

# Course Learning Outcomes

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## Semester 1

### CH-101 Applied Chemistry [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Explain</b> and appreciate the relationship and importance of experiment and theory in all sciences, chemistry in particular.	PLO1	C2
2	<b>Describe</b> the modern theoretical basis for understanding important areas of chemistry, including atomic structure, chemical bonding, and their correlation with engineering related applications.	PLO 1	C2
3	<b>Demonstrate</b> quantitative problem-solving skills in various aspects of chemistry, including Quantum Mechanics, Thermochemistry, Fuel chemistry etc.	PLO 2	C2
4	<b>Develop</b> a basic understanding of chemistry of alternate fuels and their impact on the environment.	PLO 7	C2

### HU-121 Communication Skills [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Demonstrate</b> understanding of concepts of communication and extend their application to real-life contexts	PLO 10	C1
2	<b>Elaborate</b> on topics, concepts and ideas argumentatively through enhanced writing mechanics and techniques	PLO 10	C2
3	<b>Perform</b> social communication confidently and build effective presentations with successful integration of technology	PLO 10	C3

ME-139 Engineering Drawing and Graphics [1 – 0 – 1 (Theory)]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>recognize and understand</b> engineering drawing and graphics as a language of communication	PLO 1	C2
2	To <b>comprehend</b> engineering visualization principles and projection theory and apply those principles in engineering drawing development to create projections of point, lines, auxiliary planes and solids.	PLO 2	C3
3	To <b>develop</b> visualization techniques required to create two dimensional orthographic (2D) drawings from three dimensional (3D) objects, sectional views and isometric projections using traditional board drawing technics	PLO 3	C3

HU 119 English Comprehension & Composition [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Demonstrate</b> sound 'Reading Strategies' and proficiency in comprehending the written text.	PLO 10	C2
2	<b>Display</b> fundamentals of correct expression to achieve optimum writing skills.	PLO 10	C3
3	<b>Use</b> adequate vocabulary for expression in various formats.	PLO 10	C5

MA-101 Calculus-I [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Recognize</b> properties of functions and their inverses, Define domain and range of function. Understand/comprehend the ideas of limits and continuity of a function.	PLO 1	C1
2	<b>Express</b> integration as an anti-derivative of a function; identify and apply different techniques to	PLO 1	C2

	solve indefinite/definite integrals, e.g. integration by substitution, integration by parts, integration by partial fractions and Fundamental theorem of Calculus.		
3	<b>Apply</b> the concepts of derivatives and integrations to solve problems in science and engineering; Implement definite integral to find area under a curve, volume of a solid and to find the length of a curve. Analyze the behavior of a function in its vicinity, e.g. increasing function, decreasing function, concavity of a function, relative/absolute extrema of a function; use this analysis to sketch the graph of polynomials and rational functions.	PLO 2	C3

### ME-100 Introduction to Mechanical Engineering [1 – 0 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Understand</b> the breadth and applicability of mechanical engineering profession.	PLO 1	C2
2	<b>Explain</b> the problem-solving process and <b>recognize</b> importance of communication skills in the engineering profession.	PLO 1	C2
3	<b>Solve</b> problems based on basic concepts of: solid mechanics, fluids and their flow behavior, thermodynamics, heat transfer, power generation and mechanics of machines.	PLO 2	C3

### ME-121 Engineering Statics [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Comprehend</b> concepts of vectors and scalars, forces, moments and couples	PLO 1	C2
2	<b>Apply</b> the learned concepts of forces, moments and couples to solve problems of equilibrium in 2-D and 3-D	PLO 2	C3

3	<b>Analyze</b> structures such as plain trusses, frames and machines for reaction forces	PLO 2	C4
4	<b>Apply</b> the concepts of mechanics to solve problems of dry friction	PLO 2	C3

#### ME-139 L Engineering Drawing and Graphics Lab [0 – 1 – 1 (Lab)]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>follow</b> the concept of projection of point, lines, planes, to produce orthographic projections and isometric views.	PLO 3	P3
2	To <b>choose</b> the right equipment and technique to make orthographic projections	PLO 2	P1
3	To <b>explain</b> and generate every feature of the component on the drawing sheet with proper dimensioning	PLO 3	P2

