RAJIV GANDHI COLLEGE OF ENGINEERING AND TECHNOLOGY
Pondy Cuddalore Main Road, Kirumampakkam, Puducherry – 607 403.
Affiliated to Pondicherry University and Approved by AICTE, New Delhi
DEPARTMENT OF MECHANICAL ENGINEERING

SEMESTER V

RAJIV GANDHI COLLEGE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2023-2024

COURSE DETAILS

(MET51 DYNAMICS OF MACHINERY) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite: Fundamental understanding of engineering mechanics or dynamics.

Course Objectives

- Teach students about calculation of inertia force and inertia torque slider crank mechanism and functional utilization of flywheel.
- Illustrate students about effect of free and forced vibration and finding natural frequency for simple longitudinal, transverse and torsional vibrating system
- Teach different types of governors and characteristics. And also study about gyroscopic effect on ship, plane, two-wheeler and four-wheeler.
- Teach about rotary mass and reciprocating mass balancing techniques

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Analyze the dynamic behavior of mechanisms, including four-link and slider-crank systems, through the application of Alembert's principle, and assess turning moment diagrams and energy fluctuations in reciprocating engines and flywheels.	L4
CO2	Understand and calculate natural frequencies and vibrational responses of single degree-of-freedom systems, including free and forced vibrations.	L2
CO3	Evaluate transverse and torsional vibrations in beams and shafts using methods such as Dunkerley's, and analyze whirling speeds and vibrations in multi-rotor systems and geared systems.	L5
CO4	Study the principles of centrifugal governors, their types, characteristics, and effects, as well as gyroscopic forces, torques, and their implications for vehicles and aircraft.	L1
CO5	Explore static and dynamic balancing techniques for rotating masses, including partial balancing for various engine configurations.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	-	-	-	-	3	-	-	2	-	-	-
CO2	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	-	-	2	-	-	-
Average	3	3	3	3	0	0	0	0	3	0	0	2	0	0	0

HEAD OF THE DEPARTMENT

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COURSE DETAILS

(MET52 DESIGN OF MACHINE ELEMENTS) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite: A fundamental course in Engineering Mechanics or Strength of Materials is generally required as a prerequisite for Design of Machine Elements.

Course Objectives

- To teach students how to apply the concepts of stress analysis, theories of failure and material science to analyze, design and/or select commonly used machine components.
- To illustrate to students the variety of mechanical components available and emphasize the need to continue learning.
- To teach students how to apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand fundamental machine design principles, material selection, and failure theories, with a focus on designing welded joints under various loading conditions.	L2
CO2	Apply strength and stability criteria to design power screws, threaded joints, and bolted joints, considering combined stresses and eccentric loading.	L3
CO3	Design various couplings, clutches, and brakes, focusing on their different types and applications.	L6
CO4	Learn the design principles for helical and leaf springs, as well as pipe joints, cotter joints, and knuckle joints.	L2
CO5	Design shafts under both static and fluctuating loads, including considerations for eccentric loading, curved beams, and fatigue life using Soderberg and Goodman equations.	L6

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	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	-	-	2	-	3	-
CO5	3	3	3	3	-	-	-	-	3	-	-	2	-	3	-
Average	3	3	3	3	0	0	0	0	3	0	0	2	0	3	0

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COURSE DETAILS

(MET53 METROLOGY AND QUALITY CONTROL) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite: A fundamental understanding of Engineering Mechanics or Basic Manufacturing Processes is typically required as a prerequisite for Metrology and Quality Control.

Course Objectives

- To emphasize the importance of metrology in Engineering Design, Manufacturing and Quality control.
- To explain about international standards adopted in measurements to achieve interchangeability.
- To explain the Definitions of Fit and Tolerance (Taylors Principle) for learning standards adopted in hole making and shaft making systems.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Gain an understanding of measurement principles, standards, and gauge design, including the calibration and use of slip gauges and the principles of interchangeable manufacturing.	L2
CO2	Learn about various comparators and their working principles, as well as techniques for surface finish measurement and analysis using tools like the Tomlinson surface meter and Taylor-Hobson Talysurf.	L2
CO3	Understand angular measurements, screw thread metrology, gear metrology, and the application of advanced metrology tools such as coordinate measuring machines and laser systems.	L2
CO4	Apply statistical quality control methods, including basic statistics, control charts, and process capability analysis.	L3
CO5	Implement Six Sigma methodologies, including DMAC, zero defect strategies, and understand quality standards such as ISO 9000:2001, TS 16949, and analysis techniques like FMECA and FTA.	L5

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	-	-	-	-	1	-	-	2	3	2	2
CO2	3	-	-	-	-	-	-	-	1	-	-	2	3	2	2
CO3	3	-	-	-	-	-	-	-	1	-	-	2	3	2	2
CO4	3	-	-	-	-	-	-	-	1	-	-	2	3	2	2
CO5	3	-	-	-	-	-	-	-	1	-	-	2	3	2	2
Average	3	0.4	0	0	0	0	0	0	1	0	0	2	3	2	2

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MET54 HEAT AND MASS TRANSFER) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite: A foundational understanding of Thermodynamics and Fluid Mechanics is typically required as a prerequisite for Heat and Mass Transfer.

