Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 26-05-2025 **Time:** 01:00 pm – 04:00 pm

School: SOE	**Program**: B. Tech	
Course Code: MEC2011	**Course Name:** MECHANICS OF SOLIDS	
Semester: IV	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	14	14	24	24	24

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

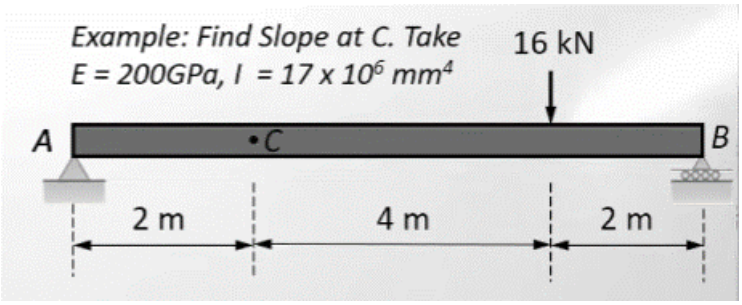
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

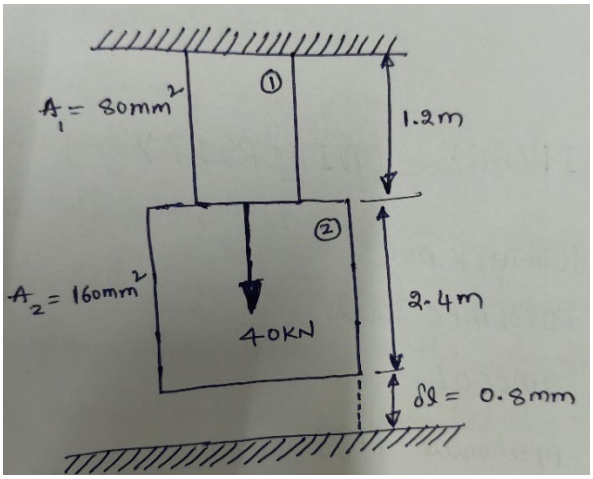
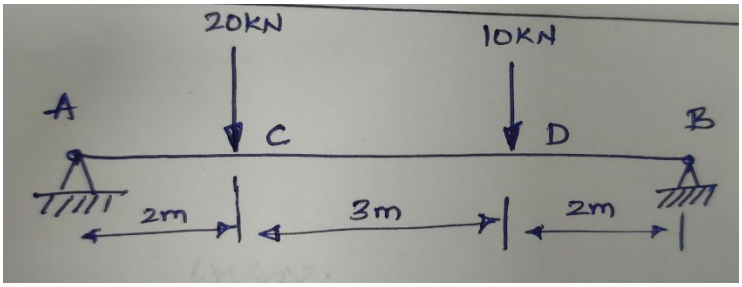
1.	Define Poisson's ratio.	**2 Marks**	**L1**	**CO1**
2.	State Hooke's Law and its significance.	**2 Marks**	**L1**	**CO1**
3.	Define statically indeterminacy in axially loaded members.	**2 Marks**	**L1**	**CO2**
4.	What is normal stress and shear stress?	**2 Marks**	**L1**	**CO2**
5.	Define the point of contraflexure with a suitable figure.	**2 Marks**	**L1**	**CO3**
6.	Define slope and deflection with a neat sketch?	**2 Marks**	**L1**	**CO3**
7.	Write the bending equation and explain its terms.	**2 Marks**	**L1**	**CO4**
8.	Define moment of inertia, and give its formulas for the rectangular and circular bar?	**2 Marks**	**L1**	**CO4**
9.	Give assumptions for the theory of simple bending?	**2 Marks**	**L1**	**CO5**
10.	Determine the maximum bending stress developed in a beam of rectangular cross section 50 × 150 mm when a bending moment of 600 N- m is applied about X-X axis.	**2 Marks**	**L5**	**CO5**

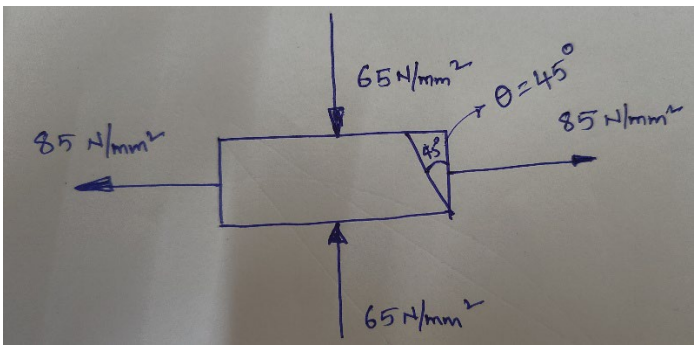
Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	A cylindrical rod of diameter 20 mm and length 2 m is subjected to a tensile force of 50 kN. Determine the stress and strain in the rod if the material has a Young's modulus of 200 GPa.	**20 Marks**	**L5**	**CO1**
	b.	A bar of length 500 mm is subjected to an axial tensile force of 40 kN. The elongation observed is 0.25 mm, and the diameter remains unchanged. Determine the Young's modulus if the cross-sectional area is 200 mm^2.		**L5**	**CO2**
		Or			
12.	**a.**	A steel rod of diameter 25 mm and length 1.5 m is fixed at both ends. If the temperature increases by 40°C, find the thermal stress induced in the rod. Assume $\alpha = 12 \times 10^{-6}$ /°C and E = 200 GPa.	**20 Marks**	**L5**	**CO1**
	b.	A composite bar consists of a steel rod and a copper rod of equal length, rigidly joined together. The assembly is subjected to an axial load of 60 kN. If the area of steel is 600 mm^2 and copper is 900 mm^2, and their respective Young's moduli are 200 GPa and 100 GPa, determine the load shared by each material.		**L5**	**CO2**

13.	**a.**	A cast iron beam 40mm wide and 80 mm deep is simply supported on a span of 1.2 m. The beam carries a point load of 15 KN at the center. Find the deflection at the centre. Take E = 108 × 1000 N/mm^2.	**20 Marks**	**L5**	**CO3**
	b.	Give expressions for the slope and deflections of the simply supported beam based on the double integration method for the loads (Point load and UDL) at all possible ends.		**L3**	**CO3**
		Or			
14.	Find the slope and defection for the following Figure using the moment area method. 		**20 Marks**	**L5**	**CO3**

15.	A bar is loaded as shown in the figure. Determine a) Reaction at the lower support b) Stresses in the bars. Take E = 205 GPa. 	**20 Marks**	**L4**	**CO4**
	Or			
16.	For a simply supported beam shown in figure, determine support reactions at A and B. Draw SFD and BMD diagram and also find point of contra flexure (If any)? 	**20 Marks**	**L4**	**CO4**

17.	Derive the differential equation for the bending moment of a beam subjected to loading.	**20 Marks**	**L5**	**CO5**
	Or			
18.	a. A circular beam of 120 mm diameter is simply supported over a span of 10 m and carries a UDL of 1000 N/m. Find the maximum bending stress produced?	**20 Marks**	**L5**	**CO5**
	b. Draw the Mohr's Circle for the given bar and determine normal, resultant, and shear stress 		**L6**	**CO5**