehend the given texts and respond appropriately.
					<b>Co-3</b>	Communicate confidently in various contexts and different cultures.
					<b>Co-4</b>	Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
					<b>Co-5</b>	Apply new oral vocabulary words in context to reinforce meaning.
<b>13</b>	<b>I/II</b>	<b>R18</b>	Engineering Chemistry Lab	CH206BS	<b>Co-1</b>	Determination of parameters like hardness and chloride content in water.
					<b>Co-2</b>	Estimation of rate constant of a reaction from concentration – time relationships.
					<b>Co-3</b>	Determination of physical properties like adsorption and viscosity.
					<b>Co-4</b>	Calculation of $R_f$ values of some organic molecules by TLC technique.
					<b>Co-5</b>	Calculation of $R_f$ values of some organic molecules by TLC technique
<b>14</b>	<b>I/II</b>	<b>R18</b>	English Language and Communication Skills Lab	EN207HS	<b>Co-1</b>	Better understanding of nuances of English language through audio-visual experience and group activities
					<b>Co-2</b>	Speak clearly with the right accent and intonation
					<b>Co-3</b>	Speaking skills with clarity and confidence which in turn enhances



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						their employability skills
					<b>Co-4</b>	Neutralization of accent for intelligibility
					<b>Co-5</b>	Understand and apply knowledge of human communication and language process.
<b>15</b>	<b>II/I</b>	<b>R18</b>	Probability and Statistics & Complex Variables	MA301BS	<b>Co-1</b>	Formulate and solve problems involving random variables.
					<b>Co-2</b>	To apply statistical methods for analysing experimental data.
					<b>Co-3</b>	Analyse the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
					<b>Co-4</b>	Laurent's series expansions of complex function
					<b>Co-5</b>	Taylor's series expansions of complex function
<b>16</b>	<b>II/I</b>	<b>R18</b>	Mechanics of Solids	ME302PC	<b>Co-1</b>	Analyze the behavior of the solid bodies subjected to various types of loading;
					<b>Co-2</b>	Apply knowledge of materials and structural elements to the analysis of simple structures;
					<b>Co-3</b>	Undertake problem identification, formulation and solution using a range of analytical methods;.
					<b>Co-4</b>	Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.
					<b>Co-5</b>	Expectation and capacity to undertake lifelong learning
<b>17</b>	<b>II/I</b>	<b>R18</b>	Material Science and Metallurgy	ME303PC	<b>Co-1</b>	An ability to apply knowledge of mathematics, science and engineering, to understand different materials and their properties.
					<b>Co-2</b>	An ability to design a system, component or process to meet desired needs within, realistic constraints such as economic , safety, manufacturability and sustainability etc., while selecting a material to manufacture the designed components.
					<b>Co-3</b>	An ability to identify the phases and their interrelationship in different alloy systems.
					<b>Co-4</b>	To understand the basic concepts of heat treatment.
					<b>Co-5</b>	A recognition of the need for, and an ability to engage in lifelong learning with the concepts of composite, ceramic and



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						nano materials for practical application
<b>18</b>	<b>II/I</b>	<b>R18</b>	Production Technology	ME304PC	<b>Co-1</b>	Understand the idea for selecting materials for patterns.
					<b>Co-2</b>	Know Types and allowances of patterns used in casting and analyze the components of moulds.
					<b>Co-3</b>	Design core, core print and gating system in metal casting processes
					<b>Co-4</b>	Understand the arc, gas, solid state and resistance welding processes.
					<b>Co-5</b>	Develop process-maps for metal forming processes using plasticity principles.
<b>19</b>	<b>II/I</b>	<b>R18</b>	Thermodynamics	ME305PC	<b>Co-1</b>	Understand and differentiate between different thermodynamic systems.
					<b>Co-2</b>	Understand and differentiate between different thermodynamic processes.
					<b>Co-3</b>	Understand and apply the laws of Thermodynamics to different types of systems undergoing various processes and to perform thermodynamic analysis.
					<b>Co-4</b>	Understand and analyze the Thermodynamic cycles and evaluate performance parameters.
					<b>Co-5</b>	Understand the concepts of psychometry
<b>20</b>	<b>II/I</b>	<b>R18</b>	Production Technology Lab	ME306PC	<b>Co-1</b>	Understanding the properties of moulding sands and pattern making.
						Fabricate joints using gas welding.
						Fabricate joints using arc welding.
						Evaluate the quality of welded joints.
						Basic idea of press working tools and performs moulding studies on plastics.
<b>21</b>	<b>II/I</b>	<b>R18</b>	Machine Drawing Practice	ME307PC	<b>Co-1</b>	Preparation of engineering and working drawings with dimensions and bill of material during design and development. Developing assembly drawings using part drawings of machine components.
					<b>Co-2</b>	Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
					<b>Co-3</b>	Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
					<b>Co-4</b>	Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features



