

**Course Outcomes (CO's):**

On the completion of these following courses, the students will be able to:

**B.E. (Mechanical) 1st Year**

Course Code Name	Course Outcomes
3110006- Basic Mechanical Engineering	CO-1 Discuss the various sources of energy and basic terminology of Mechanical engineering CO-2 Make calculations for commonly used working fluids i.e. ideal gases and steam CO-3 Analyze various heat engine cycles and understand construction and working of IC engines CO-4 Discuss working and applications of steam boilers and various energy conversion systems CO-5 Discuss various power transmission elements and properties of various engineering materials with their applications
3110012- Workshop/ Manufacturing Practices	CO-1 Understand various manufacturing processes in machine shop and perform basic operations of welding, fitting, smithy and carpentry work a) perform basic operations of welding, fitting, smithy and carpentry work b) Explain various manufacturing processes in machine shop CO-2 Discuss application of plumbing fitting, masonry items and about plastic molding and glass cutting for various engineering application CO-3 Measure different electrical quantities and trouble shoot electrical and electronics appliances. CO-4 Conduct experiments with various kits such as Raspberry and Arduino for embedded system development CO-5 Use basic commands of computer operating systems
3110013- Engineering Graphics and Design	CO-1 Know and understand the conventions and the methods of engineering drawing. CO-2 Interpret engineering drawings using fundamental technical mathematics. CO-3 Construct basic and intermediate geometry and comprehend the theory of projection. CO-4 Improve their visualization skills so that they can apply these skills in developing new products. CO-5 Improve their technical communication skill in the form of communicative drawings. CO-6 Use computer software for engineering drawing.

**B.E. (Mechanical) 3<sup>RD</sup> Semester**

3130004- Effective Technical Communication	CO1: Define and discuss dynamics of Verbal and Non Verbal aspects of Communication CO2: Write various formal documents of technical and professional communication CO3: Communicate in diverse formal situations taking place in organizations CO4: Illustrate and examine the knowledge of ethical aspects of engineering CO5: Demonstrate and explain social and professional etiquettes CO6: Plan self-development and practice self-assessment.
3130005- Complex Variables and Partial Differential Equations	CO1: convert complex number in a polar form, plot the roots of a complex number in complex plane, find harmonic conjugate of analytic functions and apply conformal mapping in geometrical transformation CO2: evaluate complex integration by using various result, test convergence of complex sequence and series and expand some analytic function in Taylor's series CO3: find Laurent's series and pole of order, and apply Cauchy Residue theorem in evaluating some real integrals CO4: form and solve first order linear and nonlinear partial differential equations CO5: apply the various methods to solve higher order partial differential equations, modeling and solve some engineering problems related to Heat flows, Wave equation and Laplace equation

