



SAPTHAGIRI COLLEGE OF ENGINEERING

Department of Mechanical Engineering

COURSE OUTCOMES AND COURSE ARTICULATION MATRIX

2018 SCHEME

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES		
Apply Knowledge	Problem Analysis	Design Solution	Investigation	Modern Tools	Society, Health, Safety, Legal	Environment & Sustainability	Ethics	Individual & Team Work	Report, Presentation, Communication	Proj Mgmt Finance	Life Long Learn	Design, Thermal, Manufacturing	Analytical, Experimental, Creativity	Modern Tools, Management, Product Development
				3 High	2 Medium	1 Low	- No							

18ME15/25-Elements of Mechanical Engineering

CO1	Describe different sources of energy and calculate steam properties.														
CO2	Articulate the concept of conversion of energy by prime movers														
CO3	Calculate performance parameters & Illustrate the working principle of refrigeration and air conditioning.														
CO4	Summarize basic engineering materials and Joining processes & Apply the concepts of Power Transmissions.														
CO5	Discuss the different machine tool operations and basics of Robotics and Automation.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	2	-	-	-	-	2	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Average	3.00	2.00	-	-	-	-	2.00	-	-	-	-	2.00	-	-	-

18EGDL15-Engineering Graphics

CO1	Demonstrate the usage of CAD software														
CO2	Draw orthographic projections of points, lines, planes and solids.														
CO3	Generate the development of lateral surfaces of solids and isometric projections of solids														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	3	-	-	-	-	3	-	3	-	-	3
CO2	3	3	2	-	3	-	-	-	-	3	-	3	-	-	3
CO3	3	3	2	-	3	-	-	-	-	3	-	3	-	-	3
Average	2.67	3.00	2.00	-	3.00	-	-	-	-	3.00	-	3.00	-	-	3.00

SECOND YEAR

Mechanics of Materials 18ME32

CO1	Determine the stress, strain, elastic constants and strain energy in structural members.☒														
CO2	Examine the stress, strain under combined loading and apply theories of failure.														
CO3	Evaluate shear force, bending moment and stresses in beams.☒														
CO4	Analyze the structural parameters of shafts and columns.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	2	3	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
Average	3.00	2.75	-	-	-	-	-	-	-	-	-	2.75	3.00	3.00	-

Basic Thermodynamics 18ME33

CO1	Determine heat and work interactions in different thermodynamic Processes.														
CO2	Apply first law of thermodynamics for thermodynamic Systems														
CO3	Analyze thermodynamic systems based on Second law of thermodynamics & Entropy concepts														
CO4	Compute available energy in thermodynamic systems and Pure substances utilization.														
CO5	Analyze the behavior of the ideal and real gases using gas laws.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	2	-	-	-	-	2	3	3	-
CO2	3	2	-	-	-	-	2	-	-	-	-	3	3	3	-
CO3	3	3	-	-	-	-	2	-	-	-	-	2	3	3	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	3	3	-
CO5	3	2	-	-	-	-	2	-	-	-	-	2	3	3	-
Average	3.00	2.20	-	-	-	-	2.00	-	-	-	-	2.20	3.00	3.00	-

Material Science-18ME34															
CO1	Describe the basic structure and mechanical properties and failure of materials.														
CO2	Illustrate the phase transformation of solidification .														
CO3	Describe the heat treatment process of metals.														
CO4	Classify materials and describe properties smart materials														
CO5	Summarize the processes and application of composite Materials.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	2	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO5	-	-	-	-	-	-	-	-	-	-	-	2	3	-	2
Average	2.00	2.50	-	-	-	-	-	-	-	-	-	2.00	2.40	2.00	2.00

Metal Cutting and Forming 18ME35A/45A															
CO1	Demonstrate the relative motion and mechanics required for various machine tools.														
CO2	Illustrate the mechanics of machining process and effect of various parameters on machining.														
CO3	Describe the fundamentals of metal forming processes.														
CO4	Explain different machine tools to produce components having different shapes and sizes.☐														
CO5	Describe the concepts of design of sheet metal dies to design different dies for simple sheet metal components.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO2	-	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	2.00	3.00	-	2.00

