



	InSem Examination-II Summer 2024		
	Exam Seat No.:		
	Academic Year :2023-2024	Semester: IV	
	Name of Programme: SY B.Tech	Pattern: 2022	
	Name of Course: Mechanics of Material	Course Code: MEC222013	
	Max. Marks: 30	Duration: 1 Hr	

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last column indicates the Course Outcome of the Question/sub-question.

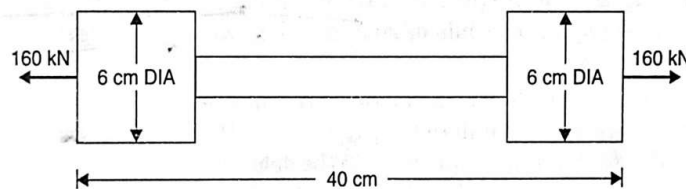
Question No. 1 Attempt following Question

- a) Explain the concept of Thermal Stress and Strains with an example. (5) CO1

OR

- b) Explain the following terms i) Principle of Superposition ii) Statically Indeterminate Structures (5) CO1

- c) The Bar shown in figure is subjected to a tensile load of 160 kN. If the stresses in the middle portion (10) CO1 is limited to 150 N/mm^2 , Determine the Diameter of the Middle Portion. Find also the length of the middle portion, if the total elongation of the bar is to be 0.2 mm. Young's modulus is given as $2.1 \times 10^5 \text{ N/mm}^2$



OR

- d) A steel tube of 30 mm external diameter and 20 mm internal diameter encloses a copper rod of 15 mm diameter to which it is rigidly joined at each end. If at a temperature of 10°C there is no longitudinal stress, Calculate the stresses in the rod and tube when the temperature is raised to 200°C . Take E for steel and Copper as $2.1 \times 10^5 \text{ N/mm}^2$ and $1 \times 10^5 \text{ N/mm}^2$ respectively. The value of coefficient of Linear expansion for steel and copper is given as $11 \times 10^{-6} \text{ per } ^\circ\text{C}$ and $18 \times 10^{-6} \text{ per } ^\circ\text{C}$ respectively. (10) CO1

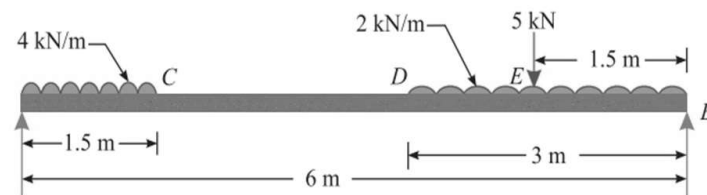
Question No. 2 Attempt following Question

- a) Write the Bending Formula and explain the terms involved in it (5) CO2

OR

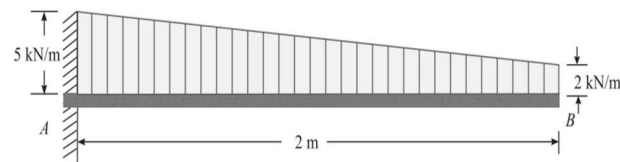
- b) Write the Shear Formula and explain the terms involved in it (5) CO2

- c) A simply supported beam AB, 6 m long is loaded as shown in Fig. Construct the shear force and bending moment diagrams for the beam and find the position and value of maximum bending moment. (10) CO2



OR

- d) A cantilever beam of 2 m span is subjected to a gradually varying load from 2 kN/m to 5 kN/m as shown in Fig. Draw the shear force and bending moment diagrams for the beam. (10) CO2



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