#### ME-140 Workshop Practice - I [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>practice</b> the basics of metal working, welding, wood working and Electrical wiring.	PLO 1	P3
2	To <b>follow</b> the safety rules and demonstrate safe work practices while working in the workshop.	PLO 8	A3
3	<b>Demonstrate</b> positive working attributes while working individually and within a group.	PLO 9	A3
4	To <b>write</b> the daily assigned task in the form of lab report.	PLO 10	A2

PH-101 Physics [2 – 1 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	The student will be able to <b>apply</b> the knowledge of vector calculus, one and two dimensional motion and kinematics.	PLO 2	C2
2	The students will be able to <b>analyze</b> Newtonian mechanics with and without frictional effects to some of the application of engineering and technology.	PLO 2	C3
3	Students will get the concept of work and energy, also the conservation of mechanical energy <b>application</b> to engineering problems.	PLO 2	C3
4	The students will able to <b>develop</b> the analytical and mathematical skills that will applicable in many scientific endeavors of electricity and magnetism, Electromagnetic fields, waves and antenna.	PLO 4	C3
5	The students will <b>demonstrate</b> the application of scientific method through laboratory experiments and projects.	PLO 9	C3

## Semester 2

### CE-112 Computer Programing [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>introduce</b> knowledge of programming fundamentals	PLO 1	C1
2	The ability to <b>analyze</b> requirements of real-world systems and translate them to the working computer software programs	PLO 2	C3
3	To <b>specify</b> the requirements of a software system and validate and verify the design by running the software program on a simulator	PLO 3	C2
4	Students should be able to <b>work</b> effectively as an individual or member/leader of a technical team.	PLO 9	A3

### CE-112 Computer Programing Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	To introduce <b>knowledge</b> of programming fundamentals	PLO 1	P1
2	The ability to <b>analyze</b> requirements of real-world systems and translate them to the working computer software programs	PLO 2	P2
3	Students should be able to <b>work</b> effectively as an individual or member/leader of a technical team.	PLO 9	A3

### MA-105 Multivariable Calculus [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	Comprehend to <b>locate</b> and use information for solving calculus problems in several variables and effectively write mathematical solutions	PLO 1	C1

2	<b>Apply</b> appropriate techniques for solving a variety of integration and differentiation problems while effectively interpreting the problems.	PLO 2	C3
3	Setup and <b>solve</b> application problems involving double and triple integrals	PLO 2	C3
4	<b>Comprehend</b> to differentiate and integrate vector-valued functions	PLO 1	C2
5	Acquire an intuitive and computational understanding for calculus applications by <b>analysing</b> and solving a variety of problems from physics, engineering and mathematics	PLO 2	C4

### ME-131 Thermodynamics – I [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Understand</b> the nature and role of the thermodynamics properties of matter and processes on appropriate diagrams.	PLO 1	C2
2	<b>Apply</b> energy and entropy balances to the closed and open systems.	PLO 1	C3
3	<b>Analyze</b> implications and limitations of the Second Law of Thermodynamics.	PLO 2	C4

### ME-146 Engineering Drawing & Graphics/Auto CAD Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>Build</b> 2D drawings and 3D solid models using engineering drawing knowledge for precise and accurate communication of mechanical design.	PLO 5	P4
2	To <b>produce</b> orthographic projections using the constructed model in the layout with proper dimensions and title block.	PLO 5	P3
3	To <b>work</b> individually on the assigned assignments and projects.	PLO 9	A3

ME-222 Engineering Dynamics [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Comprehend</b> key concepts related to position, velocity and acceleration in Cartesian, Normal & Tangential, Polar and Cylindrical Coordinate Systems for particles and rigid bodies	PLO 1	C2
2	<b>Comprehend</b> concepts related to kinetics of particles and rigid bodies including work, energy and momentum for particles.	PLO 1	C2
3	<b>Analyze</b> the problems related to kinematics of particles and rigid bodies using different principles and techniques for their solution	PLO 2	C4
4	<b>Analyze</b> the problems related to kinetics of particles and rigid bodies using different principles and techniques for their solution	PLO 2	C4

