Total No. of Questions : 4]

SEAT No. :

**PC-438**

[Total No. of Pages : 3

# [6359]-559

## S.E. (Mech./Sandwich) (Automobile & Mechanical Engg.) (Automation & Robotics Engg.) (Insem)

## SOLID MECHANICS

## (2019 Pattern) (Semester - III) (202041)

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

***Instructions to the candidates :***

1) ***Answer Q1 or Q2, Q3 or Q4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data wherever necessary.***

***Q1)*** a) A steel block 360mm × 80mm × 160mm is subjected to the following forces **[8]**

i) A tensile force of 1280KN on the 160mm × 80mm faces (take as a X-direction)

ii) A tensile force 3456 KN the 360mm × 80mm faces (take as a Y-direction) and

iii) A compressive force of 5184KN on the 160mm × 360mm faces (take as a Z-direction)

Find the changes in the dimensions of the block and also the change in volume. Take E = 2 × 105 N/mm$^2$ and 1/m = 0.25

b) In a tensile test on steel tube of external diameter 18 mm and internal diameter 12 mm, an axial pull of 2 kN produces stretch of $6.72 \times 10^{-3}$ mm in a length of 100 mm and lateral contraction of $3.62 \times 10^{-4}$ mm in an outer diameter. Calculate the values of three Moduli and Poisson's ratio of material. **[7]**

OR

***P.T.O.***

***Q2)*** a) Determine the temperature change that will cause a compressive stress of 36 MPa in the composite bar as shown in fig. 2(a). Take $E_{st} = 210 \times 10^3$ N/mm$^2$ and $E_{AL} = 0.7 \times 10^5$ N/mm$^2$, $\alpha s = 1.2 \times 10^{-5}$ and $\alpha a = 2.30 \times 10^{-5}$ per °C. **[7]**

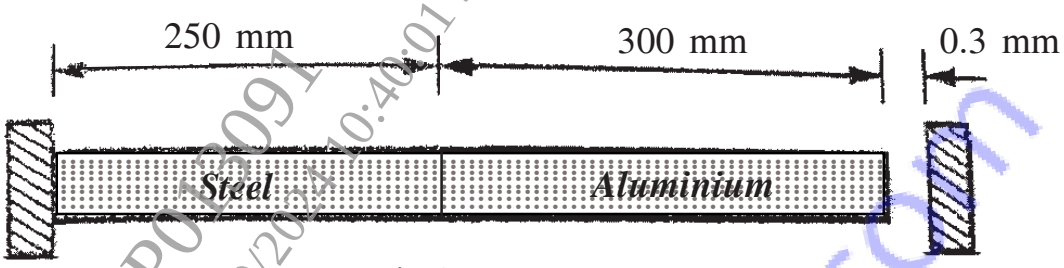


Fig.2(a)

b) A rigid rod ABCD is supported by a hinge at A and two wires at B and C as shown in figure 2.(b). Determine the stresses and elongation of the two wires, Take Es=200 GPa and Ec100 GPa **[8]**

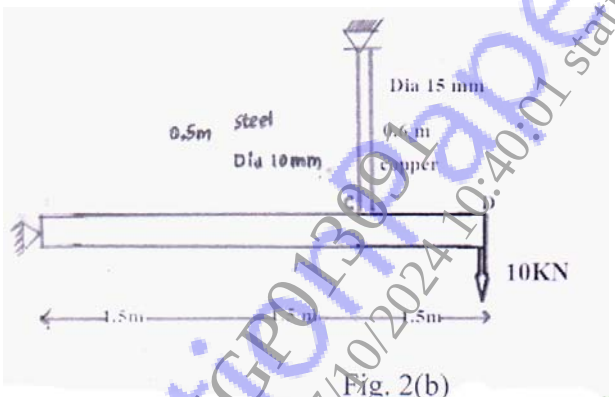


Fig. 2(b)

***Q3)*** a) Draw SFD & BMD of the beam shown in figure 3.(a), Also locate the point of contra-flexure from left end. **[8]**

