



**MAR ATHANASIOUS COLLEGE OF ENGINEERING
KOTHAMANGALAM**

MECHANICAL ENGINEERING DEPARTMENT

LIST OF COURSE OUTCOME

B.TECH 2019 SCHEME

SEMESTER	SUBJECT CODE	SUBJECT NAME	CO NO:	CO DESCRIPTION
S1	MAT 101	LINEAR ALGEBRA AND CALCULUS	1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			2	Compute the partial and total derivatives and maxima and minima of multivariable functions
			3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
			4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
			5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
S1	PHT 110	ENGINEERING PHYSICS B (FOR NON-CIRCUIT BRANCHES)	1	Compute the quantitative aspects of waves and oscillations in engineering systems.
			2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
			3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
			4	Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to

				provide a safe and healthy environment
			5	Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications
S1	EST 110	ENGINEERING GRAPHICS	1	Draw the projection of points and lines located in different quadrants
			2	Prepare multiview orthographic projections of objects by visualizing them in different positions
			3	Draw sectional views and develop surfaces of a given object
			4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions
			5	Convert 3D views to orthographic views
			6	Obtain multiview projections and solid models of objects using CAD tools
S1	EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
			2	Develop and solve models of magnetic circuits
			3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
			4	Describe working of a voltage amplifier
			5	Outline the principle of an electronic instrumentation system
			6	Explain the principle of radio and cellular communication
S1	HUN 101	LIFE SKILLS	1	Define and Identify different life skills required in personal and professional life
			2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
			3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
			4	Take part in group discussions

			5	Use appropriate thinking and problem solving techniques to solve new problems
			6	Understand the basics of teamwork and leadership
S1	PHL 120	ENGINEERING PHYSICS LAB	1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
			2	Understand the need for precise measurement practices for data recording
			3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
			4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
			5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results
S1	ESL 130	ELECTRICAL & ELECTRONICS WORKSHOP	1	Demonstrate safety measures against electric shocks.
			2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
			3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
			4	Identify and test various electronic components
			5	Draw circuit schematics with EDA tools
			6	Assemble and test electronic circuits on boards and fabricate single sided PCB
S2	CYT 100	ENGINEERING CHEMISTRY	1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.

			2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
			3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.
			4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
			5	Study various types of water treatment methods to develop skills for treating wastewater.

S2	EST 100	ENGINEERING MECHANICS	1	Recall principles and theorems related to rigid body mechanics
			2	Identify and describe the components of system of forces acting on the rigid body
			3	Apply the conditions of equilibrium to various practical problems involving different force system.
			4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
			5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses

S2	EST 120	BASICS OF CIVIL & MECHANICAL ENGINEERING	1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
			2	Explain different types of buildings, building components, building materials and building construction
			3	Describe the importance, objectives and principles of surveying.
			4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps

			5	Discuss the Materials, energy systems, water management and environment for green buildings.
			6	Analyse thermodynamic cycles and calculate its efficiency
			7	Illustrate the working and features of IC Engines
			8	Explain the basic principles of Refrigeration and Air Conditioning
			9	Describe the working of hydraulic machines
			10	Explain the working of power transmission elements
			11	Describe the basic manufacturing, metal joining and machining processes

S2	CYL 120	ENGINEERING CHEMISTRY LAB	1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
			2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
			3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
			4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
			5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
			6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum

S2	ESL 120	CIVIL & MECHANICAL WORKSHOP	1	Name different devices and tools used for civil engineering measurements
			2	Explain the use of various tools and devices for various field measurements
			3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
			4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
			5	Compare different techniques and devices used in civil engineering measurements
			6	Identify Basic Mechanical workshop operations in accordance with the material and objects
			7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
			8	Apply appropriate safety measures with respect to the mechanical workshop trades
S2	MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	1	Compute the derivatives and line integrals of vector functions and learn their applications
			2	Evaluate surface and volume integrals and learn their inter-relations and applications.
			3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
			4	Compute Laplace transform and apply them to solve odes arising in engineering
			5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering
S2	HUN 102	PROFESSIONAL COMMUNICATION	1	Develop vocabulary and language skills relevant to engineering as a profession

			2	Analyze, interpret and effectively summarize a variety of textual content
			3	Create effective technical presentations
			4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
			5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
			6	Create professional and technical documents that are clear and adhering to all the necessary conventions
S2	EST 102	PROGRAMING IN C	1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
			2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
			3	Write readable C programs with arrays, structure or union for storing the data to be processed
			4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
			5	Write readable C programs which use pointers for array processing and parameter passing
			6	Develop readable C programs with files for reading input and storing output
S3	MAT 201	Partial differential equation and complex analysis	1	Understand the concept and the solution of partial differential equation
			2	Analyse and solve one dimensional wave equation and heat equation.
			3	Understand complex functions, its continuity differentiability with the use of cauchyriemann equations
			4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's

				integral formula, understand the series expansion of analytic function
			5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals.
S3	MET 201	MECHANICS OF SOLIDS	1	Determine the stresses, strains and displacements of structures by tensorial and graphical (Mohr's circle) approaches
			2	Analyse the strength of materials using stress-strain relationships for structural and thermal loading
			3	Perform basic design of shafts subjected to torsional loading and analyse beams subjected to bending moments
			4	Determine the deformation of structures subjected to various loading conditions using strain energy methods
			5	Analyse column buckling and appreciate the theories of failures and its relevance in engineering design
S3	MET 203	MECHANICS OF FLUIDS	1	Define Properties of Fluids and Solve hydrostatic problems
			2	Explain fluid kinematics and Classify fluid flows
			3	Interpret Euler and Navier-Stokes equations and Solve problems using Bernoulli's equation
			4	Evaluate energy losses in pipes and sketch energy gradient lines
			5	Explain the concept of boundary layer and its applications
			6	Use dimensional Analysis for model studies
S3	MET 205	METALLURGY & MATERIAL SCIENCE	1	Understand the basic chemical bonds, crystal structures (BCC, FCC, and HCP), and their relationship with the properties