ME-142 Workshop Technology II [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>follow</b> about the safety / safe work practices on lathe, milling and shaper machine	PLO 8	A2
2	To <b>practice</b> the working of Lathe machine, milling machine, Gear cutting, Shaper machine, grinding machine, and Drilling machine, their cutting speeds, feeds, depth of cut and use of its various accessories by making a group job on these machines along with use of drawing learned in previous semester.	PLO 5	P3

HU-112 Technical English [2 – 0 – 2]

<b>S No</b>	<b>CLO Statement</b>	<b>PLO</b>	<b>Learning Domain and Level</b>
1	<b>Demonstrate</b> a clear understanding of professional communication and presentation to communicate in the outer world	PLO 10	C2
2	<b>Apply</b> the rules and features of technical writing and Construct effective, well-researched, polished and organized writings (curriculum vitae, reports, proposals, business letters, memos)	PLO 10	C3
3	<b>Investigate</b> and analyze the technical texts, observe flaws and incorporate suggestions/recommendations	PLO 10	C3

## Semester 3

### EE-206 Basic Electrical & Electronics [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	Be able to <b>comprehend</b> basic element laws and circuit laws	PLO 1	C2
2	<b>Apply</b> circuit analysis methods and theorems to solve complex circuits	PLO 2	C3
3	The Students Will be able to <b>analyze</b> and understand Electrical Circuits Networks with DC and AC Power Sources	PLO 2	C4
4	<b>Understand</b> the construction, operation and characteristics of semiconductor devices and <b>analyze</b> different application circuits using these devices.	PLO 2	C4

### MA-106 Differential Equations [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Define</b> the basic concepts about Ordinary Differential Equations e.g. How ODEs arise in physical world, solution of an ODE, order, degree, linearity, homogeneity of an ODE, Initial value problems, general and particular solutions.	PLO 1	C1
2	<b>Explain</b> different types of ODEs, e.g. separable, exact, Linear, Bernoulli, homogeneous ODEs.	PLO 1	C2
3	<b>Use</b> an appropriate method to solve an ODE, e.g. finding integrating factor, reduction of order, method of variation of parameters, method of undetermined coefficients, differential operator, Power series method and Laplace Transform.	PLO 1	C3
4	<b>Construct</b> the problems in mechanical and electrical systems as an ODE and apply the technique learned to find the solutions of these problems.	PLO 2	C4

5	<b>Interpret</b> the nature of physical systems by the solutions of the corresponding mathematical model, for example, <b>analyzing</b> the nature of PDEs as elliptic, parabolic or hyperbolic, Solution PDEs using separation of variables method	PLO 2	C5
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### ME-223 Mechanics of Materials – I [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Comprehend</b> the concept of stress and strain. Classifying normal and shear stress / strain. Relating stress with strain through Hooks Law	PLO 1	C2
2	<b>Application</b> of Axial, torsional and bending loads on a structural member and calculating Stress generated.	PLO 2	C3
3	<b>Design and Analysis</b> of beams under pure bending loads and plotting beams shear force and bending moment diagrams	PLO 2	C4

### ME-233 Fluid Mechanics – I [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Apply</b> key concepts related to properties of fluids knowledge for pressure measurements, manometry and hydrostatic forces calculations.	PLO1	C3
2	<b>Use</b> Bernoulli Equation to <b>solve</b> fluid flow problems.	PLO 2	C3
3	<b>Apply</b> Reynold Transport Theorem to <b>solve</b> finite control volumes.	PLO 2	C3
4	<b>Analyze</b> fluid flow problems employing continuity, momentum and energy equations to infinitesimal control volumes.	PLO 4	C4

ME-234 Thermodynamics – II [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Understand</b> the concepts related to entropy, exergy and power/refrigeration/heat pump cycles.	PLO 1	C2
2	<b>Analyze</b> rate balance for different engineering components and construct the improvement in thermodynamic cycles.	PLO 2	C4
3	<b>Analyze</b> and evaluate technical processes in compressors and turbines, as well as, important cycles such as those in engineering components.	PLO 2	C4
4	<b>Analyze</b> the gas-gas mixtures, gas-vapour mixtures and combustion process.	PLO 2	C4