3130007- Indian Constitution	<p>CO1: Enhance human values , create awareness about law enactment and importance of Consitution</p> <p>CO2: To Understand the Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities.</p> <p>CO3: Create Awareness of their Surroundings, Society, Social problems and their sutable solutions while keeping rights and duties of the citizen keeping in mind.</p> <p>CO4: Understand distribution of powers and functions of Local Self Government.</p> <p>CO5: Understand the National Emergency, Financial Emergency and their impact on Economy of the country.</p>
3131904- Material Science and metallurgy	<p>CO-1 Understand the basic concept of Material Science and Metallurgy</p> <p>CO-2 Know about the ferrous and non ferrous metals and alloys and their applications</p> <p>CO-3 Understand different non-destructive testing methods</p> <p>CO-4 Find the causes and prevention of metallic corrosion</p> <p>CO-5 Judge the Scope and limitations of different materials</p>
3131905- Engineering Thermodynamics	<p>CO-1 To identify the unique vocabulary associated with thermodynamics and explain the basic concepts of thermodynamics</p> <p>CO-2 To state and apply first law of thermodynamics for closed and open systems undergoing different thermodynamic processes and evaluate the feasibility of thermodynamic cycles and processes using second law of thermodynamics</p> <p>CO-3 To apply the concept of entropy and exergy to different thermodynamic processes and cycles</p> <p>CO-4 To analyze different gas power, vapor power and refrigeration cycles</p> <p>CO-5 To make elementary calculation of combustion phenomenon.</p>
3131906- kinematics and theory of machines	<p>CO-1 Understand basic structure and elements of machines.</p> <p>CO-2 Identify functional characteristics of various machine elements.</p> <p>CO-3 Synthesize various mechanisms based on position, velocity and acceleration requirement.</p> <p>CO-4 Determine position, velocity and acceleration of linkages in mechanism at any instant.</p> <p>CO-5 Understand basics related to friction and its practical application in mechanical engineering.</p>
3ME04 GATE	<p>CO1: Improve the analytical, quantitative as well as qualitative aspects of the subjects.</p> <p>CO2: Understand and develop the basic concepts of each subject including important definitions, equations, derivations, theorems, laws in every subject.</p> <p>CO3: Provide fundamental knowledge in all the three domains of Mechanical Engineering i.e. Production, design and thermal with easy tricks and techniques.</p> <p>CO4: Improve the ability to recall, comprehension, application, analyse and synthesize through problem solving</p>
3ME02 SEMINAR	<p>CO1: To improve active verbal and non-verbal skills as well as remove the stage phobia.</p> <p>CO2: Understand the role of effective presentations and also the factors influencing a speaker's credibility and gain experience in formal/ informal presentations.</p> <p>CO3: Develop audience-centered presentations meeting concrete professional objectives with visual aids.</p> <p>CO4: Improve the capability to deliver well-rehearsed and polished presentations, content, and interactive requirements</p> <p>CO5: Student can summarize multiple points of view in order to draw conclusions</p> <p>CO6: To set the stage for future recruitment by potential employers</p>
3ME01 SOFTWARE	<p>CO1: Create awareness in the field of CAD/CAM Software and learn the basic Microsoft office tools, Auto-CAD, Creo- Parametric and ANSYS Softwares</p> <p>CO2: Increase the ability to convert sketches to engineering drawing.</p> <p>CO3: Make familiar in Creating 2D and 3D part geometry using the design module</p>

	<p>of Auto-CAD, Creo- Parametric software</p> <p>CO4: Prepare and train students for future engineering positions so that they can play a critical role in helping several industries viz engineering, manufacturing, cement, power, iron &amp; steel, construction, oil &amp; gas and automotive industries create high quality products but also improve your productivity</p>
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### **B.E. (Mechanical) 4<sup>th</sup> Semester**

