



MECHANICAL ENGINEERING



B. TECH- MECHANICAL ENGINEERING

Department Vision

Mechanical Engineering Department strives to be recognized globally for quality education, training and research leading to well-qualified engineers, who are innovative, entrepreneurial, and successful in solving problems of society.

Department Mission

- Impart quality education to students to enhance their skills and make them globally competitive.
- Maintain a vital and state-of-the-art research to provide its students and faculty with opportunities to create, interpret, apply and disseminate knowledge.
- Prepare its graduates to pursue higher studies, serve the profession and meet intellectual, ethical and career challenges.

Program Educational Objectives (PEOs):

PEO1	To Educate the graduate of the program to build a successful technical or professional career in Mechanical Engineering.
PEO2	To envisage graduate engineer to achieve the goal in terms of pursuing higher education and Research and Development activities.
PEO3	To help graduates become a moral & ethically responsible citizen in nation building.

Program Specific Outcomes (PSO's):

PSO1	Apply mechanical engineering fundamentals to design mechanical engineering systems and thermal systems.
PSO2	Identify and select appropriate manufacturing processes and apply quality control methods for production of various components.



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Program Outcomes (POs):

Engineering Graduates will be able to:

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustain able development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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Course outcomes (Cos) of all courses of all programs offered by the institution

Course Outcomes for First Year First Semester Course	
Course Code: B17 BS 1101	
Course Title: English I	
CO-1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
CO-2	Gain confidence and competency in vocabulary and grammar.
CO-3	Listen, speak, read and write effectively in both the academic and non- academic environment.
CO-4	Extend his/her reading skills towards literature.
CO-5	Strengthen his/her analytical and compositional skills.
Course Code: B17 BS 1102	
Course Title: Mathematics I	
CO-1	Solve linear ordinary differential equations of first order and first degree. Also will be able to apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO-2	Solve linear ordinary differential equations of second order and higher order. Also will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion.
CO-3	Determine Laplace transform and inverse Laplace transform of various functions.
CO-4	Use Laplace transforms to solve a linear ODE.
CO-5	Calculate total derivative, Jacobian and maxima/minima of functions of two variables.
CO-6	Form partial differential equations and solve some standard types of first order PDEs. Find complimentary function and particular integral of linear higher order homogeneous and non-homogeneous PDEs.
Course Code: B17 BS 1105	
Course Title: Engineering Chemistry	
CO-1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.
Course Code: B17 ME 1101	
Course Title: Engineering Mechanics	
CO-1	Determine the resultant of the given force systems.
CO-2	Analyze force systems using equations of equilibrium.
CO-3	Determine centroid, center of gravity and moment of inertia of areas and bodies.
CO-4	Analyze trusses and simple beams.
CO-5	Distinguish between kinematics and kinetics.
CO-6	Apply the work energy and impulse momentum methods of various engineering problems.
Course Code: B17 ME 1102	
Course Title: Engineering Drawing	
CO-1	Apply principles of drawing to represent dimensions of an object.
CO-2	Construct polygons and engineering curves.
CO-3	Draw projections of points, lines, planes and solids.
CO-4	Represent the object in 3D view through isometric views.
CO-5	Convert the isometric view to orthographic view and vice versa
Course Code: B17 CE 1101	
Course Title: Environmental Studies	
CO-1	To bring awareness among the students about the nature and natural ecosystems
CO-2	Sustainable utilization of natural resources like water, land, energy and air
CO-3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
CO-4	Safe guard against industrial accidents particularly nuclear accidents
CO-5	Constitutional provisions for the protection of natural resources



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Course Code: B17 BS 1107	
Course Title: Engineering Chemistry Lab	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.
Course Code: B17 BS 1108	
Course Title: English Communication Skills Lab I	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students improve their speaking skills in real contexts.
CO-3	Students learn standard pronunciation and practice it daily discourse.
CO-4	Students give up their communicative barriers.
Course Code: B17 BS 1109	
Course Title: Engineering Workshop &IT Workshop	
CO-1	Use various tools to prepare basic carpentry and fitting joints.
CO-2	Prepare jobs of various shapes using black smithy.
CO-3	Make basic house wire connections.
CO-4	Fabricate simple components using tin smithy.
Course Code: B17 BS 1111	
Course Title: Inner Engineering	
CO-1	To improve his concentration levels and improve his public speaking abilities.
CO-2	To balance his academic and non-academic activities (Work Life Balance).
CO-3	To widen his vision and increase his breadth of perspective in his journey of 4 years.
CO-4	To improve his communications skills, leadership, teamwork and decision-making abilities.
CO-5	To inculcate creativity & innovation, planning & organizing as part of their life.
CO-6	Taking responsibility for themselves and people around them.
CO-7	To make their journey more fun and enjoyable.