ML-226L Engineering Mechanics Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	Perform experiments and find out unknowns such as forces, moments, positions and velocities <b>following</b> the instructions.	PLO 4	P3
2	To be able to <b>identify</b> an engineering problem and recognize the experiments needed to analyze it, in the light of Engineering Mechanics knowledge.	PLO 2	P1
3	<b>Demonstrate</b> positive working attributes by working individually and working with a group.	PLO 9	A3
4	<b>Validating</b> experimental results in the light of theoretical data and writing critically in the form of technical <b>reports</b> .	PLO 10	A2

ME-234L Thermodynamics Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Apply</b> the principles of energy transfer by heat, work and mass in connection with the first law of thermodynamics for closed and open systems.	PLO 2	C3
2	<b>Analyze</b> critically the experimental data in relation to the theoretical aspects.	PLO 4	C4
3	<b>Demonstrate</b> hands-on experience with instruments, specimens, recording and interpretation of data, and formal engineering report writing.	PLO 9	P2
4	<b>Write</b> critically the appropriate report individually based on the experiment results.	PLO 10	A2

## Semester 4

### ME-248 Manufacturing Processes – I [1 – 0 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>To enable</b> the students to use mechanical properties of materials to estimate their formability against forming processes including <b>joining/welding</b> .	PLO 4	C3
2	<b>To comprehend</b> and apply the various <b>casting</b> process along with practical applications, their respective benefits and limitations, Applications of various <b>Additive manufacturing</b> techniques, <b>powder metallurgy</b> applications for shaping metals and ceramics materials.	PLO 5	P2
3	<b>To identify</b> the potentials of various <b>bulk and sheet metal</b> forming processes to achieve design requirements in manufacturing phase.	PLO 2	C4

### ME-202 Health Safety and Environment [1 – 0 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Demonstrate</b> knowledge of Safety health and Environment.	PLO 6	C3
2	<b>Analyze</b> various types of hazards at work and living places	PLO 2	C4

### ME-224 Mechanics of Materials – II [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Apply</b> the concepts of 2D / 3D transformation of stresses and strains to calculate the transformed values.	PLO 2	C3

2	<b>Calculate</b> Principal Stresses in a beam to find out maximum / minimum stresses under various load conditions.	PLO 2	C3
3	<b>Design</b> solutions for beams and columns under various load conditions to determine resultant stresses and deflections.	PLO 3	C5
4	<b>Comprehend</b> concepts related to strain energy in loaded structures.	PLO 1	C2

### ME-336 Fluid Mechanics – II [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Apply</b> Buckingham Pi theorem to develop a set of dimensionless variables for a given flow situation and <b>apply</b> the concepts of modelling and similitude to <b>develop</b> prediction equations.	PLO2	C3
2	<b>Differentiate</b> between laminar and turbulent pipe flows, <b>investigate</b> losses in pipe systems and <b>analyze</b> variety of pipe flow situations using appropriate equations.	PLO 4	C4
3	<b>Distinguish</b> boundary layer characteristic in laminar, transitional and turbulent regimes and <b>investigate</b> boundary layer separation. <b>Analyze</b> open channel flows with uniform depth and calculate key properties of hydraulic jump.	PLO 4	C4
4	<b>Categorise</b> incompressible and compressible flows. <b>Calculate</b> speed of sound, Mach number and interpret their practical significance. <b>Develop</b> performance parameters and curves of different type of turbomachinery.	PLO 2	C3
5	<b>Analyze</b> a problem to find an optimum solution using simulation based techniques	PLO 5	C4

### ME-325 Mechanics of Machines [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Analyze</b> the problems related to kinematics and kinetics of mechanisms using graphical and analytical techniques for solution.	PLO 2	C4

2	<b>Demonstrate</b> concepts related to kinematics and kinetics of various machine components and transmission devices.	PLO 2	C3
3	<b>Design</b> a project related to mechanisms or machine elements in groups and explain calculations and working in the form of report and presentation.	PLO 3	C5

#### ML-224 Mechanics of Materials Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Identify</b> an engineering problem and recognize the experiments needed to analyze it in the light of Mechanics of Materials knowledge.	PLO 2	P1
2	<b>Perform</b> experiments and find out unknowns such as stresses, strains, displacements and material properties etc.	PLO 4	P2
3	<b>Demonstrate</b> positive working attributes by working individually and working within a group.	PLO 9	A3
4	Validating experimental results in the light of theoretical data and <b>writing</b> critically in the form of technical reports.	PLO 10	A2