3141901- Mechanical Measurement and Metrology	<p>CO-1 summarize various methods and terms used in mechanical measurements and metrology.</p> <p>CO-2 measure mechanical quantities like Force, Temperature, Pressure, Velocity, Acceleration, Strain and Torque.</p> <p>CO-3 apply concepts of metrology for gears, threads and surface finish.</p> <p>CO-4 utilize various precision machines working based on Laser technology and coordinate measuring methods.</p>
3141906- Fluid Mechanics and Hydraulics Machines	<p>CO-1 explain various fluid properties and behavior of fluid in static and dynamic mode.</p> <p>CO-2 make use of dimensional analysis and interpret types of fluid flow.</p> <p>CO-3 analyze theory of impact of jet and apply the same for hydraulic turbine.</p> <p>CO-4 evaluate performance of centrifugal pumps</p>
3141907- Fundamental of Machine Design	<p>CO-1 understand fundamentals of material selection, strength of materials and loading patterns of machine elements.</p> <p>CO-2 distinguish basic failure modes of machine elements.</p> <p>CO-3 analyse beams and columns for stresses and deflection.</p> <p>CO-4 design and analyse machine components under static loading.</p> <p>CO-5 design and analyze machine components under variable loading.</p>
3141908- Manufacturing Processes	<p>CO-1 Understand the basic concept of machining operations</p> <p>CO-2 Analyze conventional machining processes.</p> <p>CO-3 Study, understand and generate the sequence of machining operation to produce the end product.</p> <p>CO-4 Judge the limitations and scope of machines to perform variety of operations.</p>
3141909- Organizational Behavior	<p>CO-1 Students will be able to understand various methods and terms used different organizational behaviour model</p> <p>CO-2 Students will be able to understand Individual Behaviour like attitude, perception, motivation, personality, misbehaviour and emotions.</p> <p>CO-3 Students will be able to understand group behaviour, leadership and power</p> <p>CO-4 Students will be able to understand dynamics of organizational behaviour and managing change.</p>
4ME04 GATE	<p>CO1: Improve the analytical, quantitative as well as qualitative aspects of the subjects.</p> <p>CO2: Understand and develop the basic concepts of each subject including important definitions, equations, derivations, theorems, laws in every subject.</p> <p>CO3: Provide fundamental knowledge in all the three domains of Mechanical Engineering i.e. Production, design and thermal with easy tricks and techniques.</p> <p>CO4: Improve the ability to recall, comprehension, application, analyse and synthesize through problem solving</p>
4ME02 SEMINAR	<p>CO1: To improve active verbal and non-verbal skills as well as remove the stage phobia.</p> <p>CO2: Understand the role of effective presentations and also the factors influencing a speaker's credibility and gain experience in formal/ informal presentations.</p> <p>CO3: Develop audience-centered presentations meeting concrete professional objectives with visual aids.</p> <p>CO4: Improve the capability to deliver well-rehearsed and polished presentations, content, and interactive requirements</p> <p>CO5: Student can summarize multiple points of view in order to draw conclusions</p> <p>CO6: To set the stage for future recruitment by potential employers</p>

4ME01 SOFTWARE	<p>CO1: Create awareness in the field of CAD/CAM Software and learn the basic Microsoft office tools, Auto-CAD, Creo- Parametric and ANSYS Softwares</p> <p>CO2: Increase the ability to convert sketches to engineering drawing.</p> <p>CO3: Make familiar in Creating 2D and 3D part geometry using the design module of Auto-CAD, Creo- Parametric software</p> <p>CO4: Prepare and train students for future engineering positions so that they can play a critical role in helping several industries viz engineering, manufacturing, cement, power, iron &amp; steel, construction, oil &amp; gas and automotive industries create high quality products but also improve your productivity</p>
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### B.E. (Mechanical) 5<sup>TH</sup> Semester

2151902- THEORY OF MACHINES	<p>After learning the course the students should be able to:</p> <p>CO1. Analyse effect of gyroscopic couple on vehicles, ships and aeroplanes.</p> <p>CO2. Design flywheels for IC engines and punching press.</p> <p>CO3. Apply fundamentals of dynamics analysis to various mechanical systems.</p> <p>CO4. Design and analyse clutches and brakes.</p> <p>CO5. Perform power measurement using dynamometers.</p> <p>CO6. Analyse governors.</p>
2151903- FLUID POWER ENGINEERING	<p>After learning the course the students should be able to:</p> <p>CO1: Learn the benefits and limitations of fluid power compared with other power transmission technologies.</p> <p>CO2: Understand the operation and use of different hydraulic machines like hydraulic crane, fluid coupling and fluid torque convertor etc.</p> <p>CO3: Formulate and analyze models of hydraulic components</p> <p>CO4: Design and predict the performance of fluid power components.</p>
2151907- DESIGN OF MACHINE ELEMENTS	<p>After learning the course the students should be able to:</p> <p>CO1. Carryout preliminary selection of materials for mechanical components.</p> <p>CO2. Analyse components subjected to fluctuating loads.</p> <p>CO3. Design springs for mechanical application.</p> <p>CO4. Design and select belt and chain drives</p>
2151908- CONTROL ENGINEERING	<p>On completion of this course students will:</p> <p>CO 1. Understand the methodology for modelling dynamic systems with concept of stability</p> <p>CO 2. Know the transfer function, signal flow graph representation of linear systems &amp; their controlling actions</p> <p>CO 3. Understand concept of time, frequency response as well as concept of state-space models and their relation to frequency domain models</p> <p>CO 4. Control system of hydraulic and pneumatic system</p>
2151909- HEAT TRANSFER	<p>After learning the course the students should be able to:</p> <p>CO 1: Understand basic concept of heat transfer</p> <p>CO 2 : Able to do basic calculations involving heat transfer as is typical for a mechanical engineer. This includes conduction, convection and radiation heat transfer as well as heat exchanger design.</p> <p>CO 3 : Apply scientific and engineering principles to analyze and design aspects of engineering systems that relate to conduction, convection and radiation heat transfer</p>
2150002- CYBER SECURITY	<p>After learning the course the students should be able to:</p> <p>CO1: student should understand cyber-attack, types of cybercrimes, cyber laws and also how to protect them self and ultimately society from such attacks</p>
5ME04 GATE	<p>CO1: Improve the analytical, quantitative as well as qualitative aspects of the subjects.</p> <p>CO2: Understand and develop the basic concepts of each subject including important definitions, equations, derivations, theorems, laws in every subject.</p> <p>CO3: Provide fundamental knowledge in all the three domains of Mechanical Engineering i.e. Production, design and thermal with easy tricks and techniques.</p> <p>CO4: Improve the ability to recall, comprehension, application, analyse and synthesize through problem solving</p>

