Reg. No. : | | | | | | | | | | | |

L 1155

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Third Semester

Chemical Engineering

CH 235 — MECHANICS OF SOLIDS

(Common to Leather Technology and Textile Technology)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you mean by a rigid body?

2. What are the advantages of welded joints?

3. What is the maximum bending moment for a simply supported beam with uniformly varying load with intensity zero at one end and w per unit length run at the other end?

4. Explain why some overhanging beams have point of contra flexure.

5. What is the disadvantage of double integration method?

6. Give the relation for Maximum deflection ,of a bean, simply supported at its ends, carrying uniformly varying load with zero intensity at one end and W per unit length at the other end.

7. Define beam of uniform strength.

8. What is meant by section modulus?

9. Derive a relation for torsional moment carrying capacity of a hollow circular shaft.

10. What are limitations of Euler's formula?

PART B — (5 × 16 = 80 marks)

11. (a) (i) **Derive a relation for change in length of a bar hanging freely under its self weight.** (6)

(ii) **Derive a relation for change in length of a circular bar with uniformly varying diameter subjected to an axial tensile load P.** (10)

Or

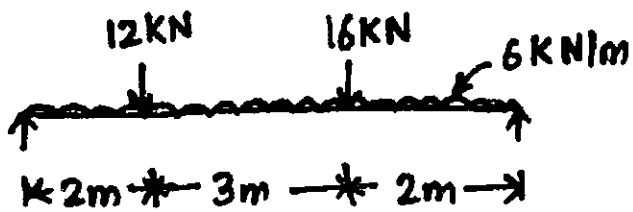
(b) **A steel rod of 3 cm diameter is enclosed centrally in a hollow copper tube of external diameter 5 cm and internal diameter of 4 cm. The composite bar is then subjected to an axial pull of 45000N. If the length of each bar is equal to 15cm, determine**

(i) The stresses in the rod and tube, and

(ii) Load carried by each bar.

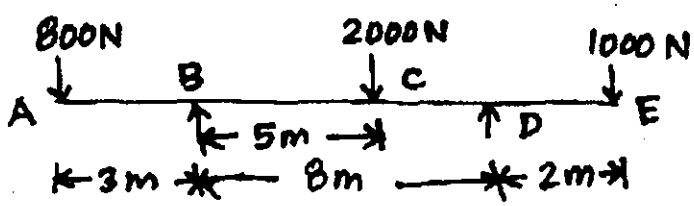
Take E for steel = 2.1 × 10^5N/mm2 and for copper = 1.1 × 10^5 N/mm2.

12. (a) Draw SFD and BMD for the beam given in fig Q12.a

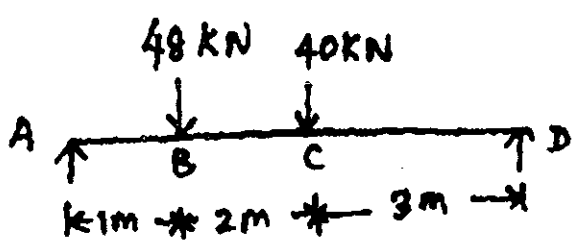


Or

(b) Draw SFD and BMD for the beam given in fig Q12.b

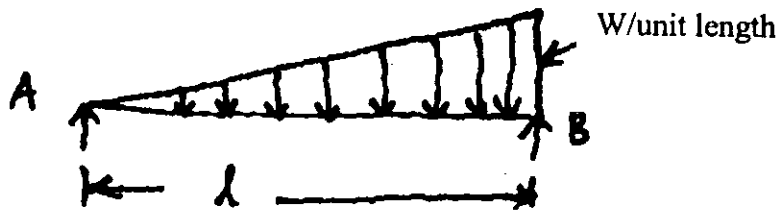


13. (a) Determine the maximum deflection and slope at the supports for the beam given in fig Q13.a. Use Macaulays Method. Take $E = 2 \times 10^5 N/mm^2$ and $I = 85 \times 10^6 mm^4$



Or

(b) Derive relations for maximum deflection and slope at the supports for the beam given in fig Q13b. Use Conjugate beam method.



14. (a) A cast iron pipe of external diameter 200 mm, 20 mm thickness and 7.5 m long is simply supported at its ends. The pipe carries a uniformly distributed load of 5 kN/m (excluding the self weight) over the full length. Calculate the maximum flexural stress induced. Assume the unit weight of material of a pipe as 80 kN/m^3.

Or

(b) Derive Torsion formula.

15. (a) Find the maximum torque that can be safely applied to a shaft of 100 mm diameter. The permissible shear stress and the allowable twist are respectively 200 N/mm^2 and 3° per 10 diameter length of the shaft. Take C = 1 × 10^5 N/mm^2.

Or

(b) Determine the ratio of buckling strengths of two columns one hollow and the other solid. Both are made of the same material and have same length, cross sectional area and end conditions. The external diameter of hollow column is half of its internal diameter.