Course Objectives

- To convey the basics of the heat transfer principles.
- To establish the relationship of these principles to thermal system behaviour.
- To develop methodologies for predicting the system behaviour.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand heat conduction principles, including steady-state and transient conduction, extended surfaces, and measurement techniques for thermal conductivity.	L2
CO2	Explore heat transfer by convection in various flow conditions, and study phase change phenomena such as condensation and boiling, including different regimes and heat transfer mechanisms.	L4
CO3	Learn the fundamentals of radiative heat transfer, including concepts of black body radiation, the Stefan-Boltzmann law, and radiative exchange between surfaces.	L2
CO4	Analyze heat exchangers, including double pipe, parallel, and counterflow designs, using Log Mean Temperature Difference (LMTD) and effectiveness expressed in terms of NTU.	L4
CO5	Apply principles of mass transfer, including diffusion and convective mass transfer, and understand the analogies between heat, mass, and momentum transfer.	L3

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	1	3	-	-	-	-	3	-	-	2	-	-	-
CO2	3	3	1	3	-	-	-	-	3	-	-	2	-	-	-
CO3	3	3	1	3	-	-	-	-	3	-	-	2	-	-	-
CO4	3	3	1	3	-	-	-	-	3	-	-	2	-	-	-
CO5	3	3	1	3	-	-	-	-	3	-	-	2	-	-	-
Average	3	3	1	3	0	0	0	0	3	0	0	2	0	0	0

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COURSE DETAILS

(MET55 MECHANICAL MEASUREMENTS) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite: A foundational understanding of Engineering Mechanics and Instrumentation is typically required as a prerequisite for Mechanical Measurements.

Course Objectives

- To provide knowledge on the instruments and techniques available for the measurement of different process variables relevant to Mechanical Engineering

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand the basics of detector transducers, signal conditioning, measurement terminologies, error types, calibration principles, and measurement standards.	L2
CO2	Learn strain measurement techniques using strain gauges and Wheatstone bridges, and explore methods for force and torque measurement, including load cells and dynamometers.	L2
CO3	Study pressure measurement methods with various transducers, temperature measurement techniques including thermocouples and pyrometers, and flow measurement devices such as orificemeters and venturimeters.	L2
CO4	Explore displacement and motion measurement techniques using LVDTs and Hall effect devices, vibration measurement with accelerometers, and the application of FFT for signal analysis.	L4
CO5	Apply digital techniques to mechanical measurements, including A/D and D/A conversion, PC-based data acquisition, and representation and analysis of experimental data.	L3

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	1	-	1	-	-	-	2	-	-	2	2	2	2
CO2	3	-	1	-	1	-	-	-	2	-	-	2	2	2	2
CO3	3	-	1	-	1	-	-	-	2	-	-	2	2	2	2
CO4	3	-	1	-	1	-	-	-	2	-	-	2	2	2	2
CO5	3	-	1	-	1	-	-	-	2	-	-	2	2	2	2
Average	3	0	1	0	1	0	0	0	2	0	0	2	2	2	2

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEE54 INDUSTRIAL CASTING TECHNOLOGY) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite: A foundational understanding of Manufacturing Processes or Materials Science is typically required as a prerequisite for Industrial Casting Technology.

Course Objectives

- To acquaint the student interested in the production of metal castings, with the essential techniques required for the production of castings in ferrous/non-ferrous metals and plastics, from basic pattern making to moulding and metal pouring.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand pattern making and moulding sands, including pattern materials, allowances, core types, and sand conditioning for effective casting.	L2
CO2	Learn about various melting equipment and furnaces used in foundries, along with refractories, metallurgical characteristics of cast metals, and the solidification process.	L2
CO3	Explore gating and risering techniques for castings, including different gating systems, riser design, and methods for achieving directional solidification.	L4
CO4	Study various moulding processes including sand moulding, permanent mould casting, die casting, centrifugal casting, and plastic moulding techniques.	L2
CO5	Examine cleaning and inspection processes for castings, including fettling, heat treatment, defect analysis, pollution control, plant layout, and mechanization in foundries.	L5

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**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	3	3	3
CO3	3	-	-	-	-	-	-	-	3	-	-	2	3	3	3
CO4	3	-	-	-	-	-	-	-	3	-	-	2	3	3	3
CO5	3	-	-	-	-	-	-	-	3	-	-	2	3	3	3
Average	3	0	0	0	0	0	0	0	3	0	0	2	3	3	3

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP51 Manufacturing Process Laboratory – III) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite A foundational understanding of Manufacturing Processes or Mechanical Engineering Principles is typically required as a prerequisite for Manufacturing Process Laboratory – III.

Course Objectives

- To train the students in foundry practices, gear cutting, tool grinding and CNC programming.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Gain hands-on experience with foundry tools and techniques, including mould preparation using solid and split patterns.	L3
CO2	Learn and practice gear cutting processes on gear hobbing machines, including spur gear hobbing, spur gear milling, and helical gear milling.	L2
CO3	Understand and perform tool grinding operations using a tool and cutter grinder, focusing on grinding single-point cutting tools.	L2
CO4	Understand CNC Programming and Operation	L2
CO5	Study CNC turning and milling machines, develop skills in CNC part programming for both turning and milling, and practice APT programming for drilling and milling operations.	L3

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	1	3	-	-	-	3	3	3
CO2	3	-	-	-	-	-	-	1	3	-	-	-	3	3	3
CO3	3	-	-	-	-	-	-	1	3	-	-	-	3	3	3
CO4	3	-	3	-	-	-	-	1	3	-	-	-	3	3	3
CO5	3	-	3	-	-	-	-	1	3	-	-	-	3	3	3
Average	3	-	1.2	0	0	0	0	1	3	0	0	2	3	3	3

HEAD OF THE DEPARTMENT

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP52 Mechanical Measurements and Metrology Laboratory)

[Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite A foundational understanding of Mechanical Measurements and Metrology, along with basic principles of Measurement Systems, is typically required as a prerequisite for Mechanical Measurements and Metrology Laboratory.

Course Objectives

- To get the practical knowledge in metrology and mechanical measurement techniques.
- To get hand-on experience on handling different measurement instruments and metrology devices.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Develop skills in calibrating precision micrometers to ensure accurate measurements.	L4
CO2	Learn to measure taper angles using a sine bar for precise angle determination.	L2
CO3	Understand and perform the calibration of plain plug gauges for accurate dimensional measurement.	L2
CO4	Utilize an autocollimator to measure straightness and flatness with high precision.	L5
CO5	Measure surface roughness using the Talysurf method for evaluating surface texture.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	1	-	-	-	-	-	1	3	-	-	2	1	1	-
CO2	3	1	-	-	-	-	-	1	3	-	-	2	1	1	-
CO3	3	1	-	-	-	-	-	1	3	-	-	2	1	1	-
CO4	3	1	-	-	-	-	-	1	3	-	-	2	1	1	-
CO5	3	1	-	-	-	-	-	1	3	-	-	2	1	1	-
Average	3	1	0	0	0	0	0	1	3	0	0	2	1	1	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP53 Computational Methods Laboratory) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisite A foundational understanding of Numerical Methods and Programming (in languages such as FORTRAN, C/C++, or MATLAB) is typically required as a prerequisite for Computational Methods Laboratory.