Course Outcomes for First Year Second Semester Course	
Course Code: B17 BS 1201	
Course Title: English II	
CO-1	To comprehend the speech of people belonging to different backgrounds and regions.
CO-2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts.
CO-3	To express fluently and accurately in social discourse.
CO-4	Participate in group activities like role-plays, discussions and debates.
CO-5	Identify the discourse features, and improve intensive and extensive reading skills.
Course Code: B17 BS 1202	
Course Title: Mathematics II	
CO-1	Find a real root of algebraic and transcendental equations using different methods.
CO-2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
CO-3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpson's rules.
CO-4	Solve a first order ordinary differential equation by Euler and RK methods.
CO-5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.
CO-6	Find Fourier transforms Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.
Course Code: B17 BS 1203	
Course Title: Mathematics III	
CO-1	Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods.



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CO-2	Determine Eigen values and Eigen vectors of a given matrix, Reduce a Quadratic form to its canonical form and classify.
CO-3	Evaluate double integrals over a region and triple integral over a volume.
CO-4	Use the knowledge of Beta and Gamma functions in evaluation of different integrals.
CO-5	Find gradient of a scalar function, divergence and curl of a vector function. Use vector identities for solving problems.
CO-6	Evaluate line, surface and volume integrals by the use of Green's, Stokes' and Gauss divergence theorems.
Course Code: B17 BS 1204	
Course Title: Engineering Physics	
CO-1	Learn the basic concepts of interference and diffraction of light and its applications.
CO-2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fibers in various applications.
CO-3	Understand the inter relationship of electric and magnetic fields and learn ultrasonic's as a tool for technological applications
CO-4	Learn the behavior of particles at the very microscopic level by using wave nature of particles and understand the behavior of materials and be able to classify them using the band theory of solids.
CO-5	Learn the basics of structures of solid materials and nano material preparation Techniques/methods.
Course Code: B17 CS 1201	
Course Title: Computer Programming Using C	
CO-1	Understand the basic terminology used in computer programming
CO-2	Write, compile and debug programs in C language.
CO-3	Use different data types in a computer program.
CO-4	Design programs involving decision structures, loops and functions.
CO-5	Explain the difference between call by value and call by reference
CO-6	Understand the dynamics of memory by the use of pointers
CO-7	Use different data structures and create/update basic data files.
Course Code: B17 BS 1206	
Course Title: Engineering Physics Lab	
CO-1	Students get hands on experience in setting up experiments and using the instruments/equipment individually.
CO-2	Get introduced to using new/ advanced technologies and understand their significance.
Course Code: B17 BS 1208	
Course Title: English Communication Skills Lab II	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students enhance their presentation skills.
CO-3	Students participate in group discussions and improve their team skills.
CO-4	Students confidently face the interviews.
Course Code: B17 CS 1204	
Course Title: C Programming Lab	
CO-1	Apply and practice logical ability to solve the problems.
CO-2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
CO-3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
CO-4	Understand and apply the in-built functions and customized functions for solving the problems.
CO-5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO-6	Document and present the algorithms, flowcharts and programs in form of user manuals.
CO-7	Identification of various computer components, Installation of software
Course Code: B17 BS 1210	
Course Title: Engineering Physics Virtual Labs- Assignments	
CO-1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.