#### ML-236 Fluid Mechanics Lab [0 – 0 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Perform</b> experiments to analyze and interpret data.	PLO 4	P3
2	Demonstrate positive working attributes by <b>working</b> individually and working with a group.	PLO 9	A3
3	<b>Write</b> critically the appropriate report individually based on the experiment results	PLO 10	A2

ML-247 Manufacturing Process Lab – I [1 – 1 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>construct</b> the 3D model of the parts, assemble the parts and extract the engineering drawing from it.	PLO 5	P4
2	To start, setup and operate the CNC Lathe machine to <b>produce</b> the required part following the instructions.	PLO 5	P3
3	To <b>follow</b> the directions to produce the G&M code program for simple and complex machining features and operations using CAD/CAM software and manually and generate the setup sheets and output file.	PLO 5	P3
4	To <b>work</b> individually or in team on the assigned projects.	PLO 9	A3
5	To <b>follow</b> the safety rules and demonstrate safe work practices while working in the CNC Lab.	PLO 8	A3

ME-248L Manufacturing Process Lab – I [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>construct</b> the 3D model of the parts, assemble the parts and extract the engineering drawing from it.	PLO 5	P4
2	To <b>follow</b> the standard start up procedure for starting, setting up and operating the CNC Lathe machine to produce the required part following the instructions.	PLO 5	P3
3	To <b>follow</b> the directions to produce the G&M code program for simple and complex machining features and operations using CAD/CAM software and manually and generate the setup sheets and output file.	PLO 5	P3
4	To <b>work</b> individually or in team on the assigned projects.	PLO 9	A3
5	To <b>follow</b> the safety rules and demonstrate safe work practices while working in the CNC Lab.	PLO 8	A3

MA-202 Numerical Analysis and Computation [2 – 1 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>construct</b> the 3D model of the parts, assemble the parts and extract the engineering drawing from it.	PLO 2	C1
2	To <b>follow</b> the standard start up procedure for starting, setting up and operating the CNC Lathe machine to produce the required part following the instructions.	PLO 2	C2
3	To <b>follow</b> the directions to produce the G&M code program for simple and complex machining features and operations using CAD/CAM software and manually and generate the setup sheets and output file.	PLO 3	C3
4	To <b>work</b> individually or in team on the assigned projects.	PLO 3	C4
5	To <b>follow</b> the safety rules and demonstrate safe work practices while working in the CNC Lab.	PLO 5	P3

## Semester 5

### HU-101 Communication Skills [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Demonstrate</b> understanding of concepts of communication and extend their application to real-life contexts	PLO 10	C2
2	<b>Perform</b> social communication confidently and build effective presentations with successful integration of technology	PLO 10	C3
3	<b>Elaborate</b> on topics, concepts and ideas argumentatively through enhanced writing mechanics and techniques	PLO 10	C5
4	<b>Evaluate</b> information by utilizing effective reading strategies and interpreting texts critically	PLO 10	C6

### ME-343 Manufacturing Processes 11 [1 – 0 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Describe</b> fundamental traditional, non-traditional machining processes ,abrasive machining, Tool signature, CAD/CAM and CIM Technology	PLO 1	C2
2	<b>Apply</b> machining /abrasive machining processes, G –codes programming keeping in view machining parameter	PLO 3	C3
3	<b>Translate</b> Standards, IT Grades, tolerances, Limits & Fits, process planning and additive manufacturing techniques	PLO 5	P3

### MA-208 Engineering Probability and Statistics [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
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1	Students will be able to <b>recognize</b> descriptive techniques to the statistical data and explain the significance of theory of probability analysis related to engineering research.	PLO 1	C1
2	<b>Understand</b> the ideas of Probability Distribution functions and <b>apply</b> the information of Probability functions of the Events for their statistical data.	PLO 2	C3
3	Students should be able to <b>analyze</b> engineering processes whether in control or out of control using quality control charts.	PLO2	C4

### ME-327 Machine Design – I [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Apply</b> concepts related to fundamentals of design process, force and stress analysis, and failure due to static and fatigue loading in the design of machine components.	PLO 2	C3
2	<b>Analyze</b> various aspects of machine elements related to mechanical joints, shafts, energy storing (Springs) and friction devices.	PLO 3	C4
3	<b>Design</b> a project related to machine elements in groups, and explain calculations and working in the form of report and presentation.	PLO 3	C5