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					<b>Co-5</b>	Title boxes, their size, location and details - common abbreviations and their liberal usage
<b>22</b>	<b>II/I</b>	<b>R18</b>	Material Science and Mechanics of Solids Lab	ME308PC	<b>Co-1</b>	The Primary focus of the Metallurgy and Material science program is to provide undergraduates with a fundamental knowledge based associated materials properties, and their selection and application.
					<b>Co-2</b>	Upon graduation, students would have acquired the necessary background and skills for successful careers in the materials-related industries.
					<b>Co-3</b>	Upon graduation, students would have developed the necessary background and skills for successful careers in the materials-related industries.
					<b>Co-4</b>	Furthermore, after completing the program, the student should be well prepared for management positions in industry.
					<b>Co-5</b>	Furthermore, after completing the program, the student should be well prepared for management positions in continued education toward a graduate degree.
<b>23</b>	<b>II/I</b>	<b>R18</b>	Constitution of India	*MC309	<b>Co-1</b>	know the importance of Constitution and Government
					<b>Co-2</b>	become Good Citizens and know their fundamental rights, duties and principles
					<b>Co-3</b>	learn about the role of PM, President, Council of Ministers and Local Administration.
					<b>Co-4</b>	understand the importance of Election Commission.
					<b>Co-5</b>	Will know about Secularism, Federalism, Democracy, Liberty, Freedom of Expression, Special Status of States etc.
<b>24</b>	<b>II/II</b>	<b>R18</b>	Basic Electrical and Electronics Engineering	EE401ES	<b>Co-1</b>	To analyze and solve electrical circuits using network laws and theorems.
					<b>Co-2</b>	To understand and analyze basic Electric and Magnetic circuits
					<b>Co-3</b>	To study the working principles of Electrical Machines
					<b>Co-4</b>	To introduce components of Low Voltage Electrical Installations
					<b>Co-5</b>	To identify and characterize diodes and various types of transistors.
<b>25</b>	<b>II/II</b>	<b>R18</b>	Kinematics of Machinery	ME402PC	<b>Co-1</b>	Understand the various elements in mechanism and the inversions of commonly used mechanisms such as four bar, slider crank and double slider crank mechanisms.
					<b>Co-2</b>	Draw the velocity and acceleration polygons for a given