Metal Casting & Welding 18ME35B/45B															
CO1	Describe the basics & preparation of sand mould.														
CO2	Illustrate different melting furnaces & methods of casting.														
CO3	Describe the solidification process & casting of aluminium.														
CO4	Classify different types of welding processes.														
CO5	Describe metallurgical aspects in welding process & inspection methods.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO2	-	-	-	-	-	-	1	-	-	-	-	2	2	-	-
CO3	-	-	-	-	-	-	1	-	-	-	-	2	2	-	2
CO4	-	-	-	-	-	-	1	-	-	-	-	3	2	-	2
CO5	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-
Average	-	-	-	-	-	-	1.00	-	-	-	-	2.20	2.00	-	2.00

Computer Aided Machine Drawing 18ME36A/46A															
CO1	Demonstrate the usage of CAD software for 3D modeling.														
CO2	Draw section of solids, orthographic views, forms of threads and fasteners.														
CO3	Draw knuckle joint, cotter joints and couplings.														
CO4	Analyze individual machine parts, assemble and prepare a drawing.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	3	-	-	-	-	3	-	3	2	-	3
CO2	3	3	-	-	3	-	-	-	-	3	-	3	2	-	3
CO3	3	3	-	-	3	-	-	-	-	3	-	3	2	-	3
CO4	3	3	-	-	3	-	-	-	-	3	-	3	3	-	3
Average	2.75	3.00	-	-	3.00	-	-	-	-	3.00	-	3.00	2.25	-	3.00

Mechanical Measurements and Metrology 18ME36B/46B

CO1	Describe metrology, methods, standards, of measurement and measuring instruments.														
CO2	Analyze system of limits, fits tolerances, gauges and comparators.														
CO3	Illustrate metrological measurements of screw threads, gear tooth parameters and advanced Metrology instruments.☐														
CO4	Differentiate methods of indirect measurements.														
CO5	Describe measurement of force, pressure, temperature and strain.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	3	3	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
Average	2.00	2.00	-	-	-	-	-	-	-	-	-	3.00	2.80	-	-

Material Testing LAB 18MEL37A/47A

CO1	Analyze mechanical properties of materials by destructive testing.														
CO2	Analyze microstructure of materials.														
CO3	Demonstrate non destructive testing methods.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	-	2	-	-	3	-	3	3	-	3	3	3	-
CO2	-	3	-	2	-	-	-	-	3	3	-	3	3	3	-
CO3	2	-	-	-	-	-	2	-	-	3	-	1	3	-	-
Average	2.00	3.00	-	2.00	-	-	2.50	-	3.00	3.00	-	2.33	3.00	3.00	-

Mechanical Measurements and Metrology LAB 18MEL37B/47B															
CO1	Calibrate the measuring instruments.														
CO2	Analyze Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer														
CO3	Demonstrate measurements of linear and angular dimensions using Sine Centre/ Sine Bar/Bevel Protractor and LVDT.														
CO4	Calculate force, pressure, temperature and strain using indirect measuring methods.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	-	3	-	-	-	-	2	3	-	3	2	3	-
CO2	-	3	-	3	-	-	-	-	2	3	-	2	2	3	-
CO3	-	3	-	3	-	-	-	-	2	3	-	3	2	3	-
CO4	-	3	-	3	-	-	-	-	2	3	-	2	2	3	-
Average	-	3.00	-	3.00	-	-	-	-	2.00	3.00	-	2.50	2.00	3.00	-

Workshop & Machine Shop Practice 18ME38A/48A															
CO1	Perform lathe operations & make cylindrical models.														
CO2	Produce grooved models using shaper machine.														
CO3	Practice milling operations.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	1	-	3	3	-	3	3	3	-
CO2	-	-	-	-	-	3	1	-	3	3	-	1	3	3	-
CO3	-	2	-	-	-	3	1	-	3	3	-	2	3	3	-
Average	2.50	2.50	-	-	-	-	-	-	-	-	-	3.00	3.00	3.00	2.00