### ML-312 Instrumentation and Measurements Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	Ability to <b>conduct</b> experiments as well as to analyze and interpret data.	PLO 2	P3
2	To <b>investigate</b> and to understand the use of measurement systems available for solving engineering problems	PLO 4	P3
3	<b>Write</b> critically the appropriate reports individually based on experimental results.	PLO 10	A3
4	<b>Demonstrate</b> positive working attributes by working in a group and justifying results individually.	PLO 9	A2

ME-343L Manufacturing Process Lab – II [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	To <b>follow</b> the standard start up procedure for starting, setting up and operating the CNC Milling machine to produce the required part following the instructions.	PLO 5	P3
2	To <b>follow</b> the directions to produce the G&M code program for simple and complex machining features and operations using CAD/CAM software and manually and generate the setup sheets and output file.	PLO 5	P3
3	To <b>work</b> individually or in team on the assigned projects.	PLO 9	A3
4	To <b>follow</b> the safety rules and demonstrate safe work practices while working in the CNC Lab.	PLO 8	A3

ME131/131L Control Engineering [3 – 1 – 4]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Comprehend</b> basics of control systems, and apply these to solve standard control system problems	PLO 2	C3
2	<b>Using</b> knowledge of control systems, analyze and model/design control systems with required performance attributes	PLO 3	C6
3	<b>Perform</b> analysis through modeling of control systems on existing software	PLO 5	P3

## Semester 6

### HU-304 Technical Report Writing [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Demonstrate</b> a clear understanding of professional communication and presentation to communicate in the outer world	PLO 10	C3
2	<b>Apply</b> the rules and features of technical writing and construct effective, well-researched, polished and organized writings (curriculum vitae, reports, proposals, business letters, memos)	PLO 10	C4
3	<b>Investigate and analyze</b> the technical texts, observe flaws and incorporate suggestions/recommendations	PLO 10	C4

### ME-201 Engineering Materials [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	Students will become <b>familiar</b> with different material types in terms of type of bonding and crystal structure. They will also be able to <b>differentiate</b> between crystalline and non-crystalline structures and the effect of imperfections on the properties of the materials.	PLO1	C2
2	Students will be able to identify the application of different types of <b>analytical techniques</b> that are available for investigating the <b>microstructure</b> & properties of Materials.	PLO 4	C2
3	Students will <b>appreciate</b> the effect of <b>micro-structure</b> on end use /mechanical properties of materials.	PLO 3	C2
4	Students will <b>be able</b> to differentiate and <b>appreciate</b> the <b>property differences</b> between <b>Metals, Polymers, Ceramics</b> and <b>Composite materials</b> . A brief intro to <b>Life Cycle Analysis (LCA)</b> will be given in the course. Students will be introduced to concepts like <b>Best</b>	PLO 7	C2

	<b>Environmental Techniques (BET)</b> and will be made to think about <b>implications of their choices</b> in terms of environment and sustainability		
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### ME-336 Heat and Mass Transfer [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Differentiate</b> the basic principles of heat and mass transfer according to mode of heat transfer and apply them to solve basic heat transfer problems.	PLO 2	C3
2	<b>Analyze and demonstrate</b> the real life/industrial heat transfer problems by applying different mode of heat transfer.	PLO 2	C4
3	<b>Illustrate</b> different techniques of heat exchanger design.	PLO 3	C4
4	<b>Design</b> an open-ended problem to understand heat and mass transfer processes in Heat Exchangers using modern engineering tools.	PLO 5	C5
5	Students have the ability to <b>present</b> (verbally/orally) an open-ended problems of Heat and Mass Transfer using <b>concepts from Thermodynamics &amp; Fluid Mechanics</b> .	PLO 10	C5

### ME-328 Machine Design – II [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Calculate</b> stresses and design parameters for the selection of standard machine elements, such as journal bearings, rolling contact bearings, chains, and belts.	PLO 2	C3
2	<b>Design</b> various aspects of machine elements related to transmission components such as	PLO 3	C5

	gears, fly wheel, contact bearings, brakes, power screws, chains, and belts.		
3	Use an appropriate software to <b>Design</b> and <b>Develop</b> modelling and FEA analysis of mechanical system in groups and demonstrate the results in the form of report and presentation.	PLO 5	C5

