



**GATES INSTITUTE OF TECHNOLOGY ( Code: F2 )**

Approved By AICTE., Affiliated to JNTUA, -  
Gooty Ananthapuram GOOTY,515401.

**Department Of Mechanical Engineering  
Course Outcomes**

Year & Sem	Course Code	Course Name	After completion of the course, the student will be able to
I-I	15A52102	Functional English	CO 1: To enable students to develop LSRW skills and improve
			CO 2: To help students express themselves fluently and appropriately.
			CO 3: To develop the ability of silent reading and comprehension .
			CO 4: To equip them with the components of different forms
			CO 5: To develop narration /description , vocabulary & note
I-I	15A54101	Engineering Mathematics-1	CO 1: Solve differential equations of first order and its applications.(L3)
			CO 2: Analyze second order differential equations and its applications.(L4)
			CO 3: Discuss about maxima & minima of the given functions and radius of curvature.(L6)
			CO 4: Evaluate multiple integrals and apply them to find areas & volumes.(L5)
			CO 5: Explain vectors and its applications.(L2)
I-I	15A05101	Computer programming	CO 1: Demonstrate computer hardware, software & classify operators in C language.
			CO 2: Solve different problems using selection statements and arrays of C
			CO 3: Apply pointers and functions in C programming.
			CO 4: Utilize structures and recursion in C programming
			CO 5: Make use of pointers in creating files.
I-I	15A51101	Engineering chemistry	CO 1: Experiment the usage of hard water domestically and industrially.
			CO 2: Explain the preparation and properties of polymers and their applications
			CO 3: Explain the corrosion effects on different materials and electrochemical cells
			CO 4: Analyze of solid fuels, liquid fuels, gaseous fuels and flue gas analysis
			CO 5: Apply the chemistry involved in chemistry of engineering materials
I-I	15A01101	Environmental Sciences	CO 1: Understand the importance of environmental studies
			CO 2: Comprehended the concepts of an eco-

			system.
			CO 3: Identify the concepts of environmental pollution
			CO 4: Differentiate social issues and environment
			CO 5: Familiarize human population and environment
I-I	15A52102	ELCS lab	CO 1: Students will learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.
			CO 2: Students will learn practical understanding of the redox reaction
			CO 3: Students will learn about the viscosity of lubricants.
			CO 4: Students will learn conductivity of strong electrolytes.
			CO 5: Students will learn the preparation of thermo-setting plastics.
I-I	15A51102	Engineering chemistry Lab	CO 1: Students will learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.
			CO 2: Students will learn practical understanding of the redox reaction.
			CO 3: Students will learn about the viscosity of lubricants.
			CO 4: Students will learn conductivity of strong electrolytes.
			CO 5: Students will learn the preparation of thermo-setting plastics.
I-II	15A52201	English for professional communication	CO 1: Comprehend & identify the speeches of different backgrounds
			CO 2: Express themselves fluently and appropriately in social & professional circles.
			CO 3: Evolve the ability of silent reading & comprehension
			CO 4: Equip with components of different forms of writing.
			CO 5: Communicate effectively & confidently thereby enhancing employability skills.
I-II	15A54201	Mathematics -2	CO 1: Solve differential equations by using Laplace transe transforms (L3).
			CO 2: Use Fourier transforms to expand the given functions (L3)
			CO 3: Solve various types of integrals using Fourier transforms (L6).
			CO 4: Evaluate partial differential equations & its applications (L5).

