

I-TEAR J

Reg. No. :

Question Paper Code : 30073

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

First/Second Semester

Mechanical Engineering

ME25C03 — INTRODUCTION TO MECHANICAL ENGINEERING

(Common to : Aeronautical Engineering/Aerospace Engineering/Automobile Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Mechanical Engineering (Specialised in Automobile)/Mechanical Engineering (Specialised in Smart Manufacturing)/Mechanical Engineering (Tamil Medium)/Mechanical and Automation Engineering/Mechatronics Engineering/Robotics and Artificial Intelligence/Robotics and Automation/Pharmaceutical Technology)

(Regulations 2025)

Time : 3 hours

Maximum : 100 marks

CO – Course Outcomes

CO1	Explain core mechanical engineering concepts.
CO2	Apply basic engineering calculations in mechanical systems.
CO3	Identify common manufacturing processes for engineering applications.

BL – Bloom's Taxonomy Levels

(L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create)

Answer ALL questions.

PART – A (Total Marks = 40)

[Q. No. 1 to Q. No. 10 ; $10 \times 1 = 10$ Marks (Multiple Choice Questions)]

Q. No. 11 to Q. No. 20; $10 \times 3 = 30$ Marks]

Q.No.	Questions	Marks	CO	BL
1.	The rate at which work is performed is termed as (A) Force (B) Energy (C) Power (D) Pressure	1	1	1

2.	Heat transfer occurring due to molecular interaction is (A) Convection (B) Radiation (C) Conduction (D) Reflection	1	1	1
3.	Work done becomes zero when displacement is (A) Parallel to force (B) Perpendicular to force (C) Opposite to force (D) Equal to force	1	1	2
4.	Efficiency of a system is defined as (A) Output / Input (B) Input / Output (C) Work $\times$ Time (D) Force $\times$ Distance	1	2	1
5.	A material subjected to higher load without change in area will experience (A) Lower stress (B) Higher stress (C) No change in stress (D) Zero stress	1	2	2
6.	Heat transfer rate increases when temperature difference (A) Decreases (B) Increases (C) Becomes zero (D) Remains constant	1	2	1
7.	CNC machines operate based on (A) Manual instructions given during machining (B) Pre-programmed numerical codes (C) Mechanical cam mechanisms (D) Hydraulic pressure variations	1	3	1

8.	Smart manufacturing primarily involves the integration of (A) Manual processes and traditional tools (B) Digital technologies and automated systems (C) Mechanical operations without sensors (D) Conventional machining methods only	1	3	2
9.	The process of shaping metal using compressive force without material removal is (A) Machining (B) Forming (C) Casting (D) Grinding	1	3	1
10.	Additive manufacturing is advantageous because (A) It removes excess material (B) It builds components layer by layer (C) It requires molds (D) It reduces accuracy	1	3	2
11.	State any three types of stresses encountered in engineering material with the help of sketches.	3	1	1
12.	Write the relationship between stress and strain in elastic materials.	3	1	2
13.	How does radiation heat transfer occur without a medium? Give two examples.	3	1	1
14.	Why is dimensional homogeneity essential in engineering equations?	3	2	2
15.	How is the efficiency of a petrol-driven motorcycle determined?	3	2	2
16.	A mild steel rod of diameter 2 cm and length 500 mm is subjected to an axial tensile load of 25 kN, then rod was elongated by 0.16 mm. Calculate tensile stress in the rod.	3	2	2
17.	State the unit of thermal conductivity and identify its significance.	3	2	1

18.	When are riveted joints preferred over welded joints? Give two examples.	3	3	2
19.	Differentiate between feed and depth of cut in machining. State their units.	3	3	1
20.	What safety procedures should be followed during practical classes in college workshops?	3	3	2

PART – B (5 × 12 = 60 marks)

Q.No.		Questions	Marks	CO	BL
21.	(a)	Describe the stress-strain behavior of engineering materials and explain the significance of elastic and plastic regions in practical applications.	12	1	2
		OR			
	(b)	Explain the working principles of heat engines and refrigeration systems and discuss their significance in daily life applications.	12	1	2
22.	(a)	A motor lifts a load of 2000 N through a height of 15 m in 20 seconds. (i) Calculate the work done by the motor. (ii) Determine the power developed. (iii) If the input power supplied to the motor is 2 kW, evaluate its efficiency. (iv) Determine the new power developed when the motor lifts a load of 3000 N under the same conditions.	12	2	3
		OR			

	(b)	Two rods are connected in series: Rod 1: length 1 m, area 300 mm ² Rod 2: length 2 m, area 300 mm ² A load of 30 kN is applied. Determine the stress in each rod and the total elongation. Take Modulus of Elasticity as 200 GPa.	12	2	3
23.	(a)	Explain the basic working principles of casting and forming processes with suitable examples from everyday applications. Discuss your observations on how these processes influence product shape and properties.	12	3	1
	OR				
	(b)	Sketch and explain the working of any one welding process. List the accessories involved and discuss their necessity.	12	3	1
24.	(a)	Explain the history and evolution of mechanical engineering from early human civilization to the modern industrial era. Discuss how major technological advancements have shaped the field.	12	1	2
	OR				
	(b)	Discuss the basic principles of heat transfer by conduction and convection. State the governing equations for each mode and illustrate their applications using suitable real-life examples.	12	2	2

25.	(a)	Explain the importance of ethics and professionalism in engineering practice. Based on your own experience in practical environments, describe a situation where ethical behavior influenced decision-making and discuss its impact.	12	1	2
	OR				
	(b)	Using a bicycle as an example, identify five machine elements. For each element, explain the manufacturing method used to produce it and describe its function.	12	3	2