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						configuration of a mechanism.
					<b>Co-3</b>	Understand the conditions for straight line motion mechanisms, steering mechanism and the usage of Hooke's joint.
					<b>Co-4</b>	Draw the displacement diagrams and cam profile diagram for followers executing different types of motions and various configurations of followers.
					<b>Co-5</b>	Calculate the number of teeth and velocity ratio required for a given combination of gears.
<b>26</b>	<b>II/II</b>	<b>R18</b>	Thermal Engineering-I	ME403PC	<b>Co-1</b>	To evaluate the performance of IC engines and compressors under the given operating conditions.
					<b>Co-2</b>	Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles.
					<b>Co-3</b>	Understand the functionality of the major components of the IC Engines and effects of operating conditions on their performance.
					<b>Co-4</b>	To understand the basic working principle of Jet engines.
					<b>Co-5</b>	To understand the working principle of Gas turbines.
<b>27</b>	<b>II/II</b>	<b>R18</b>	Fluid Mechanics and Hydraulic Machines	ME404PC	<b>Co-1</b>	Able to explain the effect of fluid properties on a flow system
					<b>Co-2</b>	Able to identify type of fluid flow patterns and describe continuity equation.
					<b>Co-3</b>	To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design.
					<b>Co-4</b>	To select and analyze an appropriate turbine with reference to given situation in power plants.
					<b>Co-5</b>	To estimate performance parameters of a given Centrifugal and Reciprocating pump.
					<b>Co-6</b>	Able to demonstrate boundary layer concepts
<b>28</b>	<b>II/II</b>	<b>R18</b>	Instrumentation and Control Systems	ME405PC	<b>Co-1</b>	To identify various elements and their purpose in typical instruments, to identify various errors that would occur in instruments
					<b>Co-2</b>	Analysis of errors so as to determine correction factors for each instrument
					<b>Co-3</b>	To understand static and dynamic characteristics of instrument and should be able to determine loading response time
					<b>Co-4</b>	For given range of displacement should be able to specify





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						transducer, its accurate and loading time of that transducer.
					<b>Co-5</b>	To understand the basic concept of open loop and closed loop systems.
<b>29</b>	<b>II/II</b>	<b>R18</b>	Basic Electrical and Electronics Engineering Lab	EE409ES	<b>Co-1</b>	To analyze and solve electrical circuits using network laws and theorems.
					<b>Co-2</b>	To understand and analyze basic Electric and Magnetic circuits
					<b>Co-3</b>	To study the working principles of Electrical Machines
					<b>Co-4</b>	To introduce components of Low Voltage Electrical Installations
					<b>Co-5</b>	To identify and characterize diodes and various types of transistors
<b>30</b>	<b>II/II</b>	<b>R18</b>	Fluid Mechanics and Hydraulic Machines Lab	ME407PC	<b>Co-1</b>	Able to explain the effect of fluid properties on a flow system
					<b>Co-2</b>	Able to identify type of fluid flow patterns and describe continuity equation
					<b>Co-3</b>	To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design
					<b>Co-4</b>	To select and analyze an appropriate turbine with reference to given situation in power plants
					<b>Co-5</b>	To estimate performance parameters of a given Centrifugal and Reciprocating pump.
					<b>Co-6</b>	Able to demonstrate boundary layer concepts
<b>31</b>	<b>II/II</b>		Instrumentation and Control Systems Lab	ME408PC	<b>Co-1</b>	At the end of the course, the student will be able to Characterize and calibrate measuring devices. Identify and analyze errors in measurement. Analyze measured data using regression analysis. Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter.
<b>32</b>	<b>II/II</b>	<b>R18</b>	Gender Sensitization Lab	*MC409	<b>Co-1</b>	To develop students' sensibility with regard to issues of gender in contemporary India
					<b>Co-2</b>	To provide a critical perspective on the socialization of men and women
					<b>Co-3</b>	To introduce students to information about some key biological aspects of genders
					<b>Co-4</b>	To expose the students to debates on the politics and economics of work
					<b>Co-5</b>	To help students reflect critically on gender violence.



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33	III/I	R18	Dynamics of Machinery	ME501PC	Co-1	the study of KOM & DOM are necessary to have an idea while designing the various machine members like shafts, bearings, gears, belts & chains and various I.C. Engine Components & Machine tool parts.
34	III/I	R18	Design of Machine Members-I	ME502PC	Co-1	The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.
					Co-2	Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading.
					Co-3	Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element
35	III/I	R18	Metrology & Machine Tools	ME503PC	Co-1	Identify techniques to minimize the errors in measurement
					Co-2	Identify methods and devices for measurement of length, angle, gear & thread parameters, surface roughness and geometric features of parts.
					Co-3	Understand working of lathe, shaper, planer, drilling, milling and grinding machines.
					Co-4	Comprehend speed and feed mechanisms of machine tools
					Co-5	Estimate machining times for machining operations on machine tools
36	III/I		Business Economics & Financial Analysis	SM504MS	Co-1	The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.
37	III/I	R18	Thermal Engineering-II	ME505PC	Co-1	Develop state – space diagrams based on the schematic diagrams of process flow of steam and gas turbine plants
					Co-2	Apply the laws of Thermodynamics to analyze thermodynamic cycles
					Co-3	Differentiate between vapour power cycles and gas power cycles
					Co-4	Infer from property charts and tables and to apply the data for the evaluation of performance parameters of the steam and gas turbine plants