### ME-329 Mechanical Vibrations [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Use</b> different techniques to model vibrating systems for one/two/multi degree of freedom.	PLO 1	C3
2	<b>Analyze</b> the physical parameters involved in natural frequency and system response to free and forced or impulse inputs.	PLO 2	C4
3	<b>Construct</b> engineering structures and mechanical systems under dynamics conditions	PLO 3	C3

### ME-349 Computer Aided Engineering [2 – 1 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	Students will <b>learn</b> the fundamentals of FEM and CFD.	PLO 1	C2
2	Students will <b>use</b> fundamental knowledge to address problems related to FEM and CFD.	PLO 2	C3
3	Students will <b>perceive</b> standard CAD - CAE architecture.	PLO 5	P1
4	Students will <b>practice</b> standard CAE software for solution of structural and fluid problems.	PLO 5	P3

### ML-329 Mechanical Vibrations Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and
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			Level
1	<b>Perform</b> experiments to identify and measure natural frequency and time period of simple vibrating mechanical systems including single and two degree of freedom systems	PLO 2	P3
2	<b>Traces</b> reasons to why the experimental data varies in relation to the theoretical aspects.	PLO 4	P3
3	<b>Write</b> critically the appropriate report individually based on the experiment results.	PLO 10	A2
4	<b>Demonstrate</b> positive team working attributes by contributing actively to the group for laboratory tests that yield valid results.	PLO 9	A3

### ML-336 Heat and Mass Transfer Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Perform</b> experiments to understand the three modes of heat transfer i-e conduction, convection and radiation.	PLO 2	P3
2	<b>Investigate</b> the effect of various parameters on the temperature distribution and Heat Transfer Coefficient.	PLO 4	P1
3	<b>Demonstrate</b> positive working attributes by working individually and working within a group.	PLO 9	A3
4	Validate experimental results in the light of theoretical knowledge and <b>write</b> a clear and concise technical report.	PLO 10	A2

## Semester 7

### ME-450 Engineering Management & Entrepreneurship [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Demonstrate</b> understanding of operations management concepts for getting the day-to-day work done quickly, efficiently, without errors and at low cost	PLO 1	C2
2	<b>Apply</b> Project Management knowledge and skills for effective management of projects	PLO 11	C3
3	<b>Demonstrate</b> concepts and best practices of entrepreneurship	PLO 2	C2
4	<b>Analyze</b> different entrepreneurial strategies for creating opportunities using entrepreneurship concepts	PLO 3	C4

### ML-463 IC Engine and Powerplant Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Apply</b> the knowledge of the fundamental principles of IC Engine and Powerplant.	PLO 1	C3
2	<b>Perform</b> the operation on IC Engine and Powerplant equipment to determine its performance parameters.	PLO 4	P2
3	<b>Analyze</b> the effect of different parameters on the performance of IC Engine and Powerplant equipment keeping in view readings, graphs as well as other assembly components.	PLO 2	C4
4	<b>Demonstrate</b> the experiment individually as well as in team by contributing actively while performing lab experiments as well as follow the given instructions and deadlines.	PLO 9	A3
5	<b>Write</b> critically the appropriate report individually based on the experimental results	PLO 10	A2

ME-436 Refrigeration & Air-conditioning [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Analyze</b> refrigeration systems based on any given refrigeration cycle (Air Refrigeration, Vapor Compression, Vapor Absorption etc.)	PLO 2	C4
2	<b>Apply</b> the fundamental concepts related to design and selection/ arrangement of various components of a refrigeration system including multi-pressure systems	PLO 3	C4
3	<b>Demonstrate</b> the understanding of refrigerant properties and working of refrigerating system components (Condenser, Evaporator etc.)	PLO 1	C3
4	<b>Analyze</b> the factors affecting thermal comfort in AC zones (air quality) and air treatment/handling requirements for public buildings	PLO 7	C4
5	<b>Design and evaluate</b> the open-ended problem of a refrigeration/air-conditioning system	PLO 3	C3