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Course Outcomes for Second Year First Semester Course	
Course Code: B17 BS 2101	
Course Title: Mathematics-IV	
CO-1	Using the concept of Analytic function in applications including Electrostatics and Fluid dynamics.
CO-2	Finding theoretical solution of certain Elliptic, Parabolic and Hyperbolic partial differential equations.
CO-3	Using Z-transforms to solve linear difference equations with constant coefficients.
CO-4	Fitting of probability frequency distribution to a given data.
CO-5	Using the concepts of sampling theory to analyze data related to some large and small samples.
Course Code: B17 ME 2101	
Course Title: Strength of Materials	
CO-1	Understanding the concepts and determining the stress and strain of simple structures.
CO-2	Locating the Principal Planes and determining the Principal Stresses.
CO-3	Determining Shear Forces and Bending Moments of determinate beams.
CO-4	Determining the distribution of Bending and Shear Stresses of beams.
CO-5	Finding relation between elastic constants. Determining shear stresses due to torsion.
CO-6	Determining stresses in Thin Cylindrical and Spherical shells and Thick Cylinders
Course Code: B17 ME 2102	
Course Title: Thermodynamics	
CO-1	Students realize the practical importance of ideal gas theory and the use of real gases in combustion engines such as IC Engines and Gas turbines
CO-2	Students are able to calculate the properties of the gases such as internal energy, enthalpy and entropy.
CO-3	Students are able to estimate the losses which occur during operation of the heat engines, and their maximum possible operating efficiencies under STP conditions.
CO-4	Students can estimate the maximum work-output delivered by the heat engines and maximum work consumed by the reversed heat engines
Course Code: B17 ME 2103	
Course Title: Manufacturing Process	
CO-1	Student will be able to recognize various manufacturing materials, manufacturing process and types of productions.
CO-2	Student will be able to identify various casting processes, metal forming process and welding process.
CO-3	Student will be able to design of gating system, patterns and cores for various casting processes.
CO-4	Student will be able to apply knowledge of casting process for manufacturing of products
CO-5	Student will be able to apply knowledge of rolling, forging, extrusion for manufacturing of products.
CO-6	Student will be able to apply knowledge of welding, brazing and soldering for joining of metals
Course Code: B17 ME 2104	
Course Title: Metallurgy & Materials Science	
CO-1	Understand crystalline solids and their atomic structures.
CO-2	Suggest and recommend necessary engineering materials for specific applications keeping in view of the cost, design, reliability, life, working conditions and properties of the products.
CO-3	Understand different phase transformations in Iron-Iron Carbide diagram and distinguish between steels and cast irons.
CO-4	Select different materials for tools and components based on functional requirements.
CO-5	Use composite materials for different engineering applications like aerospace, automobile, ship building industry, sports item etc.
CO-6	Inclination towards self learning, higher education and research work in the field of engineering materials
Course Code: B17 ME 2105	
Course Title: Advanced Engineering Drawing	
CO-1	Apply principles of drawing to represent dimensions of an object.
CO-2	Draw projections solids with axis inclined to both planes.
CO-3	Represent sectional views of solids.
CO-4	Develop the surfaces of regular solids and draw the projections of intersection of solids.
CO-5	Gain knowledge on Computer Aided Drafting.
Course Code: B17 ME 2106	
Course Title: Mechanical Engineering Lab	
CO-1	Students are now aware of the use of drawing valve timing diagrams of an engine and method to evaluate the volumetric efficiency of air compressor.



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CO-2	They are also aware of method of calibrating pressure gauge, the importance of flash and fire points and calorific values of fuels.
CO-3	The importance and application by calculating viscosities of oil samples are understood.
CO-4	The use of moment of inertia and modulus of rigidity is understood.
CO-5	They are also now able to identify the parts of boiler and engines etc.
Course Code: B17 EE 2107	
Course Title: Basic Electrical & Electronics Engineering Lab	
CO-1	Apply the concepts of Theorems for a given electrical circuit.
CO-2	Evaluate the efficiency and regulation of a single phase transformer.
CO-3	Relate physical observations and measurements involving electrical circuits" theoretical principles.
CO-4	Design amplifier circuit using NPN transistor
Course Code: B17 ME 2107	
Course Title: Auto CAD	
CO-1	Auto CAD screen and various Tool bars and menus and Explain about Dimensioning and Hatching
CO-2	Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.,
CO-3	Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack
CO-4	Rendering of 3D images
Course Code: B17 BS 2107	
Course Title: English Proficiency-I	
CO-1	Improve speaking skills.
CO-2	Enhance their listening capabilities.
CO-3	Learn and practice the skills of composition writing.
CO-4	Enhance their reading and understanding of different texts.
CO-5	Improve their inter-personal communication skills.
CO-6	Be confident in presentation skills.
Course Code: B17 BS 2108	
Course Title: Professional Ethics & Human Values	
CO	By the end of the course student should be able to understand the importance of ethics and values in life and society.

Course Outcomes for Second Year Second Semester Course	
Course Code: B17 ME 2201	
Course Title: Advanced Strength of Materials	
CO-1	Find the slope deflection produced in cantilever, simply supported and overhanging beams subjected to different kinds of lateral loads.
CO-2	Draw the bending moment and shear force diagrams of fixed beams of uniform and non uniform cross sections subjected to different load conditions, and having sinking of support.
CO-3	Draw the bending moment and shear force diagrams of continuous beams subjected to different load conditions, and having sinking of support.
CO-4	Evaluate the stresses across the cross-sections of the curved beam and crane hook subjected to external loads.
CO-5	Apply different theories to analyze the crippling stresses induced in columns and struts subjected to different load conditions.
Course Code: B17 ME 2202	
Course Title: Thermal Engineering	
CO-1	The student gets complete knowledge of steam and its properties.
CO-2	The student learns the complete calculation procedures for designing steam turbines, steam condensers, nozzles etc. used in thermal power plants, steam engines, water turbines and many other industrial applications.
CO-3	The student is prepared to work in industry immediately after his course
Course Code: B17 ME 2203	
Course Title: Metal Cutting & Machine Tools	
CO-1	Students will be able to describe the mechanisms of metal cutting.
CO-2	Students will be able to calculate cutting forces, tool life and machining parameters.
CO-3	Students will be able to design the single point and multi point cutting tools.