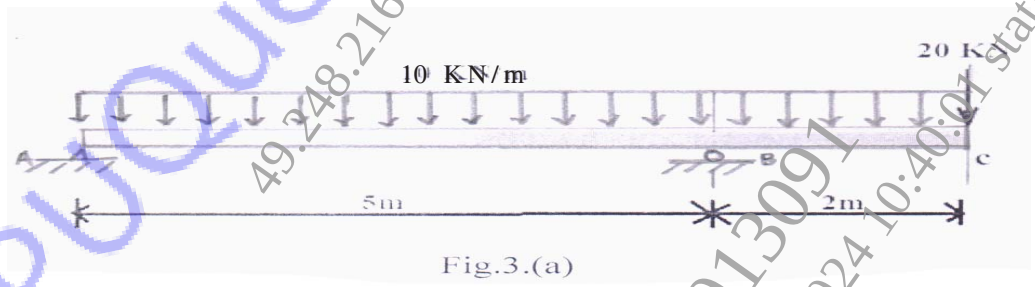


Fig.3.(a)

b) Draw SFD & BMD of the beam shown in figure 3.(b), Also locate the point of contra-flexure from left end. **[7]**

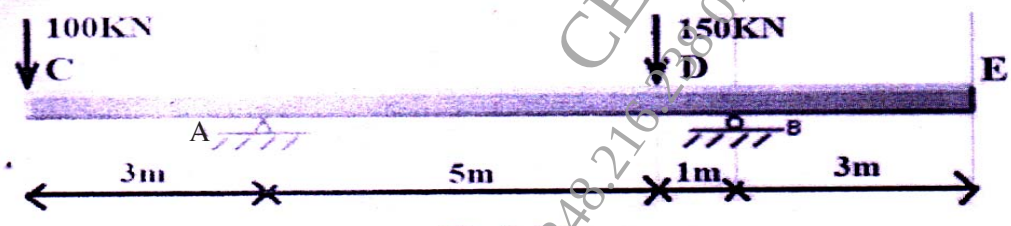


Fig.3.(b)

OR

***Q4)*** a) A beam AB 10 m is subjected to couples as shown in fig.4(a) Draw SFD and BMD and determine position of point of contra-flexure if any. **[7]**

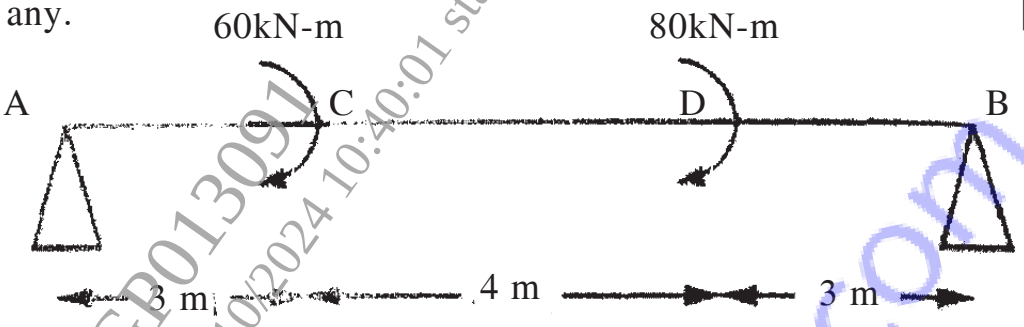


Fig. 4(a)

b) Draw SFD and BMD for a beam shown in fig. 4(b). Determine zero shear force point from left support. **[8]**

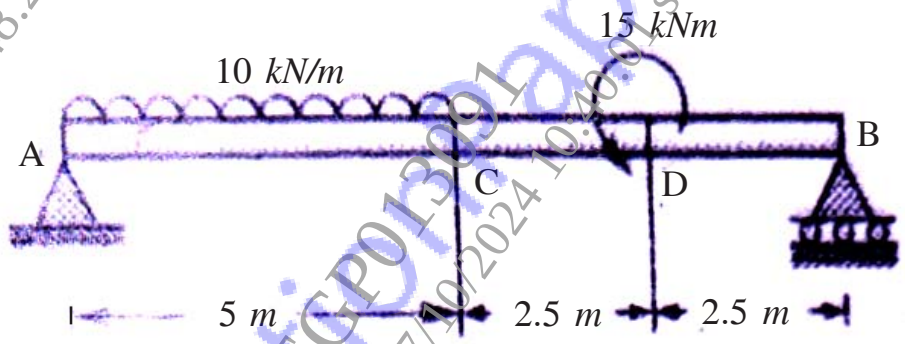


Fig. 4(b)

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