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DEPARTMENT OF CIVIL ENGINEERING

MECHANICS OF SOLIDS -4010310

PART-A

10 x3 =30

1. Define Creep And Fatigue?
2. What is meant by tension or tensile force?
3. What is meant by Bending moment diagram and shear force?
4. What is Section modulus?
5. Define Polar modulus?.
6. Define moment of inertia?
7. What is centroid?
8. What is meant by Curvature of beam?
9. What is a vector diagram?.
10. Define Deficient frame?.

PART-B

5 x14 =70

11a). A steel flat 150mm wide 20mm thick and 6000mm long carries a pull of 300kN. Find the extension in length and contraction in width and thickness under the pull. Take the Poisson's ratio as 0.3 and $E=2 \times 10^5$. Calculate also change in volume

(OR)

b). A cylindrical bar of 250mm diameter and 200mm long is increased by 0.15mm in diameter and is decreased by 0.30mm in length under an axial compression of 150kN. Compute the values of Young's modulus, Poisson's ratio, volumetric strain and change in volume.

12 a). A simply supported beam of span 8m carries a UDL of 25 kN/m over the left half of the span and a point load of 60kN at 2m from the right support. Draw SF and BM diagrams. Also find the position and magnitude of max bending moment.

(OR)

b). A simply supported beam of 12m span carries two point loads of 40kN and 50kN at 5m and 8m respectively from the left support in addition to its self weight of 5kN/m over the entire span. Draw the SF and BM diagrams for the beam.

13 a).Determine the I_{xx} and I_{yy} for the I-section given below.

Top flange-150mm x20mm

Bottom flange-200mm x20mm

Web portion-130mm x20mm

(OR)

b).Determine the I_{xx} and I_{yy} for the L-section 125mm X 125mm x10mm overall.

14 a).A hollow Shaft of internal diameter 300mm and external diameter 560mm is required to transmit power at 160rpm. Determine the power it can transmit if the shear stress is not to exceed 80N/mm^2 and max torque exceeds the mean by 20%

(OR)

b).The internal and external diameters of a hollow shaft are 200mm and 300mm respectively. It is transmitting power at 150rpm. The maximum torque is 10% more than the mean torque. Find the power transmitted by the shaft if the shear stress is not to exceed 80N/mm^2

15 a).Determine the magnitude and nature of forces in the members of the given truss by method of joint.

(OR)

b).Determine the magnitude and nature of forces in the members of the given truss by method of joint.

SUB:ENGINEERING MECHANICS

- 1.A steel bar 300mm long of section 50mm x 12 mm is subjected to an axial compression of 84KN.calculate the volumetric strain and change in volume of the bar $E=2 \times 10^5 \text{ N/mm}^2$, $1/m=0.3$.**
- 2.Calculate the change in diameter of a short mild steel column when it carries a compressive load of 800KN.The original diameter is 80mm. $E=2 \times 10^5 \text{ N/mm}^2$, $1/m=0.3$.**
- 3.A simply supported beam of span 8m carries a UDL of 12 KN/m over the left half of the span and a point load of 25KN at 2m from the right support support. Draw SF and BM diagrams .Also find the position and magnitude of max bending moment.**
- 4.A simply supported beam of 6m carries three point loads 25KN,35KN,and 40KN at 1.5m, 2.5m and 4m from the left support. Draw SF and BM diagrams and locate the max values.**
- 5.Determine the I_{xx} and I_{yy} for the I-section given below.**
Top flange-100mm x20mm
Bottom flange-200mm x20mm
Web portion-150mm x20mm
- 6.Determine the I_{xx} and I_{yy} for the L-section 75mm X 75mm overall.**
- 7.Find the values of I_{xx} , I_{yy} for the channel section.300mm x 100mm (300mm web and 100mm flange)over all. The thickness of flange and web is 10mm.**
- 8.A hollow Shaft of internal diameter 400mm and external diameter 460mm is required to transmit power at 180rpm. Determine the power it can transmit if the shear stress is not to exceed 60N/mm^2 and max torque exceeds the mean by 30%**
- 9.Determine the magnitude and nature of forces in the members of the given truss by method of joint.**

FIGURE -1

- 10. Determine the magnitude and nature of forces in the members of the given truss by method of joint.**

FIGURE -2