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					<b>Co-5</b>	Understand the functionality of major components of steam and gas turbine plants and to do the analysis of these components
<b>38</b>	<b>III/I</b>	<b>R18</b>	Operations Research	ME506PC	<b>Co-1</b>	Understanding the problem, identifying variables & constants, Formulation of optimization model and applying appropriate optimization technique
<b>39</b>	<b>III/I</b>	<b>R18</b>	Thermal Engineering Lab	ME507PC	<b>Co-1</b>	Identify the various fuel characterizations through experimental testing.
					<b>Co-2</b>	Analyze the performance characteristics of an internal combustion engines
					<b>Co-3</b>	Evaluate the performance parameters of refrigeration systems
					<b>Co-4</b>	Analyze the air compressor characteristics
<b>40</b>	<b>III/I</b>	<b>R18</b>	Material Science and Mechanics of Solids Lab	ME508PC	<b>Co-1</b>	Provide fundamental knowledge based on associated materials properties
					<b>Co-1</b>	Provide fundamental knowledge based on selection and application
					<b>Co-2</b>	Students would acquire and develop skills for careers in material related industries
					<b>Co-3</b>	Analyze the behaviour of the solid bodies subjected to various types of loading
<b>41</b>	<b>III/I</b>	<b>R18</b>	Kinematics & Dynamics Lab	ME509PC	<b>Co-4</b>	Analyze and interpret laboratory data relating to behaviour of structures and the materials
					<b>Co-1</b>	Understand types of motion
					<b>Co-2</b>	Analyze forces and torques of components in linkages
					<b>Co-3</b>	Understand static and dynamic balance
<b>42</b>	<b>III/I</b>	<b>R18</b>	Intellectual Property Rights	*MC510	<b>Co-4</b>	Understand forward and inverse kinematics of open-loop mechanisms
					<b>Co-1</b>	Distinguish and Explain various forms of IPRs
					<b>Co-2</b>	Identify criteria's to fit one's own intellectual work in particular form of IPRs.
					<b>Co-3</b>	Apply statutory provisions to protect particular form of IPRs.



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					<b>Co-4</b>	Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, Industrial Designetc
					<b>Co-5</b>	Identify procedure to protect different forms of IPRs national and international level.
					<b>Co-5</b>	Develop skill of making search using modern tools and technics
<b>43</b>	<b>III/II</b>	<b>R18</b>	Design of Machine Members-II	ME601PC	<b>Co-1</b>	To analyze and solve electrical circuits using network laws and theorems.
					<b>Co-2</b>	To understand and analyze basic Electric and Magnetic circuits
					<b>Co-3</b>	To study the working principles of Electrical Machines
					<b>Co-4</b>	To introduce components of Low Voltage Electrical Installations
					<b>Co-5</b>	To identify and characterize diodes and various types of transistors.
<b>44</b>	<b>III/II</b>	<b>R18</b>	Heat Transfer	ME602PC	<b>Co-1</b>	The main purpose is to give an idea about the relative motions obtained in all the above type of components used in mechanical Engineering.
<b>45</b>	<b>III/II</b>	<b>R18</b>	CAD & CAM	ME603PC	<b>Co-1</b>	At the end of the course, the student should be able to evaluate the performance of IC engines and compressors under the given operating conditions. Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles. Understand the functionality of the major components of the IC Engines and effects of operating conditions on their performance
<b>46</b>	<b>III/II</b>	<b>R18</b>	Professional Elective - I		<b>Co-1</b>	Able to explain the effect of fluid properties on a flow system
					<b>Co-2</b>	Able to identify type of fluid flow patterns and describe continuity equation.
					<b>Co-3</b>	To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design.
					<b>Co-4</b>	To select and analyze an appropriate turbine with reference to given situation in power plants.
					<b>Co-5</b>	To estimate performance parameters of a given Centrifugal and Reciprocating pump.