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CO-4	Students will be able to demonstrate the working of various machine tools like lathe, milling machine and grinding machine etc.
CO-5	Students will be able to identify different micro finishing operations.
CO-6	Students will be able to assess the advantages, limitations and applications of unconventional methods of machining.
Course Code: B17 ME 2204	
Course Title: Fluid Mechanics	
CO-1	Apply the Bernoulli equation to solve problems in fluid mechanics.
CO-2	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines.
CO-3	Apply control volume analysis to problems in fluid mechanics.
CO-4	Apply potential flow theory to solve problems in fluid mechanics.
CO-5	Identify the recent developments in fluid mechanics, with application to aerospace systems.
Course Code: B17 ME 2205	
Course Title: Mechanical Engineering Drawing	
CO-1	Know drawing of Screw threads and Screw Fastenings using standard Empirical formulae.
CO-2	Draw Riveted joints, Keys, Cotter-joint, Draw Couplings (Shaft couplings: Box and split muff couplings, Flanged, Flexible, Universal and Oldham couplings).
CO-3	Draw the dimensional and geometrical tolerances and surface roughness symbols.
CO-4	Draw Assembly and production drawings of various engine components and machine tool components.
Course Code: B17 BS 2203	
Course Title: Engineering Economics	
CO-1	Provide detailed insight about origin & definitions of economics & enlighten the students about demand analysis.
CO-2	Illustration about applications of cost Concepts & analysis of breakeven point.
CO-3	Understand about various types of Market Structure and Pricing practices implemented by the organization.
CO-4	Infuse knowledge about different Economic systems & Business cycles.
CO-5	Enlighten the students regarding the aspects of Depreciation & Financial Accounting
Course Code: B17 ME 2208	
Course Title: Manufacturing Process Lab	
CO-1	Student will be able to prepare moulds for a given component.
CO-2	Student will be able to apply the knowledge of arc welding to join two metal pieces.
CO-3	Student will be able to practice plain turning, facing, step turning, taper turning, and thread cutting operations on the lathe machine.
CO-4	Student will be able to generate horizontal, vertical and angular surfaces on a given work piece using shaper.
CO-5	Student will be able to generate spur gear on milling machine.
CO-6	Student will be able to demonstrate Capstan and Turret lathe, cylindrical grinder and surface grinding machine.
Course Code: B17 CE 2210	
Course Title: Strength of Materials Lab	
CO-1	To understand the different types of loading and measure the loads.
CO-2	To understand the material properties of different materials and the ways of finding them.
CO-3	To understand the bulking property and fineness of sand grains and the methods of finding them.
Course Code: B17 ME 2209	
Course Title: Industry Oriented Technology Lab	
CO-1	CATIA screen and various Tool bars and menus and Explain about Dimensioning and Hatching
CO-2	Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.,
CO-3	Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack.
CO-4	Rendering of 3D images.
Course Code: B17 BS 2206	
Course Title: English Proficiency-II	
CO-1	Develop the skills of taking and making notes
CO-2	Interpret the pictures appropriately and effectively.
CO-3	Read, comprehend and infer a given piece of writing effectively.
CO-4	Learn and practice the skills of Research writing.
CO-5	Communicate well through various forms of writing.
CO-6	Be confident in giving presentations and dealing with people.