ME-461 IC Engines [3 – 0 – 0]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Understand</b> the basic operation and classification of Internal Combustion Engines.	PLO 1	C2
2	<b>Analyze and Evaluate</b> various thermodynamic cycles and impact of engine design parameters as well as performance parameters on internal combustion engine systems.	PLO 2	C4
3	<b>Design</b> an open ended problem to under the concepts of performance and emission parameters in internal combustion engine.	PLO 3	C5
4	<b>Explain</b> pollutant formation, its effect on environment and control.	PLO 7	C2

ME-462 Powerplant Engineering [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Understand</b> basic operations and types of power plants, economics of power generations and parameters related to thermodynamics of power plants	PLO 1	C2
2	<b>Analyze</b> the concepts related to the economics of power generation, thermodynamic parameters of conventional and unconventional power plants, issues related to fossil fuels systems, turbines, condensers, boilers, cooling towers.	PLO 2	C4
4	<b>Design</b> the open ended problem of a conventional and/or unconventional power plant <b>using a modern tool</b>	PLO 5	C5
5	<b>Design and manage</b> the open ended problem of a conventional and/or unconventional power plant in groups <b>using concepts from Thermodynamics, Fluid Mechanics, Heat and Mass Transfer</b>	PLO 11	C5

#### ML-325 Mechanics of Machines Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Perceive</b> an engineering problem and <b>recognize</b> the experiments needed to analyze it, in the light of Mechanics of Machines knowledge.	PLO 2	P1
2	Perform experiments to find out unknowns such as forces, moments, positions and velocities <b>following</b> the instructions.	PLO 4	P3
3	Perform kinematic and dynamics analysis of various mechanisms using MSC Adams <b>following</b> the instructions.	PLO 5	P3
4	<b>Demonstrate</b> positive working attributes while working individually and in a group.	PLO 9	A3
5	<b>Validate</b> the experimental results in the light of theoretical data and writing critically in the form of technical <b>reports</b> .	PLO 10	A2

## Semester 8

### HU-219 Chinese Language (HSK-I) [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Interpret</b> texts by using effective reading techniques and exemplifying finessed comprehension skills.	PLO 10	C2
2	<b>Perform</b> successful presentations and implement social communicative techniques for personal and professional contexts.	PLO 10	P5
3	<b>Construct</b> academic texts based on appropriate integration of grammatical, punctuation and referencing rules.	PLO 10	C6

### FL-404 German language A1 [3 – 0 – 3]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>Interpret</b> texts by using effective reading techniques and exemplifying finessed comprehension skills.	PLO 10	C2
2	<b>Perform</b> successful presentations and implement social communicative techniques for personal and professional contexts.	PLO 10	P5
3	<b>Construct</b> academic texts based on appropriate integration of grammatical, punctuation and referencing rules.	PLO 10	C6

### ME-452 Total Quality Management [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	<b>To comprehend and explain</b> the concept of TQM and quality management principles with philosophies of quality Gurus and six sigma	PLO 1	C2

2	<b>To apply and control</b> the variation in quality using various quality tools e.g SPC techniques to improve quality using quality standard assurance procedures and some NDI/NDT scheme for quality improvements.	PLO2	C3
3	<b>To apply</b> the principles learnt during subject of TQM, reliability, and Acceptance Sampling using Military standards and use of some selected API & ASME standards.	PLO 3	C3

### EE-300 Electrical Machines Lab [0 – 1 – 1]

S No	CLO Statement	PLO	Learning Domain and Level
1	Utilization of modern tools to <b>analyze</b> and compare the electrical machines.	PLO 5	P3
2	<b>Performing</b> laboratory experiments individually and in groups.	PLO 9	P4
3	<b>Design</b> and hardware implementation of electrical machines projects.	PLO 3	P3

### EE-300 Electrical Machines [2 – 0 – 2]

S No	CLO Statement	PLO	Learning Domain and Level
1	Be able to <b>comprehend</b> working principle, construction and operation of Electrical Machines	PLO 1	C2
2	Be able to <b>analyze</b> characteristics of Electrical Machines	PLO 2	C3
3	Utilization of modern tools to <b>analyze</b> and <b>compare</b> the electrical machines	PLO 5	P3
4	Performing laboratory experiments <b>individually</b> and in <b>groups</b>	PLO 9	P4
5	<b>Design</b> and hardware <b>implementation</b> of electrical machines <b>projects</b>	PLO 3	P3