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					<b>Co-6</b>	Able to demonstrate boundary layer concepts
<b>47</b>	<b>III/II</b>	<b>R18</b>	Open Elective - I		<b>Co-1</b>	To identify various elements and their purpose in typical instruments, to identify various errors that would occur in instruments
					<b>Co-2</b>	Analysis of errors so as to determine correction factors for each instrument
					<b>Co-3</b>	To understand static and dynamic characteristics of instrument and should be able to determine loading response time
					<b>Co-4</b>	For given range of displacement should be able to specify transducer, its accurate and loading time of that transducer.
					<b>Co-6</b>	
<b>48</b>	<b>III/II</b>	<b>R18</b>	Finite Element Methods	ME604PC	<b>Co-1</b>	To analyze and solve electrical circuits using network laws and theorems.
					<b>Co-2</b>	To understand and analyze basic Electric and Magnetic circuits
					<b>Co-3</b>	To study the working principles of Electrical Machines
					<b>Co-4</b>	To introduce components of Low Voltage Electrical Installations
					<b>Co-5</b>	To identify and characterize diodes and various types of transistors
<b>49</b>	<b>III/II</b>	<b>R18</b>	Heat Transfer Lab	ME605PC	<b>Co-1</b>	Able to explain the effect of fluid properties on a flow system
					<b>Co-2</b>	Able to identify type of fluid flow patterns and describe continuity equation
					<b>Co-3</b>	To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design
					<b>Co-4</b>	To select and analyze an appropriate turbine with reference to given situation in power plants
					<b>Co-5</b>	To estimate performance parameters of a given Centrifugal and Reciprocating pump.
					<b>Co-6</b>	Able to demonstrate boundary layer concepts
<b>50</b>	<b>III/II</b>		CAD & CAM Lab	ME606PC	<b>Co-1</b>	At the end of the course, the student will be able to Characterize and calibrate measuring devices. Identify and analyze errors in measurement. Analyze measured data using regression analysis. Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter.
<b>51</b>	<b>III/II</b>	<b>R18</b>	Advanced Communication Skills	EN608HS	<b>Co-1</b>	To develop students' sensibility with regard to issues of gender in contemporary India



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			lab		Co-2	To provide a critical perspective on the socialization of men and women
					Co-3	To introduce students to information about some key biological aspects of genders
					Co-4	To expose the students to debates on the politics and economics of work
					Co-5	To help students reflect critically on gender violence.
					Co-6	To expose students to more egalitarian interactions between men and women
<b>52</b>	<b>III/II</b>	<b>R18</b>	Environmental Science	*MC609	Co-1	Gain knowledge about environment and ecosystem
					Co-2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource
					Co-3	Gain knowledge about the conservation of biodiversity and its importance
					Co-4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures
					Co-5	Students will learn about increase in population growth and its impact on environment
<b>53</b>	<b>IV/I</b>	<b>R18</b>	Refrigeration & Air Conditioning	ME701PC	Co-1	At the end of the course, the student should be able to Differentiate between different types of refrigeration systems with respect to application as well as conventional and unconventional refrigeration systems. Thermodynamically analyse refrigeration and air conditioning systems and evaluate performance parameters. Apply the principles of Psychometrics to design the air conditioning loads for the industrial applications.
<b>54</b>	<b>IV/I</b>	<b>R18</b>	Industrial Oriented Mini Project/ Summer Internship	ME702PC	Co-1	Demonstrate sound technical knowledge & Domain knowledge of the selected topic & Understand programming language concepts,
					Co-2	Plan, communicate, analyze identify the Problem for the proposed work and collect
					Co-3	Design the Solution and execute by using engineering