5ME02 SEMINAR	<p>CO1: To improve active verbal and non-verbal skills as well as remove the stage phobia.</p> <p>CO2: Understand the role of effective presentations and also the factors influencing a speaker's credibility and gain experience in formal/ informal presentations.</p> <p>CO3: Develop audience-centered presentations meeting concrete professional objectives with visual aids.</p> <p>CO4: Improve the capability to deliver well-rehearsed and polished presentations, content, and interactive requirements</p> <p>CO5: Student can summarize multiple points of view in order to draw conclusions</p> <p>CO6: To set the stage for future recruitment by potential employers</p>
5ME01 SOFTWARE	<p>CO1: Create awareness in the field of CAD/CAM Software and learn the basic Microsoft office tools, Auto-CAD, Creo- Parametric and ANSYS Softwares</p> <p>CO2: Increase the ability to convert sketches to engineering drawing.</p> <p>CO3: Make familiar in Creating 2D and 3D part geometry using the design module of Auto-CAD, Creo- Parametric software</p> <p>CO4: Prepare and train students for future engineering positions so that they can play a critical role in helping several industries viz engineering, manufacturing, cement, power, iron &amp; steel, construction, oil &amp; gas and automotive industries create high quality products but also improve your productivity</p>

### B.E. (Mechanical) 6<sup>TH</sup> Semester

2161901- DYNAMICS OF MACHINERY	<p>After learning the course the students should be able to:</p> <p>CO1. Determine unbalanced forces and bearing reactions for a system of rotating masses.</p> <p>CO2. Determine unbalanced forces in reciprocating engines.</p> <p>CO3. Determine natural frequency of mechanical systems represented in lumped form.</p> <p>CO4. Determine critical speed shafts with unbalanced rotors and cam-follower system (to avoid jump).</p>
2161902- INTERNAL COMBUSTION ENGINE	<p>After learning the course the students should be able to:</p> <p>CO1: Do in-depth cycle analysis for different types of engines.</p> <p>CO2: Analyze fuel supply systems, ignition and governing systems of IC Engines.</p> <p>CO3: Understand combustion process of SI and CI Engines.</p> <p>CO4: Measure operating characteristics of IC Engines.</p> <p>CO5: Compare the experimental results with theoretical trends</p>
2161903- COMPUTER AIDED DESIGN	<p>Course Outcome: After learning the course the students should be able to:</p> <p>CO1. Understand and appreciate use of computer in product development.</p> <p>CO 2. Apply algorithms of graphical entity generation.</p> <p>CO3. Understand mathematical aspects of geometrical modelling.</p> <p>CO4. Understand and use finite element methods for analysis of simple components.</p>
2161907- INDUSTRIAL ENGINEERING	<p>After learning the course the students should be able to:</p> <p>CO1. Demonstrate location decision and site selection</p> <p>CO2. Use of plant layout knowledge for betterment of plant</p> <p>CO3. Use of Production planning and control</p> <p>CO4. Solve forecasting problem by applying different techniques</p> <p>CO5. Understanding planning, scheduling and sequencing problems for shop floor</p> <p>CO6. Demonstrate assembly line balancing and dispatching</p> <p>CO 7. Apply work study techniques and understands its importance for better productivity</p> <p>CO 8. Demonstrate wage and incentive plans</p> <p>CO9. Acquire knowledge of industrial legislation</p> <p>CO10. Apply statistical quality control techniques for inspection</p> <p>CO11. Learn about entrepreneurship to become entrepreneur</p>
2161908- REFRIGERATION AND AIRCONDITIONING	<p>After learning the course the students should be able to:</p> <p>CO1: Understand the basic concepts of refrigeration and air conditioning systems</p> <p>CO2: Understand and analysis of various refrigeration cycles</p> <p>CO3: Make basic calculation of psychometric properties and process</p> <p>CO4: Do basic calculations of heating and cooling load requirements of a room. CO5:</p>