Course Objectives

- Introduce the students to the science of numerical computations
- Mastery of Numerical methods for solving numerically different kinds of problems in Engineering

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Write and implement programs in FORTRAN, C/C++, or MATLAB to find roots of non-linear equations using the Newton-Raphson method..	L3
CO2	Develop solutions for systems of linear equations using Gauss elimination or Gauss-Seidel methods.	L4
CO3	Implement the Gauss-Jordan method for matrix inversion to solve linear algebra problems.	L5
CO4	Compute eigenvalues of matrices using the power method to analyze matrix properties.	L5
CO5	Solve systems of non-linear equations using the successive substitution method for various computational scenarios.	L5

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	1	2	-	2	-	-	-	-	-	-	-	-	1	-
CO2	3	1	2	-	2	-	-	-	-	-	-	-	-	1	-
CO3	3	1	2	-	2	-	-	-	-	-	-	-	-	1	-
CO4	3	1	2	-	2	-	-	-	-	-	-	-	-	1	-
CO5	3	1	2	-	2	-	-	-	-	-	-	-	-	1	-
Average	3	1	2	0	2	0	0	1	2	0	0	2	0	1	0

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DEPARTMENT OF MECHANICAL ENGINEERING

Course Details

(MEP54 GENERAL PROFICIENCY-I) [Total no. of. Students: 13] [3rd Year, 5th Semester]

Course Prerequisites: Basic knowledge of English grammar.

Course Objectives

- To create good communication.
- Able to develop personality.

COURSE OUTCOMES

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	To develop Body Language	(L5)
CO2	To enhance the Self-Confidence and leadership	(L5)
CO3	Develop writing skills	(L5)
CO4	To develop fluency in speaking	(L5)
CO5	To solve verbal and nonverbal problems	(L4)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	2	-	-	3	-	1	-	3	-	3	-	-	-
CO2	-	-	2	-	-	3	-	1	-	3	-	3	-	-	-
CO3	-	-	2	-	-	3	-	1	-	3	-	3	-	-	-
CO4	-	-	2	-	-	3	-	1	-	3	-	3	-	-	-
CO5	-	-	2	-	-	3	-	1	-	3	-	3	-	-	-
Average	0	0	2	0	0	3	0	1	0	3	0	3	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

SEMESTER VI

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DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2023-2024

COURSE DETAILS

(MEP61 OPERATIONS RESEARCH) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisite: A foundational understanding of Mathematics, particularly Linear Algebra and Calculus, is typically required as a prerequisite for Operations Research.

Course Objectives

- To create awareness about optimization in utilization of resources.
- To understand and apply operations research techniques to industrial operation
- To introduce students to use quantitative methods and techniques for effective
- Decisions–making; model formulation and applications that are used in solving business decision problems.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Develop skills in formulating and solving Linear Programming Problems (LPP) understand sensitivity analysis and integer programming techniques.	L4
CO2	Apply the Revised Simplex method to solve complex transportation, transshipment, and assignment problems, and solve dynamic programming problems related to allocation, investment, stagecoach scheduling, and equipment replacement.	L3
CO3	Understand inventory control fundamentals, including deterministic models for single items, EOQ with price breaks, and basic inventory control applications, using pure and mixed strategies.	l2
CO4	Learn and apply Project Management techniques using PERT and CPM, including network diagram construction, critical path analysis, crashing, and resource leveling.	L3
CO5	Analyze waiting line (queuing) problems with Poisson arrivals and exponential service times, and design logical flow charts for single-server and parallel-server queuing models.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	2	1	-	-	1	3	-	-	3	-	1	3
CO2	3	3	-	2	1	-	-	1	3	-	-	3	-	1	3
CO3	3	3	-	2	1	-	-	1	3	-	-	3	-	1	3
CO4	3	3	-	2	1	-	-	1	3	-	-	3	-	1	3
CO5	3	3	-	2	1	-	-	1	3	-	-	3	-	1	3
Average	3	3	0	2	1	0	0	1	3	0	0	3	0	1	3

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP62 DESIGN OF TRANSMISSION SYSTEMS) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisite: A foundational understanding of Mechanical Design and Dynamics is typically required as a prerequisite for Design of Transmission Systems..

Course Objectives

- To study about various mechanical transmissions systems and design of bearings, chains and ropes.
- To have a better understanding of gears and design of spur gears, helical gears, herring bone gears, straight and spiral bevel gears, worm gears and skew gears.
- To design the gear box, speed reducers, speed diagrams and stepped pulley

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand the theory and design of hydrodynamic and hydrostatic bearings, including journal bearings, heat dissipation, bearing materials, and lubricants, and learn to select rolling contact bearings based on load capacity and life.	L2
CO2	Explore belt and chain drives, including the design and selection of flat and V-belts, roller chains, sprocket wheels, and silent chains, and understand their applications and limitations.	L4
CO3	Analyze the advantages of gear drives, including gear nomenclature, gear tooth failures, and the design of gears based on bending and wear criteria using Lewis and Buckingham equations.	L4
CO4	Study the design and nomenclature of bevel gears, worm and worm wheels, including their design procedures based on bending and wear criteria.	L2
CO5	Learn the principles of geometric progression, standard step ratios, kinematics layout, and design of sliding mesh and constant mesh gearboxes, as well as multi-speed gearboxes and speed reducers using spur and helical gears.	L2

