Department Of Mechanical Engineering
Course Outcomes(R19)

Year & Sem	Course Code	Course Name	After completion of the course, the student will be able to
I-I	19A54101	Algebra and Calculus	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
			Utilize mean value theorems to real life problems (L3)
			familiarize with functions of several variables which is useful in optimization (L3)
			Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
			Students will become familiar with 3-dimensional coordinate systems and also learn the utilization of special functions
I-I	19A51101T	Engineering Chemistry	**demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
			explain the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
			explain calorific values, octane number, refining of petroleum and cracking of oils (L2)
			explain the setting and hardening of cement and concrete phase (L2)
			summarize the application of SEM, TEM and X-ray diffraction in surface characterization (L2)
I-I	19A05101T	Problem Solving & Programming	1. Construct his own computer using parts (L6).
			2. Recognize the importance of programming language independent constructs (L2)
			3. Solve computational problems (L3)
			4. Select the features of C language appropriate for solving a problem (L4)

			5. Design computer programs for real world problems (L6)
			6. Organize the data which is more appropriated for solving a problem (L6)
I-I	19A03102	Engineering Graphics Lab	draw various curves applied in engineering. (L2)
			show projections of solids and sections graphically. (L2)
			draw the development of surfaces of solids. (L3)
			use computers as a drafting tool. (L2)
			draw isometric and orthographic drawings using CAD packages. (L3)
I-I	19A03101	Engineering Workshop	1. Apply wood working skills in real world applications. (L3)
			2. Build different parts with metal sheets in real world applications. (L3)
			3. Apply fitting operations in various applications. (L3)
			4. Apply different types of basic electric circuit connections. (L3)
			5. Demonstrate soldering and brazing. (L2)
I-I	19A51101P	Engineering Chemistry Lab	**determine** the cell constant and conductance of solutions (L3)
			prepare advanced polymer materials (L2)
			determine the physical properties like surface tension, adsorption and viscosity (L3)
			estimate the Iron and Calcium in cement (L3)
			calculate the hardness of water (L4)
I-I	19A05101P	Problem Solving & Programming Lab	1. Construct a Computer given its parts (L6)
			2. Select the right control structure for solving the problem (L6)
			3. Analyze different sorting algorithms (L4)
			4. Design solutions for computational problems (L6)
			5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.
I-II	19A02201T	Basic Electrical & Electronics Engineering	Apply concepts of KVL/KCL in solving DC circuits (L3)
			Choose correct rating of a transformer for a specific application (L5)
			Illustrate working principles of induction

			motor - DC Motor (L3)
			Identify type of electrical machine based on their operation. (L1)
			Describe working principles of protection devices used in electrical circuits. (L2)
I-II	19A54201	Differential Equations and Vector Calculus	solve the differential equations related to various engineering fields (L6)
			Identify solution methods for partial differential equations that model physical processes (L3)
			interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
			estimate the work done against a field, circulation and flux using vector calculus (L6)
I-II	19A56102T	Engineering Physics	**explain** physics applied to solve engineering problems (L2)
			apply the principles of acoustics in designing of buildings (L3)
			explains the applications of ultrasonics in various engineering fields (L2)
			apply electromagnetic wave propagation in different Optical Fibers (L2)
			Apply the lasers concepts in various applications (L3)
			Explains the concepts of dielectric and magnetic materials (L2)
			identify the sensors for various engineering applications (L3)
I-II	19A05201T	Data Structures	1. Select Appropriate Data Structure for solving a real world problem (L4)
			2. Select appropriate file organization technique depending on the processing to be done (L4)
			3. Construct Indexes for Databases (L6)
			4. Analyse the Algorithms (L4)
			5. Develop Algorithm for Sorting large files of data (L3)
I-II	19A52101T	Communicative English 1	take notes while listening to a talk/lecture and make use of them to answer questions
			make formal oral presentations using effective strategies
			comprehend, discuss and respond to academic texts orally and in writing
			produce a well-organized essay with

			adequate support and detail
			edit short texts by correcting common errors
I-II	19A52101P	Communicative English 1 Lab	CO1: To remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
			CO2: To apply communication skills through various language learning activities
			CO3: To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
			CO4: To evaluate and exhibit acceptable etiquette essential in social and professional settings
			CO5: To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
I-II	19A03201	Mechanical Engineering Workshop	make moulds for sand casting. (L3)
			develop different weld joints. (L3)
			assemble or disassemble of machine components. (L3)
			make plastic components. (L3)
			use power tools for different applications. (L3)
			Assemble computer and installation of software (L3)
I-II	19A02201P	Basic Electrical & Electronics Engineering Lab	Verify Kirchoff's Laws & Superposition theorem.
			2. Perform testing on AC and DC Machines.
			3. Study I – V Characteristics of PV Cell
			Describe construction, working and characteristics of diodes, transistors and operational amplifiers (L2)
			Demonstrate how electronic devices are used for applications such as rectification, switching and amplification (L2)
			Build different building blocks in digital electronics using logic gates (L3)
			Explain functionality of flip-flops, shift registers and counters for data processing applications (L2)
			Explain functioning of various communication systems (L2)