			CO 5: Apply Z transforms to evaluate difference equations (L3).
I-II	15A03202	Material science and engineering	CO 1: Understand the various types of elements and their properties, Analyze the properties of elements at different temperatures.
			CO 2: Drawing of microstructures of elements.
			CO 3: Know Characteristics of different materials at different conditions.
			CO 4: Learn Heating techniques used for improving the material properties.
			CO 5: To understand the properties of non metallic materials, composites, ceramic and polymers.
I-II	15A56101	Engineering Physics	CO1: Utilize of optics, laser technology and fiber optics various disciplines and its applications(L3)
			CO2: Apply the knowledge to analyze different types of crystal structure & defects found in crystal, understand the importance of ultrasonic's(L3)
			CO3: .Explain the dual nature of matter, the electron behaviour & electrical conductivity in solids.(L3)
			CO4: Analyze the semiconductors components characteristics & different magnetic material and apply the idea in solving problem in parents' streams.(L4)
			CO5: Experiment with the principle of superconductivity & synthesis of nanomaterial's and their uses in modern technology.(L3)
I-II	15A03101	Engineering Drawing	CO1: : Understand the engineering graphics concepts.
			CO2: Develop the Scales: Plain, Diagonal and Vernier; Projection of Points
			CO3: Develop the Projection of Lines & Planes
			CO4: Understand and Developments of Solids and Projections of Solids
			CO5: Develop the Isometric and Orthographic Projections:
I-II	15A56102	Material Science and Engineering Lab	CO1: An ability to compute basic properties In Optics, which includes the Interference, diffraction phenomena, and dispersive power of a prism, will be clearly visualized.
			CO2: Understand the concept of error and its analysis..
			CO3: Electrical engineering student learn to measure the Magnetic field in between coils
			CO4: Apply the knowledge on characteristics of P-N junction diode (energy band gap) LASER diode
			CO5: Student will use oscilloscope and multimeter to construct a wide variety of Electrical circuits and measure the properties of those circuits.
I-II	15A99201	Engineering & IT	CO1: Disassemble and Assemble a Personal Computer and prepare the computer ready to use.

		Workshop	CO2: Prepare the Documents using Word processors
			CO3: Prepare Slide presentations using the presentation tool
			CO4: Interconnect two or more computers for information sharing
			CO5: 5.Access the Internet and Browse it to obtain the required information
			CO6: Install single or dual operating systems on computer
II-I	15A54301	Mathematics - III	CO1: Explain the concepts of matrices and its applications (L2).
			CO2: Solve algebraic & transcendental equations using appropriate numerical methods (L3).
			CO3: Analyze a problem using different interpolation formulae (L4).
			CO4: Construct various types of curves using different numerical techniques (L5).
			CO5: Find numerical solutions of ordinary differential equations (L1).
II-I	15A52301	Managerial Economics & Financial Analysis	CO1: Explain the scope of managerial economics and types of elasticity of demand and measurements of elasticity of demand.
			CO2: Understand the production and cost concepts - normal cost, variable cost and total cost.
			CO3: Explain about markets and new economic environment.
			CO4: Introduction to financial accounting with solutions.
			CO5: Capital and capital budgeting techniques.
II-I	15A01308	Mechanics of Solids	CO1: Determine different Stresses & Strains.
			CO2: Analyze shear force and bending moment of beams.
			CO3: Apply Bending equation on different sections.
			CO4: Analyze Torsion of circular shafts and deflection of beams.
			CO5: Evaluate the Circumferential stress of Thin & Thick cylinders.
II-I	15A03301	Engineering Drawing for Mechanical Engineers	Co1: Sections and Developments of Solids View of Right Regular Solids and True shapes of the sections and their development of Surfaces
			CO2: Develop the Isometric projection with Isometric views of Sectional Planes, and Sectional Solids, Objects.

			CO3: Understand the Conversion of Pictorial views
			CO4: Understand the Interpenetration of Right Regular Solids
			CO5: Develop the perspective projections
II-I	15A03302	Engineering Mechanics	CO1: Solve the engineering problems in case of equilibrium conditions
			CO2: Analyze the types of friction for moving bodies and problems related to friction
			CO3: Determine the Centroidal, Centre of Gravity and moment of inertia of various surfaces and solids
			CO4: Explain concepts and applications of kinematics and kinetics
			CO5: Apply the concepts of analysis of perfect frames and vibrations
II-I	15A03303	Thermodynamics	CO1: To know thermodynamic basic concepts, work and heat transfer.
			CO2: To know first law of thermodynamics and analyze study flow process.
			CO3: To learn second law of thermodynamics, heat engine, and irreversible heat engines and clausius theorem.
			CO4: To understand thermodynamic relations and properties of pure substances.
			CO5: To study properties of gases and gas power cycles.
II-I	15A01309	Mechanics of Solids Lab	CO1: Understand the basic concepts of stresses and strains.
			CO2: Produce shear force and bending moment diagrams for different types of beams.
			CO3: Explain the relationship between the bending stress and maximum bending moment.
			CO4: Solve the shear strength of the solid and hollow shafts which are subjected to torsion loading in power transmitting.
			CO5: Calculate shear stress distribution across various beams sections.
			CO6: Calculate different stresses and strains for the thin and thick cylinders.
II-I	15A03304	Computer Aided	CO1: Learn the Auto CAD SOFTWARE