	Apply scientific and engineering principles to analyze and design aspects of engineering systems that relate to refrigeration and air conditioning.
2161909- PRODUCTION TECHNOLOGY	<p>After learning the course the students should be able to:</p> <p>CO1. Students will be able to apply basics of metal machining processes very well with the detailed signature of tools.</p> <p>CO2. Students able to understand different forces acting while metal cutting and can draw merchant circle diagram and also able to apply knowledge to economic metal cutting.</p> <p>CO3. Students can able to grasp distinctive knowledge of gear forming and its generating methods.</p> <p>CO4. Students are able to clutch its usefulness and design of such locating and fixing devises.</p> <p>CO5. Learn in depth about press and press work</p> <p>CO6. Gained elementary knowledge in Non-conventional machining and its application in industries.</p>
6ME04 GATE	<p>CO1: Improve the analytical, quantitative as well as qualitative aspects of the subjects.</p> <p>CO2: Understand and develop the basic concepts of each subject including important definitions, equations, derivations, theorems, laws in every subject.</p> <p>CO3: Provide fundamental knowledge in all the three domains of Mechanical Engineering i.e. Production, design and thermal with easy tricks and techniques.</p> <p>CO4: Improve the ability to recall, comprehension, application, analyse and synthesize through problem solving</p>
6ME02 SEMINAR	<p>CO1: To improve active verbal and non-verbal skills as well as remove the stage phobia.</p> <p>CO2: Understand the role of effective presentations and also the factors influencing a speaker's credibility and gain experience in formal/ informal presentations.</p> <p>CO3: Develop audience-centered presentations meeting concrete professional objectives with visual aids.</p> <p>CO4: Improve the capability to deliver well-rehearsed and polished presentations, content, and interactive requirements</p> <p>CO5: Student can summarize multiple points of view in order to draw conclusions</p> <p>CO6: To set the stage for future recruitment by potential employers</p>
6ME01 SOFTWARE	<p>CO1: Create awareness in the field of CAD/CAM Software and learn the basic Microsoft office tools, Auto-CAD, Creo- Parametric and ANSYS Softwares</p> <p>CO2: Increase the ability to convert sketches to engineering drawing.</p> <p>CO3: Make familiar in Creating 2D and 3D part geometry using the design module of Auto-CAD, Creo- Parametric software</p> <p>CO4: Prepare and train students for future engineering positions so that they can play a critical role in helping several industries viz engineering, manufacturing, cement, power, iron &amp; steel, construction, oil &amp; gas and automotive industries create high quality products but also improve your productivity</p>