Foundry, Forging and Welding Lab 18ME38B/48B															
CO1	Analyze and determine properties of green sand.														
CO2	Prepare green sand mould using foundry tools.														
CO3	Prepare models using basic forging operations.														
CO4	Prepare Model using Welding operation.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	3	3	-	-	3	3	-
CO2	-	-	-	-	-	-	-	-	3	3	-	2	3	3	-
CO3	-	2	-	-	-	3	2	-	3	3	-	2	3	3	-
CO4	-	-	-	-	-	-	2	-	3	-	-	3	-	3	-
Average	-	2.00	-	-	-	3.00	2.00	-	3.00	3.00	-	2.33	3.00	3.00	-

Constitution of india,professional ethics and cyber law 18CPC39/49															
CO1	Identify constitutional knowledge and legal literacy														
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers.														
CO3	The the cybercrimes and cyber laws for cyber safety measures.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO2	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO3	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
Average	-	-	-	-	-	2.00	-	3.00	-	-	-	2.00	-	-	-

Applied Thermodynamics 18ME42															
CO1	Determine performance parameters of Gas Power Cycles.														
CO2	Analyse the performance parameters of Vapour Power Cycles.														
CO3	Analyse Combustion constituents of exhaust gases.														
CO4	Determine the performance parameters of I C Engines.														
CO5	Evaluate the performance parameters of Refrigeration system and properties of conditioned air														
CO6	Determine performance parameters of Reciprocating Compressors.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	2	3	2	-
CO2	3	3	-	-	-	-	-	-	-	-	-	2	3	3	-
CO3	3	3	-	-	-	-	2	-	-	-	-	1	3	3	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	3	2	-
CO5	3	3	-	2	-	-	-	-	-	-	-	3	3	3	-
CO6	3	2	-	-	-	-	-	-	-	-	-	2	3	2	-
Average	3.00	2.50	-	2.00	-	-	2.00	-	-	-	-	2.00	3.00	2.50	-

Fluid Mechanics 18ME43															
CO1	Calculate the Fluid properties, Stability of floating bodies and hydrostatic forces on surfaces.														
CO2	Apply the principles of fluid kinematics and dynamics for fluid flow problems														
CO3	Analyze the fluid flows through bodies.														
CO4	Analyze the boundary layer concept.														
CO5	Formulate the relations of fluid properties by using dimensional analysis														
CO6	Describe the thermodynamics of compressible flow and basics of CFD														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	2	3	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	2	3	3	-
CO4	3	3	2	3	-	-	-	-	-	-	-	2	3	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	2	3	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
Average	3.00	2.80	2.00	3.00	-	-	-	-	-	-	-	2.33	3.00	3.00	-

Kinematics of Machines 18ME44															
CO1	Describe the working of various types of mechanisms.														
CO2	Analyse graphically the velocity and acceleration of simple mechanisms														
CO3	Synthesize simple mechanisms by analyzing the velocity and acceleration analytically														
CO4	Determine various parameters of spur gear and analyse gear trains.														
CO5	Draw and analyse the cam profiles for different types of follower motions.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	3	3	-	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
Average	2.80	2.80	-	-	-	-	-	-	-	-	-	3.00	3.00	3.00	2.00

MINI PROJECT															
CO1	Identify, formulate and analyze engineering problems for the need of society.														
CO2	Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data.														
CO3	Analyze the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics.														
CO4	Work individually and in team, Communicate effectively through reports and presentations.														
CO5	Apply engineering, management and ethical principles for Project management and finance														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO2	3	3	3	3	3	3	3	-	-	-	-	3	3	3	3
CO3	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO4	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
CO5	3	-	-	-	-	-	-	3	-	-	1	3	-	-	3
Average	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	1.00	3.00	3.00	3.00	3.00