		Drafting Lab	CO2: Modeling of component in 3D-V Block. CO3: Modeling of component in 3D-Open Bearing. CO4: Modeling of component in 3D-Dove tail bracket. CO5: Modeling of component in 3D-Dove tail bracket. CO6: Assembly of screw jack.
II-II	15A99301	Basic Electrical and Electronics Engineering	CO1: :Analyze The Basics Of Electrical Circuits, Network Theorems and Two Port Networks CO2: Understand The Basic Principle And Operation Of DC Generators & Motors, CO3: Understand The Basic Principle And Operation Of Transformers, Induction Motors And Alternator CO4: Study the Basic Introduction Of Semiconductor Devices CO5: Understand The Operation Of BJT & FET and OP-Amps
II-II	15A03401	Machine Drawing	CO1: Understand the basic concepts to analyze and Design and drafting new components by Machine Drawing. CO2: To make the students to apply the concepts of I.S. conventions in Machine Drawing. CO3: To make the students to understand and draw common machine elements and parts etc. CO4: Understand the need of Machine Drawing. CO5: Associate and draw Assembly Drawings Ability to Drawings of assembled views for the part drawings Engine parts
II-II	15A03402	Kinematics of Machines	CO1: Understand the types of Motions and Types of Mechanisms (exact & approximate). CO2: Analyze the Steering Mechanisms & Belt Drives . CO3: Understand the Motion analysis and construction analysis CO4: Understand the Gear Mechanisms and its Point of contact. CO5: Understand the how to draw cams in various motions.
II-II	15A03403	Thermal	CO1: Explain about the working of CI,SI

		Engineering – 1	<p>engines and 4&amp;2-stroke engines and valve and port timing diagrams along with the determination of engine performance fundamentals.</p> <p>CO2: Understand the fuel supply systems for SI&amp; CI engines and also the various engine systems such as ignition, cooling, lubrication, etc.</p> <p>CO3: Understand the difference between CI and SI engines combustion along with the different combustion chambers used for SI and CI engines.</p> <p>CO4: Determine the performance parameters of the engines and to draw the Heat balance sheet.</p> <p>CO5: Explain various types of air compressors with various staging and the performance of the compressors</p>
II-II	15A03404	Manufacturing Technology	<p>CO1: To understand how manufacturers use technology to change raw materials into finished products.</p> <p>CO2: To introduce the basic concepts of casting, pattern preparation, gating system</p> <p>CO3: Knowledge on basic features of various welding and cutting processes</p> <p>CO4: Also to study the concepts of surface treatment process, their characteristics and applications</p> <p>CO5: To understand the various surface treatment processes.</p>
II-II	15A03405	Thermal Engineering Laboratory	<p>CO1: Understand and performance on Valve / Port Timing Diagrams of an I.C. Engines of 4 -Stroke engines, 2-Stroke engines.</p> <p>CO2: Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Engine . Retardation and motoring test on 4- stroke engine</p> <p>CO3: Heat Balance of an I.C. Engine. Air/Fuel Ratio and Volumetric Efficiency of an I.C. Engines.</p> <p>CO4: To Performance Test on Variable Compression Ratio Engines, economical speed test.</p> <p>CO5: To Performance Test on Reciprocating Air – Compressor Unit.</p>
II-II	15A03406	Manufacturing	CO1: Describe effects of the properties of green