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Course Outcomes for Third Year First Semester Course	
Course Code: B17 ME 3101	
Course Title: Operations Research	
CO-1	Formulate a real time situation into a mathematical model.
CO-2	Identify and develop operational research models from verbal description of real system.
CO-3	Formulate simple reasoning, learning and optimization problems, in terms of the representations and methods presented.
CO-4	Demonstrate the hand execution of basic reasoning and optimization algorithms on simple problems.
CO-5	Formulate more complex, but still relatively simple problems, and apply implementations of selected algorithms to solve these problems.
CO-6	Apply and analyze mathematical optimization functions to various applications.
Course Code: B17 ME 3102	
Course Title: IC Engines & Gas Turbines	
CO-1	Apply the knowledge of gas power cycles adequately and can calculate their efficiencies.
CO-2	Explain the processes involved in combustion in S.I Engines.
CO-3	Explain the processes involved in combustion in C.I Engines.
CO-4	Apply the knowledge of reciprocating and rotary compressors in engineering applications.
CO-5	Compute and develop various methods to improve the efficiency of gas turbine power plants, and can explain jet propulsions.
Course Code: B17 ME 3103	
Course Title: Kinematics of Machines	
CO-1	Understand the basic principles of mechanisms in mechanical engineering applications.
CO-2	Understand the mechanisms, their inversions straight line motion mechanisms steering mechanisms etc.
CO-3	Understand the importance of toothed gears, gear trains.
CO-4	Understand the cam their practice application.
CO-5	Understand the importance of relative motion, velocity, and accelerations of the various elements in a mechanism
Course Code: B17 ME 3104	
Course Title: Design of Machine Elements	
CO-1	Explain the design concepts of static strength of mechanical components
CO-2	Explain the design concepts of fatigue strength of mechanical components
CO-3	Determine the strength of the threaded and welded joints
CO-4	Design the shafts, rigid and flexible couplings parametrically for different loading conditions.
CO-5	Design the energy absorbing mechanical components such as springs for the specified loading conditions.
Course Code: B17 ME 3105	
Course Title: Fluid Machines & Systems	
CO-1	Understand the concepts of jets and jet propulsion and its applications in fluid machinery.
CO-2	Gain the knowledge such as work done, specific speed, performance curves and governing of impulse and reaction turbines.
CO-3	Understand the centrifugal pumps - Multi stage pumps, Minimum speed required to start the pump, Performance curves.
CO-4	Understand the various aspects of Reciprocating pumps such as working, indicator diagram, airvessels.
CO-5	Understand description and working of various types of hydraulic devices.
Course Code:	
Course Title: Industrial Measurements & Metrology	
CO-1	identify the uncertainties in dimensional metrology and the define the measurement standards;
CO-2	describe the fundamentals of dimensional and geometrical tolerances;
CO-3	measure length and angles using line-graduated instruments, i.e. Vernier calipers, micrometers, bevel protractor, sine bar and surface plates;
CO-4	use comparative length-measuring instruments, i.e. dial indicator, to measure variations in the distance between two or more surfaces;
CO-5	use effective methods of measuring straightness, flatness, roundness, profile, screw threads and gear teeth;
CO-6	measure dimensions of shafts, bearings and linear surfaces in metric and imperial units using calibers, micrometers, and scales;
CO-7	use contour projector and coordinate measuring machine to record measurements of complex profiles with high sensitivity;
CO-8	Use gage blocks, fixed gages, pneumatic gages gage blocks to measure various work pieces.



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CO-9	Explain the effect of environmental conditions on the accuracy of measurements;
CO-10	demonstrate the correct methods for adjustment and calibration of various measuring instruments;
CO-11	Use appropriate method for determination of accuracy based on product function and manufacturing capability.
Course Code: B17 ME 3107	
Course Title: IC Engines & Kinematics of Machines Lab	
CO-1	A This course comprehensively deals with practical approach to I.C Engines and four bar chain mechanisms
CO-2	To expose students to different methods of finding friction power in single and multi cylinder engines
CO-3	Understand the working of Gyroscopes
CO-4	Deal with basic trouble shooting aspects and specifications of Car model: Maruthi ZEN
Course Code: B17 ME 3108	
Course Title: Metrology Lab	
CO-1	Students will understand construction and working of various measuring instruments and its calibration.
CO-2	The student will be able to operate measurement instruments on their own and test different components for their dimensional accuracy.
CO-3	Students will be able to understand application of gauges.
Course Code: B17 BS 3101	
Course Title: Problem Solving & Linguistic Competence	
CO-1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
CO-2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
CO-3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
CO-4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
CO-5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
Course Code: B17 ME 3109	
Course Title: Modeling Lab	
CO-1	Modelling screen and various Tool bars and menus and Explain about Dimensioning and Hatching
CO-2	Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.
CO-3	Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack.
CO-4	Rendering of 3D images.
Course Code: B17 BS 3101	
Course Title: IPR & Patents	
CO-1	Identify various types of intangible property that an engineering professional could generate in the course of his career.
CO-2	Distinguish between various types of protection granted to Intellectual Property such as Patents, Copy Rights, Trademarks etc.,
CO-3	List the steps involved in getting protection over various types of intellectual property and maintaining them.
CO-4	Take precautions in writing scientific and technical reports without plagiarism.
CO-5	Help micro, small and medium entrepreneurs in protecting their IP and respecting others IP as part of their business processes.