THIRD YEAR

Management & Economics 18ME51

CO1	Describe the Overview and functions of Management.														
CO2	Discuss Decision making, Organizing, Staffing, Directing and Controlling														
CO3	Estimate the interest by various Methods.														
CO4	Estimate Present, future and annual worth and rate of returns														
CO5	Determine the Cost and Depreciation of Product.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	2	2	-	2	2	-	-	3
CO2	-	-	-	-	-	-	-	2	2	-	2	2	-	-	3
CO3	2	2	-	-	-	-	-	-	-	-	3	2	-	-	-
CO4	2	3	-	2	-	-	-	-	-	-	3	2	-	-	-
CO5	2	3	-	-	-	-	-	2	-	-	3	3	-	-	3
Average	2.00	2.67	-	2.00	-	-	-	2.00	2.00	-	2.60	2.20	-	-	3.00

Design of Machine Elements-I 18ME52

CO1	Describe and apply various codes and standards in design process.														
CO2	Analyze the behaviour of machine elements subjected to static, impact and fatigue loading.														
CO3	Design shafts, couplings and joints for power transmission														
CO4	Design riveted and welded joints														
CO5	Design threaded fasteners and power screws														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	2	-	2	-	-	-	-	-	3	3	3	2
CO3	3	3	3	2	-	2	-	-	-	-	-	2	3	3	2
CO4	3	3	3	2	-	2	-	-	-	-	-	2	3	3	2
CO5	3	3	3	2	-	2	-	-	-	-	-	2	3	3	2
Average	3.00	3.00	3.00	2.00	-	2.00	-	-	-	-	-	2.40	3.00	3.00	2.00

Dynamics of Machines 18ME53															
CO1	Examine simple mechanisms for static and dynamic equilibrium.														
CO2	Investigate the balancing of rotating and reciprocating masses.														
CO3	Evaluate various characteristics of the governor and gyroscope.														
CO4	Analyze free vibration of single degree of freedom systems.														
CO5	Analyze forced vibration of single degree of freedom system and transverse vibration of the shaft														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO2	3	3	2	-	-	-	2	-	-	-	-	2	3	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	2	3	3	-
CO5	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
Average	3.00	2.80	2.00	-	-	-	2.00	-	-	-	-	2.25	3.00	3.00	-

Turbo Machines 18ME54															
CO1	Determine the fluid flow parameters by using model studies.														
CO2	Determine efficiency of turbo machines by using thermodynamic principles.														
CO3	Analyze energy transfer in turbo machines.														
CO4	Determine performance parameters of steam turbine.														
CO5	Design and determine performance parameters of hydraulic turbines.														
CO6	Evaluate performance parameters of centrifugal pump, centrifugal and axial compressor.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
CO2	3	2	-	-	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	3	3	3	-
CO4	3	3	2	-	-	-	2	-	-	-	-	2	3	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	2	3	3	-
CO6	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
Average	3.00	2.83	2.25	-	-	-	2.00	-	-	-	-	2.33	3.00	3.00	-

Fluid Power Engg 18ME55															
CO1	Describe structural components and working of hydraulic systems.														
CO2	Distinguish different types of pumps and actuators and Determine performance parameters.														
CO3	Apply the design of hydraulic circuit using control components for given applications.														
CO4	Describe pneumatic power system and its components.														
CO5	Apply the design of pneumatic control circuit.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	-	3	-	-
Average	2.00	2.00	2.00	-	-	-	-	-	-	-	-	2.00	3.00	-	-

OPERATIONS MANAGEMENT (18ME56)															
CO1	Able to describe Production Management Functions and Interpret Decision making Process.														
CO2	Able to explain the forecasting process.														
CO3	Able to recognize the Capacity and location Planning.														
CO4	Able to explain the Aggregate Planning and Master Scheduling.														
CO5	Able to identify the Material Requirement Planning and Supply Chain Management.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	2	-	2	2	2	1	-	2
CO2	2	-	-	-	-	-	-	-	-	2	2	2	1	-	2
CO3	2	-	-	-	-	-	-	-	-	2	2	2	1	-	2
CO4	2	-	-	-	2	-	-	-	-	2	2	2	1	2	2
CO5	2	-	-	-	2	-	-	-	-	2	2	2	1	2	2
Average	2.00	-	-	-	2.00	-	-	2.00	-	2.00	2.00	2.00	1.00	2.00	2.00