		Technology Laboratory	<p>sand Grain size, clay content, moisture content, compressive strength, shear strength, ramming effect, permeability, etc</p> <p>CO2: Define application of different types of welding processes and feasibility of that process in individual work.</p> <p>CO3: Investigate and develop a methodology and establish a manufacturing sequence to fabricate engineering components.</p> <p>CO4: List different operations in sheet metal like shearing, deep drawing and design methods for reducing operation cost, production cost, time, wastage, by using compound dies and use of simple die progressive die, and transfer die and clearance between die and punch used in sheet metal industries</p> <p>CO5: Different operations in Moulding Process</p>
III-I	15A01510	Fluid Mechanics and Hydraulic Machines	<p>CO1: Understand the Fluid properties, pressure measurement manometers and types of flows.</p> <p>CO2: Explain the continuity equation in two dimensional flow and moment of principle</p> <p>CO3: Summarize different types of losses in pipes, discharge through venturimeter and orifice meter</p> <p>CO4: Analyze the force exerted by a jet of water on different types of plate.</p> <p>CO5: Draw and working principle of a hydraulic turbines and pumps.</p>
III-I	15A03501	Thermal Engineering - II	<p>CO1: To analyze the various power generation vapor cycle.</p> <p>CO2: Understand the types of boilers and accessories and mountings.</p> <p>CO3: Distinguish the idea flow and actual flow through the design of nozzles.</p> <p>CO4: Analyzing the impulse and reaction turbine.</p> <p>CO5: To know the types of jet propulsions and gas turbines.</p>
III-I	15A03502	Dynamics of Machinery	<p>CO1: Understand the basic concepts of friction, pivot, collar and different types of brakes</p> <p>CO2: Gain knowledge about the gyroscopic couple and its application in ship, aero plane, two wheeler and four wheeler.</p> <p>CO3: Penetrate the basic concept of governor and also apply their usage to regulate the mean speed of the engine.</p>



			CO4: Gain knowledge about why balancing is needed in mechanisms of rotating and reciprocating parts.
			CO5: Remember the basic concepts regarding the vibrations, why we use isolation materials, and the applications of torsionally equivalent shaft.
III-I	15A03503	Machine Tools	CO1: Understand the principles involved in the fundamentals of machining processes and machine tools.
			CO2: To develop knowledge and importance of metal cutting parameters, tool materials
			CO3: To develop knowledge and importance of metal cutting parameters, tool materials
			CO4: Interpret apply knowledge of basic mathematics to calculate the machining parameters for different machining processes
			CO5: Discuss acquires knowledge on advanced Manufacturing processes.
III-I	15A03504	Design of Machine Members - I	CO1: Apply Design procedures using theories of failure for different elements
			CO2: Design simple components under cyclic loading using Goodman's and Soderberg's criterions.
			CO3: Design riveted joints with different configuration, boiler shell joint design and eccentric loading design of riveted joints. Further students are able to design bolted joints with direct loading and eccentric loading.
			CO4: Design cotter joint, knuckle joint and shafts
			CO5: Design various rigid and flexible shaft couplings.
III-I MOOCS -I	15A03505	Entrepreneurship	CO1: To know who is an Entrepreneur, his Traits, ethics & social responsibilities and will come to know how to create & start a new venture
			CO2: Understand what a business plan is & come to know how to write a business plan.
			CO3: Understand how to finance & manage a new venture.
			CO4: Will come to know venture expansion strategies & will able how to choose Plant
			CO5: Understand Production & Marketing management in the venture
III-I	15A01511	Fluid Mechanics and Hydraulic	CO1: To Determine Coefficient of discharge of venture and orifice meters.

		Machines Laboratory	CO2: Find out and identify The efficiency and type of turbines
			CO3: understand the performance of various Turbines.
			CO4: To Analyze the head loss due to friction and sudden contraction, sudden enlargement, obstacles etc.
			CO5: To determine forces work done and efficiency and of fixed flat vertical, inclined, curved plates and moving flat vertical, inclined and curved plates.
III-I	15A03508	Machine Tools Laboratory	CO1: Understand the knowledge of the fundamental techniques of metal cutting and dimensional measurements.
			CO2: Understand the knowledge of the mechanism of chip formation
			CO3: To estimate the forces involved and power required during metal cutting.
			CO4: Able to design and conduct experiments as well as to analyze and interpret the metal cutting processes of manufacturing engineering component.
			CO5: Understand the knowledge of the fundamental techniques of different machines like Lathe, shaping, Slotting, Planning, drilling, milling, Grinding, Lapping, Honing and Broaching machines. Able to understand design of Jigs and fixtures.
III-III	15A03601	Operations Research	CO1: Create LPP Problems and solve by using Graphical method and simplex method.
			CO2: Implement the Theory of duality and solving procedure for Transportation and Assignment problems.
			CO3: Knowledge of choosing the best strategy out of the available strategies.
			CO4: Probabilities of completing projects as per schedule etc by applying the CPM or PERT technique as per the suitability.
			CO5: Applying the DPP technique to solve the complex problems by breaking them into a series of sub problems.
III-II	15A03602	Design of Machine Members – II	CO1: To aware the student about basic concepts of curved beams with different cross sections, design of power transmission elements
			CO2: To understand the design concepts of various types of springs and power screws
			CO3: To understand the design concepts of various types of bearings
			CO4: To understand the design concepts of spur and helical gear