I-II	19A56102P	Engineering Physics Lab	**Operate** various optical instruments (L2)
			Estimate wavelength of laser and particles size using laser(L2)
			estimate the susceptibility and related magnetic parameters of magnetic materials (L2)
			plot the intensity of the magnetic field of circular coil carrying current with distance (L3)
			evaluate the acceptance angle of an optical fiber and numerical aperture (L3)
			determine magnetic susceptibility of the material and its losses by B-H curve (L3)
			identify the type of semiconductor i.e., n-type or p-type using hall effect (L3)
			Apply the concepts
I-II	19A05201P	Data Structures Lab	Select the data structure appropriate for solving the problem (L5)
			2. Implement searching and sorting algorithms (L3)
			3. Design new data types (L6)
			4. Illustrate the working of stack and queue (L4)
			5. Organize the data in the form of files (L6)
II-I	19A54301	Complex Variables, Transforms and PDE	Understand the analyticity of complex functions and conformal mappings.
			Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
			Understand the usage of Laplace Transforms.
			Evaluate the Fourier series expansion of periodic functions.
			Formulate/solve/classify the solutions of Partial differential equations and also find the solution of one dimensional wave equation and heat equation.
II-I	19A05304T	Python Programming	Apply the features of Python language in various real applications.
			2. Select appropriate data structure of Python for solving a problem.
			3. Design object oriented programs using Python for solving real-world problems.
			4. Apply modularity to programs.
II-I	19A03301T	Manufacturing Processes	Demonstrate different metal casting processes and gating systems. (L2)

			Classify working of various welding processes. (L2)
			Evaluate the forces and power requirements in rolling process. (L5)
			Apply the principles of various forging operations. (L3)
			Outline the manufacturing methods of plastics, ceramics and powder metallurgy. (L1)
			Identify different unconventional processes and their applications. (L3)
II-I	19A03302	Engineering Mechanics	Resolve forces and couples in mechanical systems. (L3)
			Identify the frictional forces and its influence on equilibrium. (L3)
			Find the centre of gravity and moment of inertia for various geometric shapes (L3)
			Develop equations for different motions. (L4)
			Determine the displacement, velocity and acceleration relations in dynamic systems (L4)
			Relate the impulse and momentum (L4
II-I	19A03303T	Material Science and Engineering	Explain the principles of binary phases. (L2)
			Select steels and cast irons for a given application. (L3)
			Apply heat treatment to different applications. (L3)
			Utilize nonferrous metals and alloys in engineering. (L3)
			Choose composites for various applications. (L3)
			Assess the properties of nano-scale materials and their applications. (L2)
II-I	19A99303T	Design Thinking & Product Innovation	summarize the importance of basic sciences in product development (L2)
			explain the historical developments in mechanical, electrical, communications and computational engineering (L3)
			apply systematic approach to innovative designs (L3)
			identify new materials and manufacturing methods in design (L3)
II-I	19A99303P	Design Thinking & Product Innovation Lab	To develop 3D models using 3D printing
			To design the system with measuring devices
			Design hydraulic / pneumatic circuits
II-I	19A03301P	Manufacturing Processes Lab	Fabricate different types of components using various manufacturing techniques. (L6)

			Adapt unconventional manufacturing methods. (L6)
II-I	19A03303P	Material Science and Engineering Lab	Identify various microstructures of ferrous and non-ferrous metals and alloys. (L3)
			Visualize grains and grain boundaries. (L3)
			Importance of hardening of steels. (L2)
			Evaluate hardness of treated and untreated steels. (L4)
II-I	19A99301	Environmental Sciences	Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
			Understand flow and bio-geo- chemical cycles and ecological pyramids.
			Understand various causes of pollution and solid waste management and related preventive measures.
			About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
			Casus of population explosion, value education and welfare programmes.
II-II	19A54304	Numerical Methods and Probability	Apply numerical methods to solve algebraic and transcendental equations
			Derive interpolating polynomials using interpolation formulae
			Solve differential and integral equations numerically
			Apply Probability theory to find the chances of happening of events.
			Understand various probability distributions and calculate their statistical constants
II-II	19A03401	Thermodynamics	Explain the importance of thermodynamic properties related to conversion of heat energy into work. (L3)
			Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles. (L3)
			Utilize steam properties to design steam based components. (L4)
			Compare thermodynamic relations and air standard cycles. (L4)
II-II	19A03402T	Mechanics of Materials	Apply the concepts of stress and strain to machine numbers. (L3)
			Determine, shear forces, and bending moments in beams. (L4)
			Find the slope and deflection in beams.(L4)