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	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	-	-	2	-	3	-
CO5	3	3	3	3	-	-	-	-	3	-	-	2	-	3	-
Average	3	3	3	3	0	0	0	0	3	0	0	2	0	3	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP63 THERMAL ENGINEERING) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisite: A foundational understanding of Thermodynamics and Fluid Mechanics is typically required as a prerequisite for Thermal Engineering

Course Objectives

- Study of IC engines and propulsion system
- Study of combustion in IC engines
- Understanding of emission, its impact on environment and control
- Study of compressible fluid flow

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand the classification, operation, and performance of internal combustion (IC) engines.	L2
CO2	Analyze the properties of fuels (liquid and gaseous), their impact on combustion in IC engines.	L4
CO3	Study the fundamentals of compressible flow, including stagnation properties, Mach number, isentropic flow, area ratios, and mass flow rates through nozzles and diffusers, with a focus on the variation of Mach number and critical states.	L2
CO4	Explore shock waves, including normal and oblique shocks, their development, governing equations, pressure, and temperature changes, as well as flow characteristics in ducts with friction and heat transfer, and multidimensional flows.	L4
CO5	Examine the principles of jet propulsion and various aircraft jet engines (turbojet, turbofan, turboprop), including engine performance metrics such as thrust, efficiency, and matching, as well as an introduction to rocket engines and their role in space missions.	L2

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO2	3	3	-	3					3	-	-	2	-	-	-
CO3	3	3	-	3					3	-	-	2	-	-	-
CO4	3	3	-	3					3	-	-	2	-	-	-
CO5	3	3	-	3					3	-	-	2	-	-	-
Average	3	3	0	3					3	-	-	2	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP64 Computer Integrated Manufacturing) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisite: A foundational understanding of Manufacturing Processes and basic principles of Computer Programming is typically required as a prerequisite for Computer Integrated Manufacturing.

Course Objectives

- On completion of the course the students are expected to be knowledgeable in converting design information in to manufacturing planning and manufacturing control.
- To gain knowledge on how computers are integrated at various levels of planning and manufacturing and understand the concept of computer networking, CAD/CAM integration, computer process planning and production planning.
- To gain knowledge about the fundamental concept of product design, simultaneous/concurrent engineering and reverse engineering.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand the fundamentals of Computer Integrated Manufacturing (CIM), including its evolution, benefits, and trends	L2
CO2	Explore database management principles relevant to manufacturing, including data representation and shop floor control; gain insights into product design	L4
CO3	Study concurrent and simultaneous engineering practices, design for manufacturing and assembly, and advanced manufacturing planning; introduce reverse engineering	L2
CO4	Learn about production planning and control systems, including computerized PPL, aggregate production planning, understand automated data collection technologies	L2
CO5	Examine modern quality concepts, including TQM and TPM, and ISO standards; explore contact and non-contact quality control methods	L5

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	2	-	1	-	-	-	2	-	-	2	2	2	2
CO2	3	-	2	-	1	-	-	-	2	-	-	2	2	2	2
CO3	3	-	2	-	1	-	-	-	2	-	-	2	2	2	2
CO4	3	-	2	-	1	-	-	-	2	-	-	2	2	2	2
CO5	3	-	2	-	1	-	-	-	2	-	-	2	2	2	2
Average	3	-	2	0	1	0	0	0	2	0	0	2	2	2	2

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Pondy Cuddalore Main Road, Kirumampakkam, Puducherry – 607 403.
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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP65 CONTROL SYSTEM ENGINEERING) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisite: A foundational understanding of Mathematics (particularly Differential Equations and Linear Algebra) and Basic Electrical Engineering principles is typically required as a prerequisite for Control System Engineering.

Course Objectives

- To introduce to the basics of Control System Engineering as part of life.
- To make aware of different tools and duties of Control System Engineer.
- To conversant with Mathematical Modeling of Physical Systems.
- To convey the concepts to analyze the simple systems in time and frequency domain.
- To introduce to Modern Control Systems

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand the fundamentals of control systems, including the basic components and tools for control engineering,	L2
CO2	Develop skills in modeling physical systems across mechanical, thermal, fluid, and electrical domains, and apply block diagram reduction techniques;	L4
CO3	Analyze the response of first-order and second-order systems to various standard input signals, understand sources of errors	L4
CO4	Study the concepts of poles and zeros, system stability, and stability criteria such as the Routh-Hurwitz criterion	L2
CO5	Examine frequency response analysis, including the correlation between time and frequency responses	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO2	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO4	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO5	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
Average	3	3	0	3	0	0	0	0	3	0	0	2	0	0	0

HEAD OF THE DEPARTMENT

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEE74- CONTROL SYSTEM ENGINEERING) [Total no. of. Students: 13] [3rd Year, 6th Semester]
Course Prerequisite: A foundational understanding of Manufacturing Processes and Material Science is typically required as a prerequisite for Metal Forming Processes.

Course Objectives

- To impart knowledge on plasticity, surface treatment for forming of various types of metal forming process.
- To understand the basic concepts of metal forming techniques and to develop force calculation in metal forming process.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand the classification of metal forming processes, including the significance of flow curves	L2
CO2	Explore various forging processes and equipment	L2
CO3	Analyze rolling mills, including the estimation of rolling load and power	L4
CO4	Examine the drawing of rods, wires, and tubes, including load determination	L4
CO5	Learn about high rate energy forming processes	L2

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	1	-	-	-	2	-	-	2	3	3	3
CO2	3	-	-	-	1	-	-	-	2	-	-	2	3	3	3
CO3	3	-	-	-	1	-	-	-	2	-	-	2	3	3	3
CO4	3	-	-	-	1	-	-	-	2	-	-	2	3	3	3
CO5	3	-	-	-	1	-	-	-	2	-	-	2	3	3	3
Average	3	0	0	0	1	0	0	0	2	0	0	2	3	3	3

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP61- Thermal Engineering Laboratory – I) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisite: A foundational understanding of Thermal Engineering principles, as well as basic knowledge in Heat Transfer and Fluid Mechanics, is typically required as a prerequisite for Thermal Engineering Laboratory – I