			CO5: To know the students how to apply design concepts in designing of IC engine parts like Piston, cylinder, connecting rod and crank shaft
III-II	15A03603	Heat Transfer	CO1: To analyse the concepts of heat transfer and different modes of heat transfer
			CO2: To understand the concept of extended surfaces and convection heat transfer
			CO3: To understand the concept of heat exchangers
			CO4: To calculate heat flux and analyze the various stages of boiling
			CO5: To understand the concept of irradiative heat transfer between black bodies and grey bodies
III-II	15A03604	Finite Element Method	CO1: Understand the principles involved in discretization in finite element Approach
			CO2: Analyze to the form stiffness matrices and force vectors for simple elements.
			CO3: Utilize the various elements for discretization and learn about shape function
			CO4: Interpret the application of FEM to various structural problems incorporating temperature.
			CO5: Discuss boundary conditions and heat transfer problems.
III-II	15A03605	Metal forming Process	CO1: Understand the basic concepts of one, two and three dimensional stress analysis, theory of plasticity, strain hardening, hot and cold working process
			CO2: Understand the principles of rolling and forging processes, their applications and defects.
			CO3: Understand the fundamentals of extrusion process and wire drawing processes and their industrial applications.
			CO4: Understand the various press working processes, their advantages and disadvantages.
			CO5: Understand the concept of plastic manufacturing process, rapid manufacturing process and its applications.
III-II- CBCC-I	15A03606	Non Conventional Source of Energy	CO1: Student can differentiate new and renewable source, Environmental impact of solar power extraterrestrial and terrestrial solar radiation.
			CO2: Student can outline the Flat plate and concentrating collectors, and their classification.
			CO3: Student will be able to explain Sensible,

			latent heat, solar ponds and Solar Applications.
			CO4: Student will understand the Sources and potentials, horizontal and vertical axis windmills, performance characteristics, geothermal energy Resources
			CO5: Student can recognize the Need of DEC, principles of DEC, Tidal and wave energy.
III-II	15A03609	Heat Transfer Laboratory	CO1: Students will analyse the concepts of heat transfer and different modes of heat transfer
			CO2: Student can understand the concept of extended surfaces and convection heat transfer
			CO3: Students can understand the concept of heat exchangers
			CO4: student will be able to calculate heat flux and analyze the various stages of boiling
			CO5: student can understand the concept of radiative heat transfer between black bodies and grey bodies
III-II	15A03610	Computer Aided Engineering Laboratory	CO1: Analyze the bracket plate with axial loading
			CO2: Analyze the structure of a truss member under loading.
			CO3: Analyze the prismatic bars and beams.
			CO4: Analyze the square plate considering conduction and convection
			CO5: Analyze the air flow over a simple geometry (aerofoil) in a wind tunnel (2-D).
III-II	15A52602	Advanced English Language Communication Skills (AELCS) Laboratory (Audit Course)	CO1: Understand basics of communication in social and professional circles.
			CO2: : Become active participant in learning process
			CO3: Acquire proficiency in spoken English.
			CO4: Speak with clarity and confidence there by enhance employability skills
IV-I	15A52601	Management Science	CO1: Understand the core concept of Management science.
			CO2: Students are able to know principals and applications of management in production and management science.
			CO3: To take efficient and effective management decisions in human resources.
			CO4: To develop strategy at the corporate, business and functional levels by defining the objectives, goals, mission and vision.
			CO5: To know importance of management science in present day scenario.

IV-I	15A03701	Automobile Engineering	CO1: Explain briefly the components of automobile and its functioning
			CO2: Explain the various techniques to improve the efficiency of an engine, Using of different filters& pumps.
			CO3: Explain each and every component of transmission system and its functioning.
			CO4: Explain the types of steering mechanism & steering gears, and its applications and describe the types of braking and suspension systems, and its applications.
			CO5: Describe the emission standards, its controlling techniques & elements in Electrical system
IV-I	15A03702	CAD/CAM	CO1: Understand the basic concepts of input and output components of CAD.
			CO2: Distinguish different modeling techniques in CAD technology .Generate basic numerically controlled (NC) and computerized
			CO3: numerically controlled (CNC) programs to manufacture various engineering components.
			CO4: Understand the need of GT, FMS and CAQC.
			CO5: To select the type of computer Aided Processes Planning.
IV-I	15A03703	Metrology and Measurements	CO1: After completions of these unit students are able to understand the Limits, Fits and Tolerances. Indian standard system – International Standard organization system. And also working of comparators.
			CO2: After completions of these unit students are able to understand the principles of working of the most commonly used instruments for measuring linear and angular distances.
			CO3: After completion of this unit students are able to understand, surface roughness measuring methods, Screw thread elements and measuring methods, Gear tooth profile measurement, CMM, Alignment tests on lathe, milling and drilling machine tools.
			CO4: After completion of this unit students are able to understand working of various instruments used for measuring for displacement, temperature and pressure.
			CO5: After completion of this unit students are able to understand working of various instruments used for measuring for flow, speed, stress, strain and Vibration.
IV-I CBCC-II	15A03704	Refrigeration and	CO1: Understand Basic concepts - System of Refrigeration & air conditioning and its

		Air – Conditioning	Application CO2: Identify Different Types of Refrigeration & Air conditioning CO3: Describes the vapour compression systems & vapour absorption systems. Its working as well as industrial applications CO4: Analysis Air conditioning ,study of psychometric charts solving the exercises CO5: Analysis of Perfect Air conditioning equipments & its applications to know principles working of heat pumps ,its types & applications
IV-I CBCC-III	15A03709	Production & Operations Management	CO1: Students will be able to compose a new material that will have some desirable properties. CO2: Students will be able to construct the equilibrium diagrams and learn all types of equilibrium diagrams. CO3: Students will be able to learn the structures and properties of all cast irons, steels and Non-ferrous metal alloys of copper, Al and Titanium CO4: Students will be able to learn the methods of different heat treatments . CO5: students can explain the importance of composite materials
IV-I	15A03710	CAD/ CAM Laboratory	CO1: Create a 3D model of Open bearing. CO2: Create a 3D model of Dovetail bracket. CO3: Create an assembly of Stuffing box. CO4: Create an assembly of Square tool post. CO5: Create a CNC Part programming for CNC Lathe and CNC Milling machines.
IV-I	15A03711	Metrology and Measurements Laboratory	CO1: Learn the method of measuring internal bores, Do Alignment tests on different machines and Working principle of Toolmakers microscope CO2: Measuring techniques of the angular deviations, pitch diameters and Surface Roughness. CO3: Know flatness measurement and calibration procedure for pressure, temperature. CO4: Learn the calibration method for LVDT, Capacitive and Magnetic pickups transducer. CO5: Understand the calibration principles for Rota meter, Seismic pickups and McLeod gauges
IV-II	15A03801	Industrial	CO1: Understand the Management Concept

MOOCS-II		Engineering	<p>and various types of organizations</p> <p>CO2: Design and working of various plant layouts</p> <p>CO3: To analyze the work study and micro motions in industry.</p> <p>CO4: Summarize the stores and inventory control techniques.</p> <p>CO5: Explain the quality control tools and charts</p>
IV-II MOOCS-III		Power Plant Engineering	<p>CO1: Students can explain the boilers, concept of fluidized bed combustion ,fuel handling</p> <p>CO2: Student can demonstrate concepts of diesel power plant, IC Engines</p> <p>CO3: Student can describe concepts of gas turbine plants,open and closed cycle gas turbines</p> <p>CO4: Student can able to understand the power generation through solar energy, wind energy, MHD and Nuclear energy.</p> <p>CO5: Student can able to estimate the economics of power distribution, Power Tariff, Load Factor and other related terms.</p>