

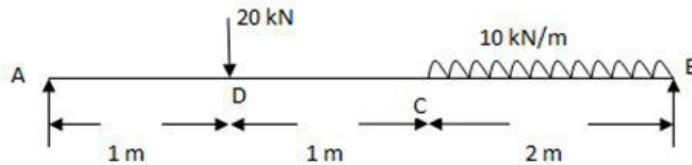
14CE2006 Strength of Materials

Set B

Time : 3 hrs
Total Marks: 100

1. A beam AB of span 4m is simply supported at the ends and is loaded as shown in diagram. Determine i) Deflection at C ii) Maximum deflection and iii) Slope at the end A

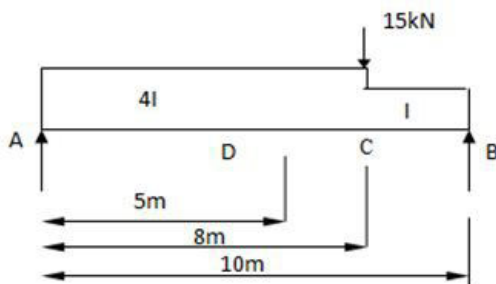
Take $E = 200 \text{ GPa}$ and $I = 20 \times 10^{-6} \text{ m}^4$.



OR

2. For the beam shown in the figure, determine the following:

a). Slope at B b). Deflection at C. Take $I = 8 \times 10^{-5} \text{ m}^4$ $E = 200 \times 10^6 \text{ kN/m}^2$. (20M)



3. a) Calculate the Euler's crippling load for a strut of T section. The flange width being 100mm, overall depth 80mm and both flange and stem 10mm thick. The strut is 3m long and is rigidly fixed at both ends. Take $E = 2 \times 10^5 \text{ N/mm}^2$ (16M)
- b) Differentiate between a strut and a column. Give neat sketches (4M)

OR

4. a) The external and internal diameter of a hollow cast iron column 50 mm and 40 mm respectively. If the length of this column is 3 m and both of its ends are fixed, determine the crippling load using Euler's and Rankine's formula. Take $E = 200 \text{ GPa}$, maximum permissible compressive stress is 320 N/mm^2 and $a = 1/7500$. (16M)
- b) Give the equivalent length corresponding to different end conditions of a column (4M)
5. a) A continuous beam ABC of uniform section, with span AB and BC as 4m each, is fixed at A and simply supported at B and C. the beam AB is carrying a uniformly distributed load of 5 kN/m. Span BC carries a point load of 4 kN at a distance 3m from point B. Find the support moments and reactions. Draw the shear force and bending moment diagrams. (16M)
- b). Differentiate between determinate and indeterminate structures. (4M)

OR

6. a) A continuous beam ABC of uniform section, with span AB and BC as 6m each, is fixed at A and C and simply supported at B. AB carries a udl of 4kN/m and BC carries a concentrated load of 3kN of 2m from C. Find the support moments and the reactions. Draw the shear force and bending moment diagrams. (16M)
- b) What are continuous beams and fixed beams? (4M)

7. a) A cylindrical thin drum 800 mm in diameter and 4 m long is made of 10 mm thick plates. If the drum is subjected to an internal pressure of 2.5 Mpa. Determine its change in diameter and length. Take E as 200 GPa and Poisson's ratio as 0.25. (15M)
- b) A channel section has flanges 120 X 20 mm and web 180 X 10 mm. Determine the shear centre of the channel. (5M)

OR

8. a) A compound cylinder, formed by shrinking one tube to another is subjected to an internal pressure of 90 MN/m². Before the fluid is admitted, the internal and external diameters of the compound cylinder are 180mm and 300mm respectively and the diameter at the junction is 240mm. If after shrinking on, the radial pressure at the common surface is 12 MN/m², determine the final stresses developed in the compound cylinder. (16M)
- b) Differentiate between thin and thick pressure vessels. (4M)
9. a) A beam of T-section (flange=100x20mm, web=150x10mm) is 4 m in length and is simply supported at the ends. It carries a load of 3.2kN inclined at 20° to the vertical axis and passing through the centroid of the section. The load is acting at middle span. If $E = 2 \times 10^5 \text{ N/mm}^2$. Calculate the deflection due to the applied load. (12M)
- b) Name any four theories of failure. Give short notes on each of them. (8M)

Wishing you All the Best