Course Outcomes for Third Year Second Semester Course

Course Code: B17 ME 3201	
Course Title: Industrial Engineering & Management	
CO-1	Apply management theories in industry
CO-2	Know personnel management techniques to motivate the workers
CO-3	Settle the industrial disputes in the organization
CO-4	Acquire full knowledge on production planning and control procedures
CO-5	Understand the economics of plant layout
CO-6	Aware of material handling principles and equipment



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CO-7	Apply maintenance practices
CO-8	Have knowledge on materials management
CO-9	Improve the productivity by applying work study procedures and quality concepts
Course Code: B17 ME 3202	
Course Title: Control Systems	
CO-1	Classify control systems and explain the needs and effects of feedback in a control system and Compute transfer function of multiple subsystems modeled as block diagram/ signal flow graph.
CO-2	Develop mathematical models for physical systems using the knowledge of fundamental principles of mathematics and control systems.
CO-3	Compute transfer function of multiple subsystems modeled as state space representation.
CO-4	Compute and describe the output response and steady state error of first, second and higher order control systems for standard input signals
CO-5	Determine the stability of a system using Routh Hurwitz and Nyquist criterion.
Course Code: B17 ME 3203	
Course Title: Dynamics of Machines	
CO-1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
CO-2	Compute frictional losses, torque transmission of mechanical systems.
CO-3	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
CO-4	Understand the importance of governors , bearings, clutches and their applications
CO-5	Understand balancing of reciprocating and rotary masses
Course Code: B17 ME 3207	
Course Title: Computer Aided Design	
CO-1	Analyze and use engineering computer graphics and geometric modelling techniques for mechanical engineering applications.
CO-2	Able to understand and apply theories, methods and procedures for complex-shapes part design.
CO-3	Apply advanced modelling and computational tools for complex part and shape design and analysis.
CO-4	Select and use various engineering design procedures for mechanical design problems involving complex shapes.
CO-5	Execute professional engineering CAD projects for mechanical engineering applications in the current industrial practice.
Course Code: B17 ME 3208	
Course Title: Industrial Engineering Lab	
CO-1	Students will be able to find the quality of the product using different charts.
CO-2	Can improve the method of doing work by applying principle of motion economy and method study charts.
CO-3	Can find the standard time required for completing a job by different methods.
CO-4	Understands the basic probability distributions.
CO-5	Understands the impact of work on the human body and also the physiological constraints of the body
Course Code: B17 ME 3209	
Course Title: Fluid Mechanics and Machinery Lab	
CO-1	The student gets complete knowledge on fluid mechanics, hydraulic turbines and pumps.
CO-2	The student learns the complete calculation procedures for designing hydraulic turbines, and pumps.
CO-3	The student is prepared to work in industry immediately after this course.
Course Code: B17 BS 3201	
Course Title: Employability Skills	
CO-1	Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.
CO-2	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences
CO-3	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation(for professional and educational purposes).
CO-4	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.
CO-5	Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, tailor make answers to the



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	questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process.
Course Code: B17 BS 3202	
Course Title: Basic Coding	
CO-1	Know about Control Structures, Loop Structures and branching in programming.
CO-2	Know about various searching and sorting methods.
CO-3	Know about Functions, Recursions and Storage Classes.
CO-4	Know about Structures and Unions.
CO-5	Know different Operating System concepts.
CO-6	Differentiate OSI Model Vs. TCP/IP suite.
Course Code: B17 BS 3207	
Course Title: Entrepreneurship (Open Elective)	
CO-1	Students will be able to understand the characteristics of entrepreneur and its role in economic development.
CO-2	Student will be able to gain comprehensive knowledge on women entrepreneurship, rural entrepreneurship and their contribution towards economic development.
CO-3	Students will be familiarizing with project formulation and design.
CO-4	Students will be able to familiarize with the problems and prospectus of India.
CO-5	Student will be able to include and implement Government of India initiatives in supporting skill development programmes.
Course Code: B17 CS 3213	
Course Title: Database Management System(Open Elective)	
CO-1	Demonstrate the basic elements of a relational database management system.
CO-2	Ability to identify the data models for relevant problems.
CO-3	Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
CO-4	Apply normalization for the development of application software
Course Code: B17 CE 3207	
Course Title: Waste Water Management(Open Elective)	
CO-1	Define the quality of industrial wastes
CO-2	Explain various industrial waste treatment processes
CO-3	Outline the advanced treatment techniques available for industrial wastes
CO-4	Explain the sludge reduction and disposal methodologies
CO-5	Analyze the waste effluent treatment from different case studies
Course Code: B17 CS 3210	
Course Title: Computer Graphics(Open Elective)	
CO-1	The students will understand graphics principles and graphics hardware.
CO-2	The students can demonstrate geometrical transformations.
CO-3	The students can create interactive graphics applications and demonstrate computer graphics
Course Code: B17 ME 3205	
Course Title: Industrial Robotics(Open Elective)	
CO-1	Distinguish between fixed automation and programmable automation.
CO-2	Identify various components of robot.
CO-3	Select appropriate type of actuator for a joint.
CO-4	Illustrate robot applications in manufacturing.
CO-5	Analyze kinematics of a robot.
Course Code: B17 ME 3206	
Course Title: Green Engineering Systems(Open Elective)	
CO-1	Understand the principles and working of solar energy and solar energy solar energy collection.
CO-2	Understand the principles of solar energy storage and applications of solar energy and wind energy.
CO-3	Understand the principles and working of biomass, geo thermal and ocean energies and appreciate their significance in view of their importance in the current scenario and their potential future applications.
CO-4	Understand the principles and working of energy efficient systems like electrical and mechanical systems.
CO-5	Understand the principles and working of energy efficient processes.