Course Objectives

- To make the students to understand the different properties of fuels like flash point fire point, viscosity, calorific value etc and the principle of measurement.
- To teach the students principle of working of air compressors and blowers
- To teach the students the different modes of heat transfer like natural convection, forced convection and the use of fins

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Enable students to determine and interpret key fuel properties such as flash point, fire point, viscosity, and calorific value, and understand the principles behind their measurement.	L3
CO2	Teach students the operating principles and performance evaluation methods for reciprocating air compressors and centrifugal air blowers.	L2
CO3	Provide students with practical knowledge of different heat transfer mechanisms, including natural convection, forced convection, and the use of fins, through hands-on experiments.	L2
CO4	Educate students on the composition of exhaust gases and their analysis using the Orsat apparatus, highlighting environmental and performance implications.	L2
CO5	Explain the principles of parallel flow and counterflow heat exchangers, including their design, performance, and practical applications.	L2

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO2	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO3	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO4	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO5	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
Average	3	3	0	3	0	0	0	1	3	0	0	2	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP62- DYNAMICS OF MACHINES LABORATOR) [Total no. of. Students: 13] [3rd Year, 6th Semester]
Course Prerequisite: A foundational understanding of vibration and motion.

Course Objectives

- To teach the students principle of working of various governor.
- To teach the students the different modes of balancing
- To teach the students, various modes of vibration.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Measure radius of gyration and moment of inertia using bifilar and trifilar suspension methods.	L2
CO2	Teach students the working principles and performance characteristics of various types of governors used in mechanical systems.	L2
CO3	Enable students to understand and apply different methods for balancing rotating and reciprocating masses to minimize vibrations and improve machine performance.	L2
CO4	Educate students on different modes of vibration, including their causes, effects, and measurement techniques, to analyze and address vibrational issues in mechanical systems.	L2
CO5	Measure and analyze the pressure distribution in journal bearings under different loads and speeds to study bearing performance.	L2

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO2	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO3	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO4	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
CO5	3	3	-	3	-	-	-	1	3	-	-	2	-	-	-
Average	3	3	0	3	0	0	0	1	3	0	0	2	0	0	0

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COURSE DETAILS

(MEP63- Computational Fluid Dynamics Laboratory) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisite: Basic understanding of fluid mechanics and numerical methods.

Course Objectives

- To Introduce the students to the science of computational fluid dynamics and heat transfer
- Familiarity with pre and post processing steps in CFD study
- Using physics-based simulation for computer aided design and engineering

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Introduce students to computational fluid dynamics (CFD) and heat transfer principles.	L2
CO2	Familiarize students with pre-processing and post-processing steps in CFD simulations	L2
CO3	Apply physics-based simulations to computer-aided design and engineering problems.	L3
CO4	perform grid generation and set boundary conditions for complex geometries.	L4
CO5	Understand and apply multi-physical simulation approaches to the phenomena under investigation.	L2

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**	**PSO3**
CO1	3	2	3	1	2	-	-	1	2	-	-	2	-	-	-
CO2	3	2	3	1	2	-	-	1	2	-	-	2	-	-	-
CO3	3	2	3	1	2	-	-	1	2	-	-	2	-	-	-
CO4	3	2	3	1	2	-	-	1	2	-	-	2	-	-	-
CO5	3	2	3	1	2	-	-	1	2	-	-	2	-	-	-
Average	3	2	3	1	2	0	0	1	2	0	0	2	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP64-GENERAL PROFICIENCY-I) [Total no. of. Students: 13] [3rd Year, 6th Semester]

Course Prerequisites: knowledge about English grammar

COURSE OBJECTIVES

- To provide the concepts of functions of a complex variable, conformal mapping, complex integration, series expansion of complex functions, Harmonic analysis and Fourier series.
- To make the students understand and work out problems of constructing analytic functions, conformal mapping, bilinear transformation, contour integration and expanding functions into Fourier series including Harmonic analysis.

COURSE OUTCOMES

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	To ability construct the technical and non-technical passage	(L5)
CO2	Ability to create Job Application Letter Writing & Resume Writing	(L6)
CO3	Students able to perform Group Discussion	(L2)
CO4	To make the students to be adaptation of corporate life	(L3)
CO5	Students' ability to solve Verbal and numerical aptitude	(L3)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	2	-	-	1	-	1	-	-	-	1	2	-	-
CO2	-	-	2	-	-	1	-	1	-	-	-	1	2	-	-
CO3	-	-	2	-	-	1	-	1	-	-	-	1	2	-	-
CO4	-	-	2	-	-	1	-	1	-	-	-	1	2	-	-
CO5	-	-	2	-	-	1	-	1	-	-	-	1	2	-	-
Average	0	0	2	0	0	1	0	1	0	0	0	1	2	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

SEMESTER VII

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DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2023-2024

COURSE DETAILS

(MET71 COMPUTER AIDED DESIGN) [Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisite: Proficiency in using computers, including familiarity with operating systems, file management, and basic software applications.

Course Objectives

- To understand the principles of Graphics
- To develop the knowledge of computer assisted drawing and modeling Techniques

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Explain the stages and types of design models used in the design process.	L1, L2
CO2	Describe and utilize coordinate systems in graphics, including windowing and viewport transformations.	L2
CO3	Differentiate between wireframe, surface, and solid modeling techniques.	L4
CO4	Compare and understand the features of advanced modeling software like PRO-E, CATIA, IDEAS, and SOLID EDGE.	L4
CO5	Implement data exchange standards like IGES and STEP in CAD applications.	L3

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	3	-	2	-	-	-	2	-	-	2	-	2	-
CO2	3	-	3	-	2	-	-	-	2	-	-	2	-	2	-
CO3	3	-	3	-	2	-	-	-	2	-	-	2	-	2	-
CO4	3	-	3	-	2	-	-	-	2	-	-	2	-	2	-
CO5	3	-	3	-	2	-	-	-	2	-	-	2	-	2	-
Average	3	0	3	0	2	0	0	0	2	0	0	2	0	2	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MET72 Industrial Engineering and Management) [Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisite: foundation in both engineering principles and management practices.