Environmental Studies (18CIV59)															
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,														
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.														
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.														
CO4															
CO5															
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO3	-	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO4													-	-	-
CO5															
Average	-	-	-	-	-	3.00	3.00	-	-	-	-	3.00	-	-	-

Fluid Mechanics & Machines Lab 18MEL57															
CO1	Analyze the performance of power developing and Power absorbing machines.														
CO2	Calibrate and determine the flow properties of flow measuring devices.														
CO3	Analyze major and minor losses for flow through pipes.														
CO4	Analyze the impact of jet on vanes.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	-	2	-	-	1	-	3	3	-	3	3	3	-
CO2	-	3	-	2	-	-	1	-	3	3	-	-	3	3	-
CO3	-	3	-	2	-	-	1	-	3	3	-	2	3	3	-
CO4	-	3	-	2	-	-	1	-	3	3	-	-	3	3	-
Average	-	3.00	-	2.00	-	-	1.00	-	3.00	3.00	-	2.50	3.00	3.00	-

Energy Conversion Lab 18MEL58															
CO1	Analyze the properties of fuels and oils.														
CO2	Analyze performance of IC engines and draw its characteristics.														
CO3	Investigate performance on Air Compressors and draw its characteristics.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	-	3	-	3	3	-	2	3	-	2	3	3	-
CO2	-	3	-	3	-	2	3	-	3	3	-	2	3	3	-
CO3	-	3	-	3	-	2	3	-	3	3	-	2	3	3	-
Average	-	3.00	-	3.00	-	2.33	3.00	-	2.67	3.00	-	2.00	3.00	3.00	-

Finite Element Analysis 18ME61															
CO1	Apply basics of finite element formulation methods.														
CO2	Derive interpolation functions for structural elements.														
CO3	Apply finite element formulation to determine structural behavior of bar, truss, beam and shaft.														
CO4	Formulate 1D heat transfer and fluid flow problems.														
CO5	Determine numerical solution for axisymmetric triangular element subjected to point load.														
CO6	Formulate 1D bar and truss element subjected to dynamic loading.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	3	1	-
CO3	3	3	3	2	-	-	-	-	-	-	-	3	3	3	-
CO4	3	3	3	2	-	-	-	-	-	-	-	2	3	3	-
CO5	3	3	3	2	-	-	-	-	-	-	-	2	3	3	-
CO6	3	3	3	2	-	-	-	-	-	-	-	2	3	3	-
Average	2.83	2.80	3.00	2.00	-	-	-	-	-	-	-	2.25	3.00	2.50	-

Design of Machine Elements-II 18ME62															
CO1	Design springs, clutches and brakes.														
CO2	Design belts and wire ropes for power transmission.														
CO3	Design different types of gears.														
CO4	Design and analyze bearings for engineering applications														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	2	2	-	-	-	-	3	3	3	-
CO2	3	3	3	2	-	2	2	-	-	-	-	3	3	3	2
CO3	3	3	3	3	-	2	2	-	-	-	-	3	3	3	2
CO4	3	3	3	2	-	2	2	-	-	-	-	3	3	3	2
Average	3.00	3.00	3.00	2.25	-	2.00	2.00	-	-	-	-	3.00	3.00	3.00	2.00
Heat Transfer 18ME63															
CO1	Apply concept of the conduction heat transfer of steady and unsteady state.														
CO2	Analyze one-dimensional and two-dimensional steady and unsteady state heat conduction using numerical methods.														
CO3	Analyze the radiation heat transfer by applying fundamental laws														
CO4	Determine convective heat transfer using non-dimensional numbers.														
CO5	Evaluate performance parameters using LMTD and NTU methods.														
CO6	Determine heat transfer co-efficient of boiling and condensation.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	-	2	-	-	-	-	2	3	3	-
CO2	3	3	3	-	-	-	1	-	-	-	-	2	3	3	-
CO3	3	3	3	-	-	-	2	-	-	-	-	2	3	3	-
CO4	3	2	3	2	-	-	-	-	-	-	-	-	3	3	-
CO5	3	2	2	2	-	-	2	-	-	-	-	2	3	3	-
CO6	3	2	3	2	-	-	2	-	-	-	-	2	3	3	-
Average	3.00	2.33	2.67	2.00	-	-	1.80	-	-	-	-	2.00	3.00	3.00	-

