Total No. of Questions : 4]

SEAT No. :

PE-529

[Total No. of Pages : 3

[6578]-2
S.E. (Civil) (Insem.)
MECHANICS OF STRUCTURE
(2019 Pattern) (Semester - III) (201002)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic pocket calculator is permitted.***

Q1) a) Two solid circular bars are as shown in figure 1. Determine force P required for equilibrium. Also find stress in each bar and total change in length of the assembly. **[8]**

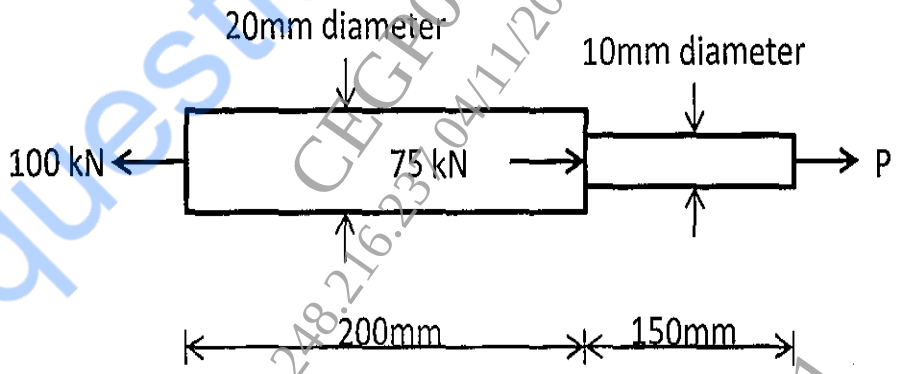

Figure 1

b) A compound bar is constructed from three bars 50 mm wide and 12mm thick fastened together. Middle bar is copper and outer two bars are of steel. The copper bar has an E = 100 GPa, while the steel bars have E = 200 GPa. Determine the stresses produced in the copper and steel if the bars are originally fastened at 18°C and the temperature of the entire assembly is subsequently raised to 50°C. Coefficient of thermal expansion for copper and steel are 18×10^{-6} per °C and 12×10^{-6} per°C respectively. **[7]**

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OR

Q2) a) A copper rod with a diameter of 40 mm is firmly enclosed by a cast iron tube with an external diameter of 80 mm. The ends of these components are rigidly connected. When subjected to a compressive force of 30 kN, what will be the load borne by each of them? Additionally, calculate the extent to which the compound bar will contract if its length is 2 meters. **[8]**

b) A solid steel rod of 40 mm diameter and 4m length is subjected to tensile load of 40 kN. Determine its elongation. If this rod is bored centrally with diameter of 20mm till 3.6m from one side, find increase in elongation. Take modulus of elasticity of steel as 2×10^5 N/mm^2. **[7]**

Q3) a) Plot Shear force and Bending moment diagram for the overhanging beam loaded and supported as shown in Figure 2 **[8]**

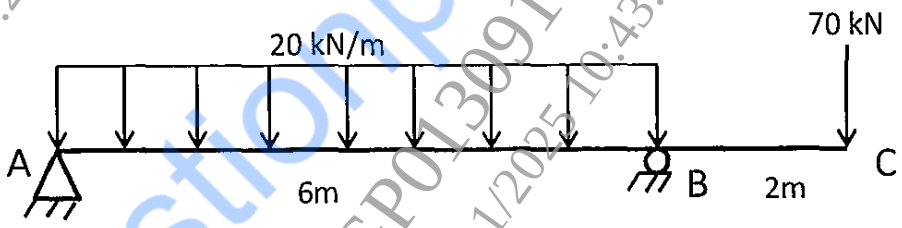

Figure 2

b) Plot Shear force and Bending moment diagram for the cantilever beam loaded and supported as shown in Figure 3 **[7]**

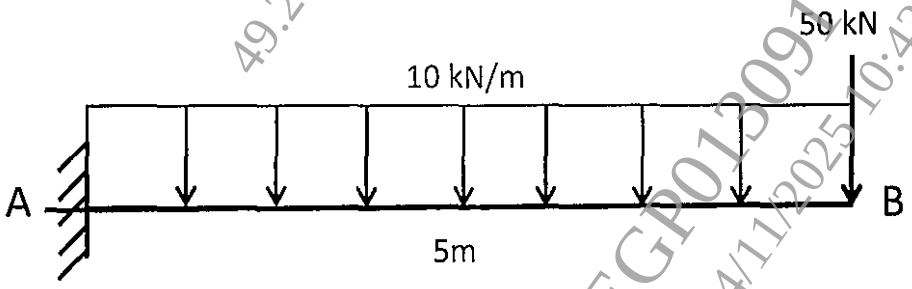

Figure 3

OR

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Q4) a) Plot Shear force and Bending moment diagram for the simply supported beam loaded and supported as shown in Figure 4 **[8]**

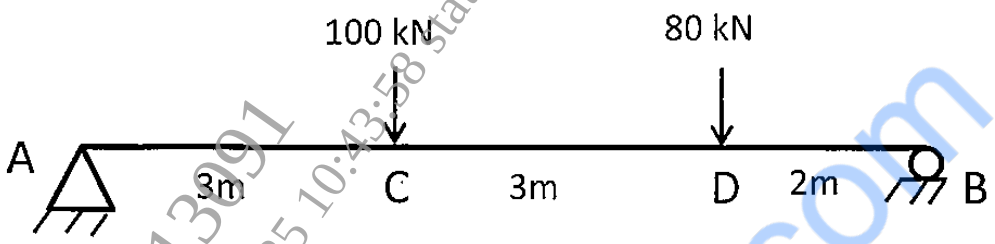
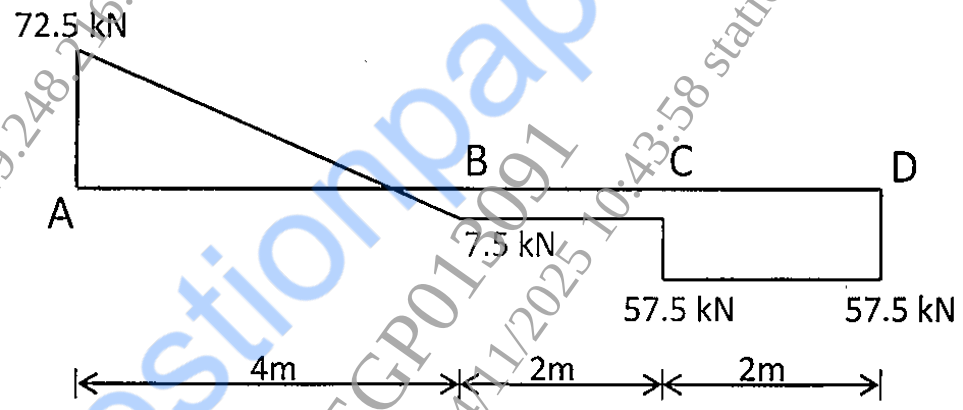


Figure 4

b) Fig 5 shows the shear force diagram. Plot loading diagram and bending moment diagram from this shear force diagram. **[7]**



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