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Course Outcomes for Final Year First Semester Course	
Course Code: B17 ME 4101	
Course Title: Heat Transfer	
CO-1	Apply the modes of heat transfer and study the problems involving steady and unsteady state heat conduction in various Cross sections.
CO-2	Formulate and solve the heat transfer coefficients for natural and forced convection for various cross section areas.
CO-3	Design Simple heat exchanger units, acquiring basic knowledge on boiling and condensation heat transfer.
CO-4	Analyze radiation heat transfer between black body and gray body surfaces.
Course Code: B17 ME 4102	
Course Title: Computer Aided Manufacturing	
CO-1	Prepare manual and APT programming for various components by applying the knowledge of numerical control techniques
CO-2	Analyse various computer aided process planning methods and computer aided material handling system
CO-3	Distinguish various automated quality control methods
CO-4	Organize flexible manufacturing system and CIM system
Course Code: B17 ME 4103	
Course Title: Mechatronics	
CO-1	Understand various components that constitute a mechatronic system.
CO-2	Develop knowledge of various types of available sensors, and use the sensors apply in a mechatronic system.
CO-3	Identify the required actuation system for the design of mechatronic system
CO-4	Formulate the mathematical model of the simple dynamic systems of mechanical, electrical, and hydraulic & pneumatic domains
CO-5	Develop the closed loop PID control of a given mechatronic system
CO-6	Develop knowledge of microcontroller and programmable logic controller.
Course Code: B17 ME 4110	
Course Title: Heat Transfer Lab	
CO-1	Conduct experiments on conduction, convection and radiation of heat;collect data, perform analysis and interpret results to draw valid conclusions through standard test procedures
CO-2	Determine thermal properties and performance of heat exchanger
Course Code: B17 ME 4111	
Course Title: CAD Lab	
CO-1	Apply various commands in CAD software for modelling 2D &3D objects.
CO-2	Analyze various structural components using CAD software.
Course Code: B17 ME 4104	
Course Title: Finite Element Analysis(Elective-I)	
CO-1	Understand the fundamental concepts of Finite Element Analysis and Solve the physical problem using functional approximation method.
CO-2	Analyze the 1Dstructural problems by applying the concepts of finite element analysis.
CO-3	Analyze Trusses and Beams by applying the concepts of finite element analysis
CO-4	Analyze 2D structural problems by applying concepts of finite element analysis and apply the principles of Numerical Integration and its application to Finite Element Analysis
CO-5	Analyze Axisymmetric solids by applying the concepts of Finite Element Analysis.
Course Code: B17 ME 4105	
Course Title: Automation in Manufacturing(Elective-I)	
CO-1	Understand the basic principles of automation and its components which are implemented in production systems.
CO-2	Identify the importance of material handling and various automatic identification methods used in production systems.
CO-3	Understand the components of manufacturing systems and different production lines implemented in production systems.
CO-4	Understand cellular manufacturing, forming part families, group technology and their involvement in flexible manufacturing systems.
CO-5	Understand various automated inspection methodologies and manufacturing support systems like CAPP, shop floor control, etc.
Course Code: B17 ME 4106	