Heat Transfer Lab 18MEL67															
CO1	Estimate the thermal conductivity of metal rod, composite wall and effectiveness of extended surfaces.														
CO2	Analyze convective heat transfer coefficient for free and forced convection														
CO3	Investigate the surface emissivity of a test plate and Stefan Boltzman constant validation.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	-	3	-	2	2	-	3	3	-	2	3	3	-
CO2	-	3	-	3	-	2	2	-	3	3	-	2	3	3	-
CO3	-	3	-	3	-	2	2	-	3	3	-	2	3	3	-
Average	-	3.00	-	3.00	-	2.00	2.00	-	3.00	3.00	-	2.00	3.00	3.00	-

Modeling & Analysis Lab 18MEL68															
CO1	Demonstrate the finite element analysis software.														
CO2	Analyze 1-D and 2-D Structural Problems.														
CO3	Analyze 1-D and 2-D Heat Transfer Problems.														
CO4	Evaluate the dynamic behavior for Bars and Beams Problems														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	3	-	-	-	-	-	-	3	3	3	3
CO2	-	3	2	2	3	-	-	-	2	3	-	3	3	3	3
CO3	-	3	2	2	3	-	-	-	2	3	-	3	3	3	3
CO4	-	3	2	2	3	-	-	-	2	3	-	3	3	3	3
Average	-	3.00	2.00	2.00	3.00	-	-	-	2.00	3.00	-	3.00	3.00	3.00	3.00

FOURTH YEAR

Control Engineering 18ME71

CO1	Describe the Basic Principles of control system and controllers														
CO2	Determine the system governing equations for physical models of mechanical, hydraulic,Pneumatic and electrical system.														
CO3	Illustrate the response of 1st and 2nd order systems														
CO4	Determine the transfer function of a control system using Block diagram reduction technique and Signal flow graphs														
CO5	Solve the stability of the control system using Nyquist, Polar, Bode and root locus methods														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	2	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
Average	3.00	3.00	2.00	-	-	-	-	-	-	-	-	2.00	3.00	3.00	-

Computer Aided Design and Manufacturing-18ME72

CO1	Describe the basics of automated manufacturing systems and mathematical model to analyze the different types of automated flow lines.														
CO2	Explain the different types of manufacturing planning and control system using graphics software.														
CO3	Discuss the Flexible manufacturing system														
CO4	Write CNC part program and programs for Robots.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	3.00	3.00	-	-

Design Lab -18MEL76															
CO1	Analyse the vibration characteristics in a single degree of freedom vibrating systems														
CO2	Analyse the rotating elements for balancing, critical speed of shaft.														
CO3	Compute the fringe constant of photo elastic material for different loading conditions.														
CO4	Analyse the characteristics of governors														
CO5	Evaluate the stresses for combined loading in straight and curved beam using strain gauges														
CO6	Analyse pressure distribution in journal bearing														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	-	3	-	-	-	-	3	3	-	3	3	3	-
CO2	-	3	-	3	-	-	-	-	3	3	-	3	3	2	-
CO3	-	3	-	3	-	-	-	-	3	3	-	-	3	2	-
CO4	-	3	-	3	-	-	-	-	3	3	-	-	3	2	-
CO5	-	3	-	3	-	-	-	-	3	3	-	3	3	2	-
CO6	-	3	-	3	-	-	-	-	3	3	-	2	3	2	-
Average	-	3.00	-	3.00	-	-	-	-	3.00	3.00	-	2.75	3.00	2.17	-