Course Objectives

- To provide the students' knowledge of productivity techniques and systems, industrial engineering and management disciplines
- To fully equip them to take up challenging assignments as industrial engineers, systems managers, productivity advisers, managers of management services or training officers

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Identify and classify material handling equipment, and apply principles to select appropriate equipment for specific material handling needs.	L2
CO2	Apply principles of motion economy and use Therbligs, micromotion, and memomotion studies to enhance work efficiency.	L3
CO3	Utilize qualitative and quantitative forecasting techniques, including moving averages and regression methods, to predict production requirements.	L3
CO4	Analyze financial management concepts including fixed and working capital, sources of finance, and investment alternatives using financial evaluation methods.	L4
CO5	Utilize basic market research techniques to gather and analyze data for informed decision-making in marketing strategies.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	-	-	-	3	3	-	-	2	3	3	3
CO2	3	-	-	-	-	-	-	3	3	-	-	2	3	3	3
CO3	3	-	-	-	-	-	-	3	3	-	-	2	3	3	3
CO4	3	-	-	-	-	-	-	3	3	-	-	2	3	3	3
CO5	3	-	-	-	-	-	-	3	3	-	-	2	3	3	3
Average	3	0	0	0	0	0	0	3	3	0	0	2	3	3	3

HEAD OF THE DEPARTMENT

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MET73 Refrigeration, Air Conditioning and Cryogenic Engineering)

[Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisite: need a foundational understanding in several areas such as thermodynamics, heat transfer and Refrigeration Principles

Course Objectives

- To disseminate the operation of various types of refrigeration systems
- To build up an intuitive understanding of operation of air-conditioning systems
- To develop ability to estimate capacity of any air-conditioner
- To understand the basics of cryogenics and operation of cryogenic systems

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Explain the basic principles of refrigeration, including methods such as evaporative refrigeration, expansion cooling, and throttling.	L2
CO2	Compare the advantages and disadvantages of different refrigeration technologies and their applications.	L3
CO3	Utilize psychometric charts and relations, including Dalton's law of partial pressures and measurements of wet bulb temperature and adiabatic saturation temperature, to analyze air properties.	L4
CO4	Calculate various sources of heat load including conduction, sun load, occupant load, equipment load, infiltration air-load, and moisture gain, using ASHRAE standards.	L3
CO5	Analyze various cryogenic liquefaction systems including Linde-Hampson, Claude, Kapitza, Heylandt, and Simon helium-liquefaction systems, and understand their working principles.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO2	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO4	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO5	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
Average	3	3	0	3	0	0	0	0	3	0	0	2	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MET74 METAL FORMING PROCESSES) [Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisite: foundational concepts you should be familiar with Materials Science , Mechanics of Materials and Engineering Mechanics

Course Objectives

- To impart knowledge on plasticity, surface treatment for forming of various types of metal forming process.
- To understand the basic concepts of metal forming techniques and to develop force calculation in metal forming process.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand and Classify Metal Forming Processes	L2
CO2	Analyze Flow Curves and Their Significance	L4
CO3	Evaluate the Effects of Temperature, Speed, and Metallurgical Structure on Forming Processes	L4
CO4	Assess the Impact of Friction on Forming Processes	L4
CO5	Design Forging Processes and Equipment	L5

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**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	3	3	3
CO3	3	-	-	-	-	-	-	-	3	-	-	2	3	3	3
CO4	3	-	-	-	-	-	-	-	3	-	-	2	3	3	3
CO5	3	-	-	-	-	-	-	-	3	-	-	2	3	3	3
Average	3	0	0	0	0	0	0	0	3	0	0	2	3	3	3

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP71 Thermal Engineering Laboratory - II) [Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisite: Understanding the basic principles of thermodynamics, including laws of thermodynamics, thermodynamic cycles, and properties of gases and vapors.

Course Objectives

- To make the students to understand the principle of working of internal combustion engines and make them to do performance test on petrol engines and diesel engines.
- To make them to understand the load test and heat balance test on IC engines.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Analyze and interpret valve and port timing diagrams for 4-stroke and 2-stroke internal combustion (IC) engines, understanding the impact on engine performance.	L4
CO2	Measure and analyze the performance of a single-cylinder 4-stroke diesel engine, focusing on power, fuel consumption, and efficiency.	L4
CO3	Test and analyze the performance of a cooling tower, including its cooling capacity and efficiency in heat rejection.	L4
CO4	Evaluate the performance of a refrigeration system, focusing on parameters such as cooling capacity, coefficient of performance (COP), and energy consumption.	L5
CO5	Perform a performance test on a vapor absorption refrigeration system to determine its efficiency, cooling capacity, and operational characteristics.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO2	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO4	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
CO5	3	3	-	3	-	-	-	-	3	-	-	2	-	-	-
Average	3	3	0	3	0	0	0	0	3	0	0	2	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP72 Computer Aided Engineering Laboratory) [Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisite: Basic knowledge of programming.

Course Objectives

- To give exposure to students about computer aided design and modelling & analysis software's

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Develop and draft detailed designs of transmission shafts, journal bearings, and flange couplings using FORTRAN.	L3
CO2	Apply 3D modeling techniques using CAD software to create detailed models of machine components, including the use of sketching, part design, assembly, and drafting workbenches.	L3
CO3	Generate complex 3D models through various techniques such as protrusion, revolve, shell, and sweep, demonstrating the ability to use advanced modeling features for component design.	L5
CO4	Perform assembly modeling of components, incorporating a minimum of six machine elements, and demonstrate the ability to handle complex assemblies through at least two part modeling exercises and one assembly exercise.	L5
CO5	Analyze thermal stress and heat transfer in a simple plate, applying FEA software to evaluate thermal effects and stress distribution due to temperature gradients.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	3	-	-	-	-	1	3	-	-	2	-	-	-
CO2	3	-	3	-	-	-	-	1	3	-	-	2	-	-	-
CO3	3	-	3	-	-	-	-	1	3	-	-	2	-	-	-
CO4	3	-	3	-	-	-	-	1	3	-	-	2	-	-	-
CO5	3	-	3	-	-	-	-	1	3	-	-	2	-	-	-
Average	3	-	3	0	0	0	0	1	3	0	0	2	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP73 COMPREHENSIVE VIVA VOCE) [Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisites: Knowledge about communication and all subjects

