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School of Engineering
Mid-Term Examinations - November 2024

Semester: 3 rd	Date: 07-11-2024
Course Code: CIV2007_v03	Time: 09.30am to 11.00am
Course Name: Strength of Materials	Max Marks: 50
Program: B. Tech	Weightage: 25%

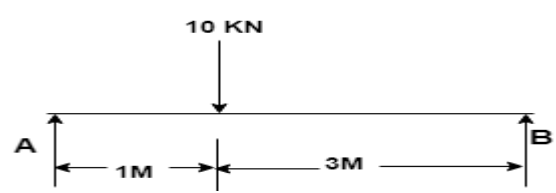
Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

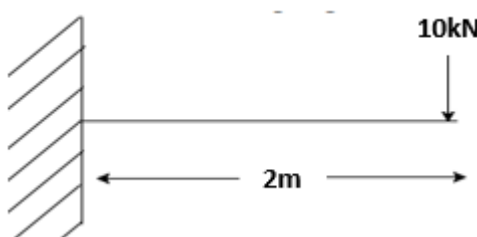
Part A

Answer ALL the Questions. Each question carries 2marks. 5Qx2M=10M

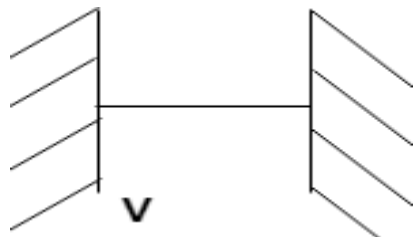
- 1** Convert $2 \times 10^6 \text{ N/m}^2$ into N/mm^2 . **2 Marks** **L1** **C01**
- 2** Find the reaction at the simple support A? **2 Marks** **L1** **C02**



- 3** Find the strain of a brass rod of length 250mm which is subjected to a tensile load of 50kN when the extension of rod is equal to 0.3mm? **2 Marks** **L1** **C01**
- 4** Name the beams that the below diagram depicts: **2 Marks** **L1** **C02**



(a)



(b)

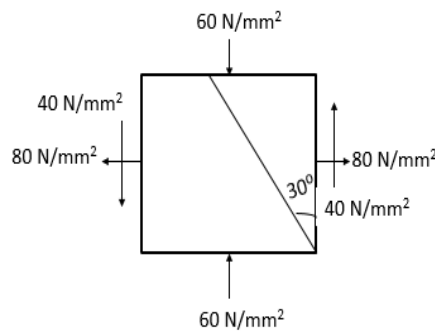
- 5** Define Poisson's Ratio and Volumetric strain. Write the expressions for the same. **2 Marks** **L1** **C01**

Part B

Answer ALL Questions. Each question carries 10 marks.

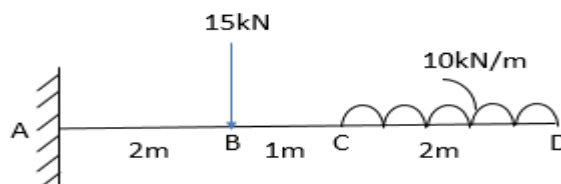
4QX10M=40M

- 6 At a point in an elastic material, the stresses on two perpendicular planes are 80 N/mm^2 (tensile) and 60 N/mm^2 (compressive). There is also a shear stress of 40 N/mm^2 . Find the normal stress and shear stress on a plane making an angle of 30° with the plane on which the tensile stress acts. Also, find the values of principal stresses and the location of principal planes. **10Marks L2 CO1**



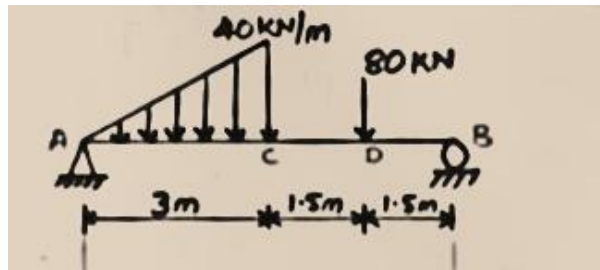
Or

- 7 At a point in a loaded elastic member, there are normal stresses of 60 N/mm^2 and 40 N/mm^2 both tensile respectively at right angles to each other. The positive shear stress of 20 N/mm^2 are also acting. Draw the Mohr's Circle diagram and find (i) Principal stresses and their planes, (ii) Maximum shear stress **10Marks L2 CO1**
- 8 For the cantilever beam shown below, calculate the support reactions and Draw the shear force diagram only. **10Marks L2 CO2**

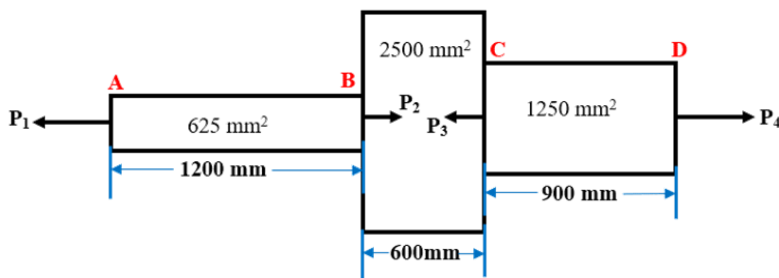


Or

- 9 For the simply supported beam given , determine only the support reactions. **10Marks** **L2** **CO2**



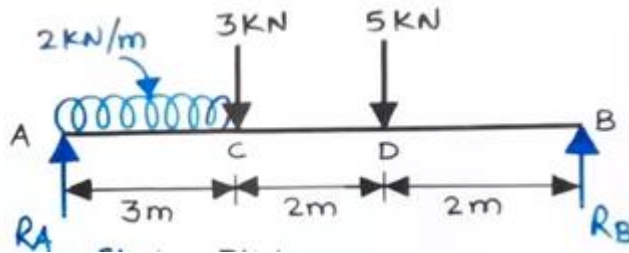
- 10 A stepped member ABCD made up of steel is subjected to point loads P_1 , P_2 , P_3 and P_4 as shown in Fig 1. Calculate the force P_2 necessary for equilibrium, if $P_1 = 45$ kN, $P_3 = 450$ kN & $P_4 = 130$ kN. Also, Determine the total elongation of the member if the Young's modulus of steel is 2.1×10^5 N/mm². The area of each cross section and length of different segments are as indicated in the figure below. **10Marks** **L2** **CO1**



Or

- 11 A tension test was carried out on a steel specimen to determine the elastic constants. The original diameter and length of the specimen were 50 mm and 1000 mm respectively and the change in length at 200 kN was recorded to be 0.509mm. If the corresponding change in diameter at the same load was 0.007635 mm, compute all three elastic constants or modulli. **10Marks** **L2** **CO1**

- 12 For the simply supported beam given , determine the support reactions . Draw the SFD and BMD . **10Marks** **L2** **CO2**



Or

- 13 A simply supported beam shown in the figure carries one concentrated load and a uniformly distributed load. Draw shear force diagram and Bending moment diagram. Also determine the point of contraflexure. **10Marks** **L2** **CO2**