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						approach to overcome the complex problems
					<b>Co-4</b>	Learn to work as a team and to focus on getting a working project done on time with each student
					<b>Co-5</b>	Discuss about and go through the software development cycle with emphasis on different processes like – requirements, design, and implementation phases.
<b>55</b>			<b>REFRIGERATION AND AIR CONDITIONING</b>	<b>ME701PC</b>	<b>Co-1</b>	At the end of the course, the student should be able to Differentiate between different types of refrigeration systems with respect to application as well as conventional and unconventional refrigeration systems. Thermodynamically analyse refrigeration and air conditioning systems and evaluate performance parameters. Apply the principles of Psychometrics to design the air conditioning loads for the industrial applications
<b>56</b>	<b>IV/I</b>	<b>R18</b>	<b>ADDITIVE MANUFACTURING (PE - II)</b>	<b>ME711PE</b>	<b>Co-1</b>	Describe various CAD issues for 3D printing and rapid prototyping and related operations for STL model manipulation.
					<b>Co-2</b>	Formulate and solve typical problems on reverse engineering for surface reconstruction from physical prototype models through digitizing and spline-based surface fitting.
					<b>Co-3</b>	Formulate and solve typical problems on reverse engineering for surface reconstruction from digitized mesh models through topological modelling and subdivision surface fitting.
					<b>Co-4</b>	Explain and summarize the principles and key characteristics of additive manufacturing technologies and commonly used 3D printing and additive manufacturing systems
					<b>Co-5</b>	Explain and summarize typical rapid tooling processes for quick batch production of plastic and metal parts.
<b>57</b>	<b>IV/I</b>	<b>R18</b>	<b>MEMS (PE – II)</b>	<b>ME713PE</b>	<b>Co-1</b>	Students will be able to understand working principles of currently available micro sensors, actuators, and motors, valves, pumps, and fluidics used in Microsystems
					<b>Co-2</b>	Students will be able to apply scaling laws that are used extensively in the conceptual design of micro devices and systems. Students will be able to differentiate between the positive and negative consequences of scaling down certain physical quantities that are



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						pertinent to Microsystems.
					<b>Co-3</b>	Students will be able to use materials for common micro components and devices
					<b>Co-4</b>	Students will be able to choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process.
					<b>Co-5</b>	Students will be able to understand the basic principles and applications of micro-fabrication processes, such as photolithography, ion implantation, diffusion, oxidation, CVD, PVD, and etching.
					<b>Co-6</b>	Students will be able to consider recent advancements in the field of MEMS and devices.
					<b>Co-7</b>	Students will be able to communicate their results and findings orally via formal presentations and in writing through reports
<b>58</b>	<b>IV/I</b>	<b>R18</b>	<b>POWER PLANT ENGINEERING (PE – III)</b>	<b>ME721PE</b>	<b>Co-1</b>	Understand the concept of Rankine cycle
					<b>Co-2</b>	Understand working of boilers including water tube, fire tube and high pressure boilers and determine efficiencies
					<b>Co-3</b>	Analyze the flow of steam through nozzles
					<b>Co-4</b>	Evaluate the performance of condensers and steam turbines
					<b>Co-5</b>	Evaluate the performance of gas turbines
<b>59</b>	<b>IV/I</b>	<b>R18</b>	<b>RENEWABLE ENERGY SOURCES (PE – III)</b>	<b>ME723PE</b>	<b>Co-1</b>	Understanding of renewable energy sources
					<b>Co-2</b>	Knowledge of working principle of various energy systems
					<b>Co-3</b>	Capability to carry out basic design of renewable energy systems
<b>60</b>	<b>IV/I</b>	<b>R18</b>	<b>COMPUTATIONAL FLUID DYNAMICS (PE – IV)</b>	<b>ME731PE</b>	<b>Co-1</b>	Differentiate between different types of Partial Differential Equations and to know and understand appropriate numerical techniques.
					<b>Co-2</b>	Solve the simple heat transfer and fluid flow problems using different numerical techniques, viz., FDM.
					<b>Co-3</b>	Understand and to appreciate the need for validation of numerical solution
<b>61</b>	<b>IV/I</b>	<b>R18</b>	<b>TURBO MACHINERY (PE – IV)</b>	<b>ME732PE</b>	<b>Co-1</b>	Ability to design and calculate different parameters for turbo machines
					<b>Co-2</b>	Prerequisite to CFD and Industrial fluid power courses
					<b>Co-3</b>	Ability to formulate design criteria