CIM Lab-18MEL77															
CO1	Demonstrate the Simulation softwares in Manufacturing														
CO2	Simulate Turning Operations using CNC software														
CO3	Simulate Milling operations using CNC software														
CO4	Demonstrate flexible manufacturing and Robots.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	3	-	-	-	-	3	-	2	3	-	3
CO2	-	3	-	-	3	-	-	-	2	3	-	2	3	2	3
CO3	-	3	-	-	3	-	-	-	2	3	-	2	3	2	3
CO4	-	-	-	-	3	-	-	-	-	-	-	2	2	-	2
Average	-	3.00	-	-	3.00	-	-	-	2.00	3.00	-	2.00	2.75	2.00	2.75

Project Phase 1 18MEP78															
CO1	Identify, formulate and analyze engineering problems for the need of society.														
CO2	Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data														
CO3	Analyze the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics														
CO4	Work individually and in team, Communicate effectively through reports and presentations.														
CO5	Apply engineering, management and ethical principles for Project management and finance														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO2	3	3	3	3	3	3	3	-	-	-	-	3	3	3	3
CO3	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO4	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
CO5	3	-	-	-	-	-	-	3	-	-	3	3	-	-	3
Average	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Operations Research-18ME735															
CO1	Describe the basics of operations research and Analyze linear programming problems														
CO2	Formulate and optimize transportation and assignment problems.														
CO3	Evaluate project completion time using PERT and CPM techniques and formulate strategies of game.														
CO4	Evaluate job sequencing and queuing theory models.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	2	2	-	3	-
CO2	3	3	2	2	-	-	-	-	-	-	2	2	-	3	-
CO3	3	3	3	2	-	-	-	-	-	-	3	2	-	3	-
CO4	3	3	2	2	-	-	-	-	-	-	3	2	-	3	-
Average	3.00	3.00	2.25	2.00	-	-	-	-	-	-	2.50	2.00	-	3.00	-

Additive Manufacturing-18ME741															
CO1	Describe the different process of additive manufacturing														
CO2	Illustrate the working of different types of actuators														
CO3	Outline the different process of polymerization and powder metallurgy techniques.														
CO4	Describe the different characterization techniques.														
CO5	Demonstrate the various NC, CNC machine programming and Automation techniques														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	3	3	2	-
Average	3.00	2.00	-	-	-	-	-	-	-	-	-	3.00	3.00	2.00	-

Total Quality Management-18ME734															
CO1	Discuss the Principle and Application of Total Quality Management in Organizations.														
CO2	Describe the Quality, Roles of Leaders and Principles of Leadership.														
CO3	Discuss customers satisfactions and involvement in Service and Products.														
CO4	Analyze the use of Statistical Tools for Continuous Improvement of Processes.														
CO5	Apply Tools and Techniques of Total Quality Management.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	3	2	-	-	3	-	-	3
CO2	-	-	-	2	-	-	-	3	2	-	2	3	-	-	3
CO3	-	-	-	-	-	-	-	3	-	-	2	3	-	-	3
CO4	-	2	-	2	-	-	-	2	-	-	2	3	-	-	3
CO5	3	-	-	2	-	-	-	2	-	-	2	3	-	-	3
Average	3.00	2.00	-	2.00	-	-	-	2.60	2.00	-	2.00	3.00	-	-	3.00

Design for Manufacturing-18ME731															
CO1	Outline the different phases and concepts of DFM and Process capabilities.														
CO2	Describe the Theories of assembly and Dimensioning parameters.														
CO3	Review and Modify the Design of a component for Manufacturing Process														
CO4	Review and Modify consideration for Casting and Welding.														
CO5	Illustrate the Design consideration for forging, powder metallurgy and injection moulding.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO2	2	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	3	-	-	-	-	-	-	-	2	3	2	2
CO4	-	-	-	3	-	-	-	-	-	-	-	2	3	2	2
CO5	-	-	-	3	-	-	-	-	-	-	-	2	3	2	2
Average	2.00	-	-	3.00	-	-	-	-	-	-	-	2.00	3.00	2.00	2.00