			2	Analyze the microstructure of metallic materials using phase diagrams and modify the microstructure and properties using different heat treatments.
			3	How to quantify mechanical integrity and failure in materials.
			4	Apply the basic principles of ferrous and non-ferrous metallurgy for selecting materials for specific applications
			5	Define and differentiate engineering materials on the basis of structure and properties for engineering applications.
S3	MEL201	COMPUTER AIDED MACHINE DRAWING	1	Apply the knowledge of engineering drawings and standards to prepare standard dimensioned drawings of machine parts and other engineering components.
			2	Prepare standard assembly drawings of machine components and valves using part drawings and bill of materials.
			3	Apply limits and tolerances to components and choose appropriate fits for given assemblies
			4	Interpret the symbols of welded, machining and surface roughness on the component drawings.
			5	Prepare part and assembly drawings and Bill of Materials of machine components and valves using CAD software.
S3	MEL203	MATERIALS TESTING LAB	1	To understand the basic concepts of analysis of circular shafts subjected to torsion.
			2	To understand the behaviour of engineering component subjected to cyclic loading and failure concepts
			3	Evaluate the strength of ductile and brittle materials subjected to compressive, Tensile shear and bending forces

			4	Evaluate the microstructural morphology of ductile or brittle materials and its fracture modes (ductile /brittle fracture) during tension test
			5	To specify suitable material for applications in the field of design and manufacturing.
S3	HUT 200	Professional ethics	1	Understand the core values that shape the ethical behaviour of a professional
			2	Adopt a good character and follow an ethical life.
			3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
			4	Solve moral and ethical problems through exploration and assessment by established experiments.
			5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
			6	
S4	MAT202	PROBABILITY , STATISTICS AND NUMERICAL METHODS	1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.
			2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena.
			3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
			4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques
			5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.
			6	
S4	MET 202	ENGINEERING THERMODYNAMICS	1	Understand basic concepts and laws of thermodynamics

			2	Conduct first law analysis of open and closed systems
			3	Determine entropy and availability changes associated with different processes
			4	Understand the application and limitations of different equations of state
			5	Determine change in properties of pure substances during phase change processes
			6	Evaluate properties of ideal gas mixtures
S4	MET 204	MANUFACTURING PROCESS	1	Illustrate the basic principles of foundry practices and special casting processes, their advantages, limitations and applications.
			2	Categorize welding processes according to welding principle and material.
			3	Understand requirements to achieve sound welded joint while welding different similar and dissimilar engineering materials.
			4	Student will estimate the working loads for pressing, forging, wire drawing etc. Processes
			5	Recommend appropriate part manufacturing processes when provided a set of functional requirements and product development constraints.
S4	MET 206	FLUID MACHINERY	1	Explain the characteristics of centrifugal and reciprocating pumps
			2	Calculate forces and work done by a jet on fixed or moving plate and curved plates
			3	Explain the working of turbines and Select a turbine for specific application.
			4	Analyse the working of air compressors and Select the suitable one based on application.
			5	Analyse gas turbines and Identify the improvements in basic gas turbine cycles.
			6	Explain the characteristics of centrifugal and reciprocating pumps

S4	MEL 202	FM & HM LAB	1	Determine the coefficient of discharge of flow measuring devices (notches, orifice meter and Venturi meter)
			2	Calibrate flow measuring devices (notches, orifice meter and Venturi meter)
			3	Evaluate the losses in pipes
			4	Determine the metacentric height and stability of floating bodies
			5	Determine the efficiency and plot the characteristic curves of different types of pumps and turbines
S4	MEL 204	MACHINE TOOLS LAB- I	1	The students can operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality.
			2	Apply cutting mechanics to metal machining based on cutting force and power consumption.
			3	Select appropriate machining processes and process parameters for different metals.
			4	Fabricate and assemble various metal components by welding and students will be able to visually examine their work and that of others for discontinuities and defects.
			5	Infer the changes in properties of steel on annealing, normalizing, hardening and tempering.
S4	MCN 202	CONSTITUTION OF INDIA	1	Explain the background of the present constitution of India and features.
			2	Utilize the fundamental rights and duties
			3	Understand the working of the union executive, parliament and judiciary.
			4	Understand the working of the state executive, legislature and judiciary.
			5	Utilize the special provisions and statutory institutions
			6	Show national and patriotic spirit as responsible citizens of the country

S4	EST 200	DESIGN AND ENGINEERING	1	Explain the different concepts and principles involved in design engineering
			2	Apply design thinking while learning and practicing engineering.
			3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
			4	
			5	
			6	