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					<b>Co-4</b>	Ability to understand thermodynamics and kinematics behind turbo machines
<b>62</b>	<b>IV/I</b>	<b>R18</b>	<b>FLUID POWER SYSTEMS (PE – IV)</b>	<b>ME733PE</b>	<b>Co-1</b>	Understand the Properties of fluids, Fluids for hydraulic systems
					<b>Co-2</b>	governing laws. distribution of fluid power, Design and analysis of typical hydraulic circuits.
					<b>Co-3</b>	Know accessories used in fluid power system, Filtration systems and
					<b>Co-4</b>	maintenance of system
<b>63</b>	<b>IV/II</b>	<b>R18</b>	<b>INDUSTRIAL ROBOTICS (PE – V)</b>	<b>ME811PE</b>	<b>Co-1</b>	Make the students acquainted with the theoretical aspects of Robotics
					<b>Co-2</b>	Enable the students to acquire practical experience in the field of Robotics through design projects and case studies.
					<b>Co-3</b>	Make the students to understand the importance of robots in various fields of engineering.
					<b>Co-4</b>	Expose the students to various robots and their operational 2details
<b>64</b>	<b>IV/II</b>	<b>R18</b>	<b>MECHANICAL VIBRATIONS (PE – V)</b>	<b>ME812PE</b>	<b>Co-1</b>	At the end of the course, the student will be able to, Understand the causes and effects of vibration in mechanical systems. Develop schematic models for physical systems and formulate governing equations of motion. Understand the role of damping, stiffness and inertia in mechanical systems Analyze rotating and reciprocating systems and compute critical speeds. Analyze and design machine supporting structures, vibration isolators and absorbers.
<b>65</b>	<b>IV/II</b>	<b>R18</b>	<b>COMPOSITE MATERIALS (PE – V)</b>	<b>MM813PE</b>	<b>Co-1</b>	Knowledge of the crystal structures of a wide range of ceramic materials
					<b>Co-2</b>	Able to explain how common fibers are produced and how the properties of the fibers are related to the internal structure
					<b>Co-3</b>	Able to select matrices for composite materials in different applications
					<b>Co-4</b>	Able to describe key processing methods for fabricating composites
<b>66</b>	<b>IV/II</b>	<b>R18</b>	<b>INDUSTRIAL MANAGEMENT (PE – VI)</b>	<b>ME821PE</b>	<b>Co-1</b>	Able to apply principles of management
					<b>Co-2</b>	Able to design the organization structure
					<b>Co-3</b>	Able to apply techniques for plant location, design plant layout and value analysis
					<b>Co-4</b>	Able to carry out work study to find the best method for doing the work and establish standard time for a given method
					<b>Co-5</b>	Able to apply various quality control techniques and sampling plans



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					<b>Co-6</b>	Able to do job evaluation and network analysis
<b>67</b>	<b>IV/II</b>	<b>R18</b>	<b>PRODUCTION AND OPERATIONS MANAGEMENT (PE – VI)</b>	<b>ME822PE</b>	<b>Co-1</b>	Able to execute operations management functions
					<b>Co-2</b>	Able to carry out value analysis
					<b>Co-3</b>	Able to carry out aggregate planning and implement MRP Or JIT
					<b>Co-4</b>	Able to schedule the jobs so as to complete them in minimum makespan time
					<b>Co-5</b>	Able to carry out network analysis
					<b>Co-6</b>	Able to do job evaluation and network analysis
<b>68</b>	<b>IV/II</b>	<b>R18</b>	<b>TRIBOLOGY (PE – VI)</b>	<b>ME833PE</b>	<b>Co-1</b>	Understanding friction characteristics in journal bearings
					<b>Co-2</b>	Knowledge about different theories of lubrication to reduce friction and wear