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Course Title: Quality Control and Assurance(Elective-I)	
CO-1	Apply the fundamentals in interpreting the concepts like Quality Costs, Deming's philosophy, Taguchi's loss function and Six Sigma
CO-2	Construct and analyse control charts for Variables and Attributes for the purpose of improving the process
CO-3	Analyse different processes for their Process Capability Acquire knowledge of Laplace transform, partial differentiation and their applications
CO-4	Design different sampling plans for the purpose of inspection.
Course Code: B17 ME 4107	
Course Title: Project Management (Elective-II)	
CO-1	Understand that PM skills are critical to most careers and they can be applied at most businesses and professions.
CO-2	Acquire thorough knowledge on various analytical tools required during different stages of project life cycle.
CO-3	Will be able to apply various tools and techniques for planning and scheduling the projects and can estimate the cost of the project.
CO-4	Learn how to be proactive to the risks and be able to manage them that occur during the progressive stages of the projects
CO-5	Learn the ways of controlling the projects and all possible practical situations that lead to different changes during the course of project execution.
CO-6	Possess full knowledge on how to evaluate the projects, terminate the projects and finally how to close the contract.
CO-7	Be an effective team member or project manager and knows how to manage the stress.
CO-8	Finally, students will acquire all the key skills to become effective project managers across various industries.
Course Code: B17 ME 4108	
Course Title: Tool Design(Elective-II)	
CO-1	Explain about locating and clamping devices
CO-2	Practice with jigs and fixtures
CO-3	Use press and press tools and design different types of dies
CO-4	Illustrate Die casting Dies and Injection Moulds
CO-5	Determine gauges and gauge design
Course Code: B17 ME 4109	
Course Title: Refrigeration & Air Conditioning(Elective-II)	
CO-1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO-2	Analyze cooling capacity and performance of refrigeration systems
CO-3	Examine the properties, applications and environmental issues of different refrigerants
CO-4	Analyze the air conditioning processes using principles of Psychrometry

Course Outcomes for Final Year Second Semester Course	
Course Code: B17 ME 4201	
Course Title: Production Planning & Control	
CO-1	Judge which type production is required for different specific real-world situations and can apply various qualitative/quantitative methods for forecasting the future demand.
CO-2	Analyze different inventory systems for minimizing the total costs and maximizing the profit.
CO-3	Determine the most economical process of doing a work and prepare the route sheets for establishing how and where the work will be done.
CO-4	Analyze the sequence of performing jobs scheduled through different machines in order to measure the effectiveness of the system and can also administer the priority rules for dispatching jobs.
Course Code: B17 ME 4205	
Course Title: CAM Lab	
CO-1	Demonstrate the CAM Software's XL MILL and XL TURN
CO-2	Create manual part programming for CNC Turning and milling using G- Codes and M-Codes
Course Code: B17 ME 4207	
Course Title: Project Work	
CO-1	Identify a current problem through literature/field/case studies
CO-2	Identify the background objectives and methodology for solving the same.



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CO-3	Design a technology/ process for solving the problem.
CO-4	Develop a technology/ process for solving the problem.
CO-5	Evaluate that technology/ process at the laboratory level.
Course Code: B17 ME 4202	
Course Title: Power Plant Engineering(Elective-III)	
CO-1	Describe with a layout, the working of steam power plant with fuel handling and ash handling systems
CO-2	Determine the performance of Diesel engine and gas turbine power plants.
CO-3	Analyze various hydroelectric power plant and nuclear power plant along with their economics and their impact on environment.
CO-4	Calculate load factor, capacity and utilization factor and cost of power generated by power plants.
Course Code: B17 ME 4203	
Course Title: Automobile Engineering and Hybrid Vehicles(Elective-III)	
CO-1	Apply and understand all sub systems of an Automobile such as various types of suspension systems and the concepts of brakes, electrical and electronic ignition systems
CO-2	Analyze different types of engines, their cooling systems and various types of catalytic converters to control Exhaust emissions
CO-3	Analyze various types and working principles of clutch, gearbox, drive shaft and final drive systems and hybrid vehicles.
CO-4	Analyze, troubleshoot, servicing and maintenance of automobile vehicles and also create an idea on future challenges in the field of automobile.
Course Code: B17 ME 4204	
Course Title: Additive Manufacturing(Elective-III)	
CO-1	Understand the significance of rapid prototyping and its practical usage.
CO-2	Use Stereo Lithography System models files for rapid prototyping.
CO-3	Understand various Liquid based and Solid based rapid prototyping methods
CO-4	Understand the concept of additive manufacturing.
CO-5	Develop the CAD models for rapid prototyping
CO-6	Use the tools of rapid prototyping