### **B.E. (Mechanical) 7<sup>TH</sup> Semester**

2171901- Operation Research	<p>After learning the course the students should be able to:</p> <p>CO 1. Students will be able to describe characteristics and scope of OR.</p> <p>CO 2. Students will be able to define and formulate mathematical problems.</p> <p>CO 3. Students will be able to select optimal problems solving techniques for a given problem using LP.</p> <p>CO 4. Students will be able to formulate and solve transportation, travelling sales man and transshipment problems.</p> <p>CO 5. Students will be able to formulate and solve optimization problems related to job/ work assignments.</p> <p>CO 6. Students will be able to demonstrate and solve simple models of Game theory.</p> <p>CO 7. Students will be able to evaluate optimum solution using dynamic programming for different applications.</p> <p>CO 8. Students will be able to choose / devise appropriate queuing model for practical</p>
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	application. CO 9. Students will be able to solve different problems related to Network.
2171903- Computer Aided Manufacturing	After learning the course the students should be able to: CO 1. Students will describe basic concepts of CAM application and understand CAM wheel CO 2. Students will prepare CNC programs for manufacturing of different geometries on milling and lathe machines. CO 3. Students will prepare logic diagram for different application of automation. CO 4. Students will classify different components using different techniques of group technology CO 5. Students will prepare Process planning for different components CO 6. Students will select layouts of FMS for industrial applications CO 7. Students will describe Robot for preliminary industrial applications like pick and place. CO 8. Student will identify application of PPC, JIT, MRP-I, MRP-II, and Expert system to CAM
2171909- Machine Design	After learning the course the students should be able to: CO 1. :Design gears of various types. CO 2. :Design gearboxes for machine tools. CO 3. :Design journal bearing and select antifriction bearing for state application. CO 4. :Design IC engine components and crane parts.
2171910- Power Plant Engineering	After learning the course the students should be able to: CO 1:Understand the different power generation methods, its economics and global energy CO2:situation Apply the basic thermodynamics and fluid flow principles to different power generation CO3:methods Analyze thermodynamic cycles of steam power plant and understand construction, CO4:working and significance of its various systems Analyze thermodynamic cycles of gas turbine power plant, nuclear power plant and jet CO5:propulsion systems
2171912- Oil Hydraulics and Pneumatics	After learning the course, the students should be able to: CO1. Identify and analyse the functional requirements of a power transmission system for a given application. (Application involving fluid power transmission) CO2. Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application. Develop a circuit diagram. CO 3. Visualize how the hydraulic/pneumatic circuit will work to accomplish the function. CO4. Selection and sizing of components of the circuit.
7ME04 GATE	CO1: Improve the analytical, quantitative as well as qualitative aspects of the subjects. CO2:Understand and develop the basic concepts of each subject including important definitions, equations, derivations, theorems, laws in every subject. CO3:Provide fundamental knowledge in all the three domains of Mechanical Engineering i.e. Production, design and thermal with easy tricks and techniques. CO4:Improve the ability to recall, comprehension, application, analyse and synthesize through problem solving

#### **B.E. (Mechanical) 8<sup>TH</sup> Semester**

2181910- RENEWABLE ENERGY ENGINEERING	After learning the subject, student will be able to understand CO1:Importance of RE sources CO2: Applications of different RE sources CO3: Carry out preliminary economic analysis of RE systems
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2181915- AUTOMOBILE ENGINEERING	After learning the course the students should be able to: CO1. Understand the construction details of types of vehicle and functions of various systems. CO2. Analyse and select components of various systems of vehicle.
2181923- ENTREPRENEURSHIP	After learning the course the students should be able to: CO1. Understand Entrepreneurship. CO2. Understand Business Models and Planning for Business. CO3. Understand Operations and Management in business
8ME04 GATE	CO1: Improve the analytical, quantitative as well as qualitative aspects of the subjects. CO2: Understand and develop the basic concepts of each subject including important definitions, equations, derivations, theorems, laws in every subject. CO3: Provide fundamental knowledge in all the three domains of Mechanical Engineering i.e. Production, design and thermal with easy tricks and techniques. CO4: Improve the ability to recall, comprehension, application, analyse and synthesize through problem solving