Mechatronics-18ME744															
CO1	Summarise the Components of Mechatronics Systems														
CO2	Describe the basic, architecture of Microprocessor and Microcontroller														
CO3	Examine the Programmable Logic Controller														
CO4	Describe the principles of Actuation System and its classification, application														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	-	-	-	-	-	-	3	3	1	2
CO2	-	-	-	-	2	-	-	-	-	-	-	3	3	1	2
CO3	3	-	-	2	2	-	-	-	-	-	-	3	3	1	2
CO4	-	-	-	-	2	2	-	-	-	-	-	3	3	1	2
Average	3.00	-	-	2.00	2.00	2.00	-	-	-	-	-	3.00	3.00	1.00	2.00

Energy Engineering 18ME81

CO1	Summarize the concepts of steam power plant.														
CO2	Describe the solar and Biomass energy conversion technology														
CO3	Outline the tidal, wind and geo thermal energy conversion technology														
CO4	Illustrate the concepts of Ocean energy extraction and Analyze parameters of Hydroelectric power plant.														
CO5	Summarize the Nuclear Energy conversion methods.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO3	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO4	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-	2	2	-	-
Average	-	-	-	-	-	-	3.00	-	-	-	-	2.00	2.00	-	-

Tribology-18ME822

CO1	Recognize and describe the fundamentals of tribology and associated parameters.														
CO2	Analyze performance and design of components experiencing relative motion.														
CO3	Analyze the requirements and design hydrodynamic journal and plane slider bearings for a given application.														
CO4	Select proper bearing materials and lubricants for a given tribological application														
CO5	Apply the principles of surface engineering for different applications of tribology.														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	2	3	-	2
CO2	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
CO3	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
CO4	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
CO5	3	3	3	2	-	2	2	-	-	-	-	2	3	3	2
Average	3.00	2.80	2.60	2.00	-	2.00	2.00	-	-	-	-	2.00	3.00	3.00	2.00

Internship/Professional Bodies 18MEI85															
CO1	Apply gained knowledge and skills in engineering practice														
CO2	Analyze and design solutions for engineering problems.														
CO3	Work individually, in team and communicate effectively through reports and presentations														
CO4	Demonstrate apt workplace attitude and ethics														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	3	2	-	-	-	-	3	2	2	3
CO2	3	3	3	3	2	3	-	-	-	-	2	3	2	2	3
CO3	-	-	-	-	-	-	-	3	3	3	-	3	-	-	3
CO4	-	-	-	-	-	-	-	3	3	-	2	3	-	-	-
Average	3.00	3.00	3.00	3.00	2.00	3.00	2.00	3.00	3.00	3.00	2.00	3.00	2.00	2.00	3.00
Project Phase- II 18MEP83															
CO1	Identify, formulate and analyze engineering problems for the need of society.														
CO2	Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data														
CO3	Analyze the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics														
CO4	Work individually and in team, Communicate effectively through reports and presentations.														
CO5	Apply engineering, management and ethical principles for Project management and finance														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO2	3	3	3	3	3	3	3	-	-	-	-	3	3	3	3
CO3	3	3	-	3	-	3	3	-	-	-	-	3	3	3	-
CO4	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
CO5	3	-	-	-	-	-	-	3	-	-	3	3	-	-	3
Average	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
18MES84 Technical Seminar															
CO1	Identify and explore recent trends in mechanical engineering														
CO2	Prepare effective report on the selected topic														
CO3	Prepare power point presentation (PPT), communicate and answer the queries on the topic														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	3	2	2	3	3	3	-	3	3	3	-
CO2	-	-	-	-	3	-	-	3	3	3	-	3	3	3	-
CO3	-	-	-	-	3	-	-	3	3	3	-	3	3	3	-
Average	3.00	3.00	-	3.00	3.00	2.00	2.00	3.00	3.00	3.00	-	3.00	3.00	3.00	-