			Estimate the stress in machine members such as shafts and springs.(L4)
			Apply Castigliano's theorem to determine displacements in beams. (L3)
			Analyse columns for buckling loads.(L4)
			Estimate the stresses in thin cylinders due to internal pressure.(L3)
II-II	19A01407	Fluid Mechanics and Hydraulic Machinery	Understand characteristics of laminar and turbulent flows.
			Understand the energy losses in different types of pipes.
			Identify the performance of different types of turbines
			Identify the performance of centrifugal pumps.
II-II	19A03403	Kinematics of Machinery	An understanding of concepts of different of mechanism with lower pairs and higher pairs.
			Gain the knowledge of different types of straight line motion mechanism and steering gear mechanisms.
			Obtain an in depth knowledge of finding displacement, velocity and acceleration of
			different points on different mechanisms using different methods(relative velocity,Instantaneous methods).
			Acquire the knowledge on different gear profiles and calculating the different parameters of gears.
			Gain the knowledge in designing of gear trains for the required purpose.
			Design and analyze different cam profile for different types of followers.
II-II	19A03404	Computer Aided Machine Drawing	Demonstrate the conventional representations of materials and machine components.
			Model riveted, welded and key joints using CAD system.
			Create solid models and sectional views of machine components.
			Generate solid models of machine parts and assemble them.
			Translate 3D assemblies into 2D drawings.
			Create manufacturing drawing with dimensional and geometric tolerances
II-II	19A03402P	Mechanics of Materials Lab	Understand the stress-strain behaviour of different materials.
			Identify the difference between compression and tension testing.

			Evaluate the hardness of different materials.
			Correlate the elastic constants of the materials.
			Explain the relation between elastic constants and hardness of materials.
II-II	19A99302	Biology For Engineers	Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
			Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
			Briefly about human physiology.
			Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
			Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals
III-I	19A03501T	Applied Thermodynamics	Explain working of IC engines with combustion process. (L2)
			Select compressors for different applications. (L1)
			Use T-s diagram in vapour power and gas power cycles. (L3)
			Explain the basic principles of steam turbines. (L2)
			Select appropriate refrigerant for different applications. (L1)
III-I	**19A03502T**	MANUFACTURING TECHNOLOGY	Choose cutting processes and variables. (l3)
			Relate tool wear and tool life. (l1)
			Calculate the machining parameters for different machining processes. (l5)
			Identify methods to generate different types of surfaces. (l3)
			Explain work-holding requirements. (l2)
			Design jigs and fixtures. (l6)
III-I	19A03503T)	HEAT TRANSFER	Apply the concepts of different modes of heat transfer. (l3)
			Apply knowledge of conduction heat transfer in the design of insulation of furnaces and pipes. (l3)

			Analyse free and forced convection phenomena in external and internal flows. (l4)
			Design of thermal shields using the concepts of black body and non-black body radiation. (l5)
			Apply the basics of mass transfer for applications in diffusion of gases. (l3)
III-I	19A03505	Dynamics of Machinery	Understand the effect of reactive gyroscopic couple on the stability of vehicles
			Understand the power lost and power transmitted due to friction
			Identify and correct the unbalances of rotating body
			Reduce the magnitude of vibration and isolate vibration of dynamic systems
			Determine dimensions of Governors for speed control.
III-I	19A03504a	Automobile Engineering	Identify different parts of automobile.(l3)
			Explain the working of various parts like engine, transmission, clutch, brakes.(l2)
			Describe the working of steering and the suspension systems. (l2)
			Summarize the environmental implications of automobile emissions.(l2)
			Outline the future developments in the automobile industry.(l2)
III-I	19A52506a	Technical Communication and Presentation Skills	Understand the importance of effective technical communication
			Apply the knowledge of basic skills to become good orators
			Analyze non-verbal language suitable to different situations in professional life
			Evaluate different kinds of methods used for effective presentations
III-I	19A03501P	Applied Thermodynamics Lab	Explain different working cycles of engine
			Describe various types of combustion chambers in ic engines

			Illustrate the working of refrigeration and air conditioning systems
			Evaluate heat balance sheet of ic engine.
III-I	19A03502P	Manufacturing Technology Lab	Explain the concept of machining with various machine tools.
			Get hands on experience on various machine tools and machining operations.
III-I	19A03403P	Fluid Mechanics & Hydraulic Machinery Lab	The various flow properties using various flow measuring devices
			The performance of various turbines and pumps
III-I	19A99501)	CONSTITUTION OF INDIA	Understand historical background of the constitution making and its importance for building a democratic India.
			Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
			Understand the value of the fundamental rights and duties for becoming good citizen of India.
			Analyze the decentralization of power between central, state and local self-government
			Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy