

Total No. of Questions : 4]

SEAT No. :

PA-2485

[Total No. of Pages : 2

[5931]-46

S.E. (Production/Production & Industrial Engg./Production -S.W./RA)

STRENGTH OF MATERIALS

(2019 Pattern) (Semester - I) (211082)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right side indicates full marks.
- 3) Use of Calculator is allowed.
- 4) Assume suitable data if necessary.

Q1) a) State and Explain the Hook's law. [4]

b) A rod of 150cm long and of diameter 2 cm is subjected to an axial pull of 20KN. If the modulus of elasticity of the rod material is 2×10^5 N/mm² Determine. [5]

i) Stress.

ii) Strain.

iii) Elongation.

c) In a tensile test carried out on 16mm diameter rod, the elongation measured on 100 mm length was found to be 0.1 mm under a load of 40KN. The change in diameter was found to be 0.045 mm. Determine Young's Modulus and Poisson's Ratio for rod material. Also find the change in volume of bar. [6]

OR

Q2) a) Explain the concept of 'Thermal Stresses in Composite Bar' and also derive the expression for the same. [5]

b) A steel bar 4m long is 32 mm in diameter for 1m of length, 28 mm in diameter for 2 m length and 25 mm in diameter for remaining 1m length. The bar is in tension and the stress on the smallest section is 110 N/mm². Find total elongation of the bar. [5]

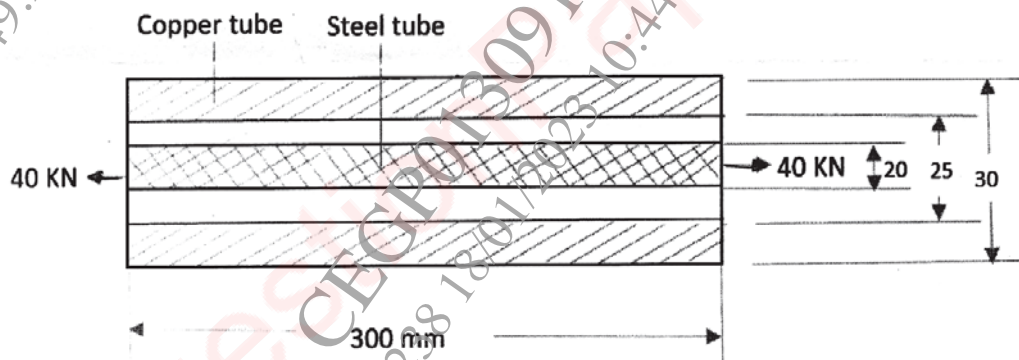
c) A short concrete column section of 300 mm \times 300 mm section is reinforced axially with four symmetrically placed steel bars each 200 mm² in the area. If the applied load P = 750KN, compute the stresses developed in each material. Assume modulus of elasticity for steel material as 13 times that of concrete. [5]

P.T.O.

- Q3)** a) State with neat sketches, different types of beams. [3]
 b) Explain the rules to draw the shear force and bending moment diagram. [4]
 c) Draw the shear force and bending moment diagram for a simply supported beam AB of length 8m having point loads of 4 kN, 10 kN, and 7 kN at 1.5m, 4m, and 6 m from end A respectively. [8]

OR

- Q4)** a) Draw shear force and bending moment diagram for a simply supported beam carrying 18 kN/m run spread over a distance of 4m from left end. Take the span of beam as 9m. [7]
 b) A Mild steel rod of 20 mm diameter and 300 mm long is enclosed centrally inside a hollow copper tube having external diameter 30 mm and internal diameter 25 mm as shown in the figure. This composite bar is subjected to an axial pull of 40 kN. Find the stresses developed in the rod and Tube. Assume $E_{\text{steel}} = 200 \text{ kN/mm}^2$, $E_{\text{Copper}} = 100 \text{ kN/mm}^2$. [8]



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