Course Objectives

- To analyze the understanding of all Programme core & elective subjects.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Ability to remember the subjects	(L2)
CO2	Ability defends the subjects	(L2)
CO3	Ability to identify the problems in Mechanical Engineering concepts	(L2)
CO4	Able to provide the solution for Mechanical Engineering sector	(L2)
CO5	Ability to share the Mechanical Engineering thoughts	(L2)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	-	-	-	-	-	-	-	-	3	2	-	2
CO2	3	3	-	-	-	-	-	-	-	-	-	3	2	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	3	2	-	2
CO4	3	3	-	-	-	-	-	-	-	-	-	3	2	-	2
CO5	3	3	-	-	-	-	-	-	-	-	-	3	2	-	2
Average	3	3	0	0	0	0	0	0	0	0	0	3	2	0	2

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP74 INDUSTERIAL VISIT) [Total no. of. Students: 31] [4th Year, 7th Semester]

Course Prerequisites: Internship

Course Objectives

- To provide the concepts coordination and cooperation for team work
- To provide real time operations of all medical equipment's.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Ability to handle the medical equipment's.	(L3)
CO2	To develop team coordination.	(L5)
CO3	To develop organizational quality by organizing industrial visit	(L5)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	2	1	-	1	-	1	-	-	1	-	2	-	-
CO2	-	-	2	1	-	1	-	1	-	-	1	-	2	-	-
CO3	-	-	2	1	-	1	-	1	-	-	1	-	2	-	-
CO4	-	-	2	1	-	1	-	1	-	-	1	-	2	-	-
CO5	-	-	2	1	-	1	-	1	-	-	1	-	2	-	-
Average	0	0	2	0	0	1	0	1	0	0	0	0	2	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEPW7- PROJECT WORK PHASE 1) [Total no. of. Students:31] [4th Year, 7th Semester]

Course Prerequisites: Internship / In-plant training

COURSE OBJECTIVES

- To provide the innovative ideas to solves the problems in healthcare sector.
- To provide depth knowledge in biomedical engineering.

COURSE OUTCOMES

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	To create a new innovative idea	(L6)
CO2	To develop depth knowledge in medical instrumentation	(L5)
CO3	To create research environments	(L6)
CO4	To understand the research methodology.	(L2)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	-	-	1	-	1	-	-	-	3	2	-	-
CO2	3	3	2	-	-	1	-	1	-	-	-	3	2	-	-
CO3	3	3	2	-	-	1	-	1	-	-	-	3	2	-	-
CO4	3	3	2	-	-	1	-	1	-	-	-	3	2	-	-
CO5	3	3	2	-	-	1	-	1	-	-	-	3	2	-	-
Average	3	3	2	0	0	1	0	1	0	0	0	3	2	0	0

HEAD OF THE DEPARTMENT

Head of the Department,
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DEPARTMENT OF MECHANICAL ENGINEERING

SEMESTER VIII

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DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2023-2024

COURSE DETAILS

(MEP81- POWER PLANT ENGINEERING) [Total no. of. Students:31] [4th Year, 8th Semester]

Course Prerequisite: Basic understanding of foundational knowledge is essential in the area of Basic Engineering Knowledge, Electrical Engineering and Power Plant Cycles and Systems:

Course Objectives

- Introduce the students to fundamentals of power generation using fossil fuels namely coal, gas and liquid
- Familiarizing with the power generation terminology and performance figures
- Power plant equipment for fuel handling, steam generation, feed water, combustion air and flue gas
- Emission control through equipment and process modification
- Estimation of power costs through the Economics involved in power plant construction and operation

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Explain the current power generation scenario in India and the role of various power plants in meeting energy demands.	L2
CO2	Discuss the air handling systems in power plants, including forced draught fans, primary and secondary air systems, and methods of producing draught.	L3
CO3	Classify steam turbines and analyze turbine blading and velocity diagrams for impulse and reaction turbines.	L4
CO4	Compare nuclear power plants with coal-fired power plants in terms of fuel requirements, safety, and waste disposal.	L4
CO5	Define and analyze fluctuating loads, load curves, and the impact of variable loads on power plant operations.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	3	-	-	2	-	3	-	-	2	-	1	-
CO2	3	3	-	3	-	-	2	-	3	-	-	2	-	1	-
CO3	3	3	-	3	-	-	2	-	3	-	-	2	-	1	-
CO4	3	3	-	3	-	-	2	-	3	-	-	2	-	1	-
CO5	3	3	-	3	-	-	2	-	3	-	-	2	-	1	-
Average	3	3	0	3	0	0	2	-	3	0	0	2	0	1	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEE83- COMPOSITE MATERIALS) [Total no. of. Students:31] [4th Year, 8th Semester]

Course Prerequisite: Understanding the basic principles of materials science, including atomic structure, bonding, crystallography, and the properties of metals, ceramics, and polymers.

Course Objectives

- To learn the fundamental knowledge on composites materials and their unique properties.
- To be able to fabricate fiber reinforced, polymer composite products using a variety of processes and to know how variables affect the processing and product performance.
- To be able to use rework and repair methods common to the fabrication of composite products.
- To be able to synthesis a new advanced composite indigenously by individual student.
- To acquire knowledge on latest green composites.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Define composite materials and explain the need for and general characteristics of composites, types of reinforcement materials	L1
CO2	Describe different types of matrix resins used in polymer matrix composites, including thermosetting and thermoplastic resins.	L2
CO3	Discuss the criteria for matrix selection in metal matrix composites.	L3
CO4	Explain the fabrication methods for metal matrix composites, including solid-state techniques and liquid-state techniques.	L2
CO5	Analyze the monotonic strength and fracture behavior of composites.	L4

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	-	-	-	-	3	-	-	2	2	1	2
CO2	3	-	-	-	-	-	-	-	3	-	-	2	2	1	2
CO3	3	-	-	-	-	-	-	-	3	-	-	2	2	1	2
CO4	3	-	-	-	-	-	-	-	3	-	-	2	2	1	2
CO5	3	-	-	-	-	-	-	-	3	-	-	2	2	1	2
Average	3	0	0	0	0	0	0	0	3	0	0	2	2	1	2

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEE85- Maintenance and Safety Engineering) [Total no. of. Students:31] [4th Year, 8th Semester]

Course Prerequisite: Understanding the basic principles of mechanics, including statics, dynamics, and the behavior of materials under different loading conditions.

Course Objective

- Focused study on the issues of maintenance, reliability and safety of technical systems
- Fault finding and diagnostics in engineering industry
- Knowledge of lubricants and lubrication systems
- Understand maintenance requirements of plant and equipment with increased sophistication and complexity.

Course Outcomes

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Understand and apply fundamental concepts of maintenance engineering, including preventive, predictive, and corrective maintenance strategies.	L2
CO2	Analyze and implement reliability-centered maintenance (RCM) and total productive maintenance (TPM) practices to enhance equipment reliability and performance.	L3
CO3	Define and explain concepts related to reliability-based design, including failure rate, Mean Time To Failure (MTTF), Mean Time Between Failures (MTBF), and different failure patterns.	L3
CO4	Conduct accident reporting and investigation, and measure safety performance using established metrics.	L4
CO5	Ensure compliance with emergency exit facilities, NFPA Standards, and ISO 14000 for environmental management and safety.	L5

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	-	-	-	-	3	-	-	2	-	1	2
CO2	3	-	-	-	-	-	-	-	3	-	-	2	-	1	2
CO3	3	-	-	-	-	-	-	-	3	-	-	2	-	1	2
CO4	3	-	-	-	-	-	-	-	3	-	-	2	-	1	2
CO5	3	-	-	-	-	-	-	-	3	-	-	2	-	1	2
Average	3	0	0	0	0	0	0	0	3	0	0	2	0	1	2

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MET82- Professional Ethics and Indian Constitution) [Total no. of. Students:31] [4th Year, 8th Semester]

COURSE OBJECTIVES

- To provide the concepts of functions of a complex variable, conformal mapping, complex integration, series expansion of complex functions, Harmonic analysis and Fourier series.
- To make the students understand and work out problems of constructing analytic functions, conformal mapping, bilinear transformation, contour integration and expanding functions into Fourier series including Harmonic analysis.

COURSE OUTCOMES

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	To understand the Engineering Ethics – Moral issues, Ethical theories and their uses	(L2)
CO2	To understand the Engineering as Experimentation – Code of Ethics	(L2)
CO3	To understand Engineer's responsibility for safety	(L2)
CO4	To understand the Responsibilities and rights	(L2)
CO5	To understand the Global issues of engineering ethics	(L2)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications.
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools.
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
Average	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEPW8- Project Work (Phase II)) [Total no. of. Students:31] [4th Year, 8th Semester]

Course Prerequisites: Knowledge of designing biomedical projects, preparation of reports

COURSE OBJECTIVES

- To provide analyze the biomedical problems.
- To develop solution for issues in healthcare sectors.

COURSE OUTCOMES

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	Ability to identify the problems in healthcare sector	(L4)
CO2	Ability to design research protocol	(L4)
CO3	Ability to carry out the projects in healthcare sector	(L4)
CO4	Ability to provide solution for healthcare problems	(L5)
CO5	Ability prepares the research report	(L4)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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DEPARTMENT OF MECHANICAL ENGINEERING

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	-	-	1	-	1	-	2	-	3	2	2	2
CO2	3	3	2	-	-	1	-	1	-	2	-	3	2	2	2
CO3	3	3	2	-	-	1	-	1	-	2	-	3	2	2	2
CO4	3	3	2	-	-	1	-	1	-	2	-	3	2	2	2
CO5	3	3	2	-	-	1	-	1	-	2	-	3	2	2	2
Average	3	3	2	0	0	1	0	1	0	2	0	3	2	2	2

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE DETAILS

(MEP81- SEMINAR) [Total no. of. Students:31] [4th Year, 8th Semester]

Course Prerequisites: Spoken English, concern Subject knowledge.

COURSE OBJECTIVES

- To provide confidence to communicate their thoughts.
- To make the ability to presentation of subjects
- To enhance the demonstration of their projects.

COURSE OUTCOMES

COS	Upon successful completion of this course, students should be able to:	RBT
CO1	To improve the communication.	(L2)
CO2	To develop the personality	(L2)
CO3	To create the knowledge shrining	(L2)
CO4	To enhance the confidence	(L2)

PO AND PSO OVERVIEW

Program Outcomes		Program Specific Outcomes
PO1	Engineering Knowledge	PSO1 Capacity to develop manufacturing procedures that adhere to particular material and other specifications. PSO2 Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools. PSO3 Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
PO2	Problem analysis	
PO3	Design/development of solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	The engineer and society	
PO7	Environment and sustainability	
PO8	Ethics	
PO9	Individual and team work	
PO10	Communication	
PO11	Project management and finance	
PO12	Life-long learning	

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MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Capacity to develop manufacturing procedures that adhere to particular material and other specifications.	Capacity to develop and resolve problems in real time using industrial, manufacturing, and design tools	Capacity to apply production planning, strategy, quality, and control ideas to gain a competitive edge
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	2	-	3	-	-	1	-	3	-	3	-	-	-
CO2	3	-	2	-	3	-	-	1	-	3	-	3	-	-	-
CO3	3	-	2	-	3	-	-	1	-	3	-	3	-	-	-
CO4	3	-	2	-	3	-	-	1	-	3	-	3	-	-	-
Average	3	0	2	0	3	0	0	1	0	3	0	3	0	0	0

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