



Module-2

- 3 Plot the elastic curve and find the maximum deflection and maximum slope for the cantilever beam loaded as shown in Fig.Q3. Take  $E = 200\text{kN/mm}^2$  and  $I = 300 \times 10^6\text{mm}^4$ .

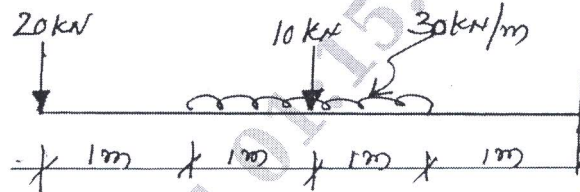


Fig.Q3

(16 Marks)

OR

- 4 a. Find the slope and deflection at free end of the cantilever beam shown in Fig.Q4(a) by moment area method. Take  $EI = 2500\text{kN-m}^2$ .

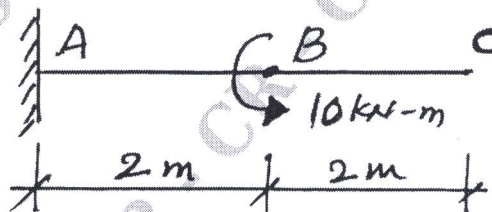


Fig.Q4(a)

(06 Marks)

- b. Find the deflection at D for simply supported beam as shown in Fig.Q4(b). Take  $EI = 8000\text{kN-m}^2$ . Use conjugate beam method.

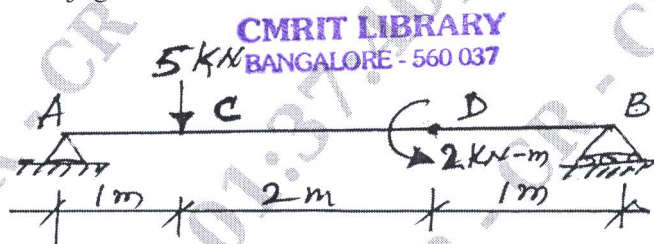


Fig.Q4(b)

(10 Marks)

Module-3

- 5 a. Obtain an expression for strain energy stored in the member due to bending moment 'M'. (08 Marks)
- b. Find the strain energy stored due to bending in the simply supported beam shown in Fig.Q5(b) and hence find the deflection at the centre of span.

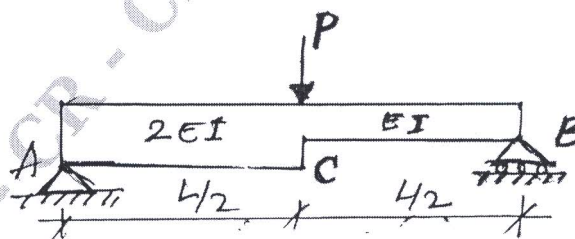


Fig.Q5(b)

(08 Marks)



OR

- 6 a. Determine the deflection at free end of the overhanging beam shown in Fig.Q6(a). Use Castigliano's method.

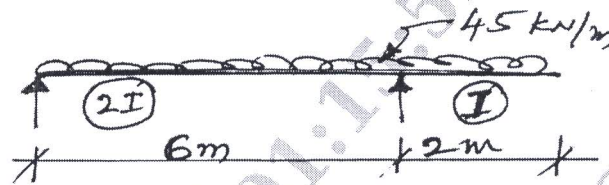


Fig.Q6(a)

(06 Marks)

- b. For the bent shown in Fig.Q6(b). Calculate using unit load method the vertical and horizontal deflection of the free end.  $EI = 80 \text{ kN-m}^2$ .

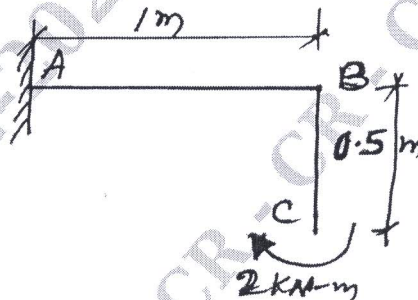


Fig.Q6(b)

(10 Marks)

**Module-4**

- 7 a. A three hinged parabolic arch of span 20m and rise of 5m carries a udl of 30kN/m on the left half of the span. Find the maximum bending moment for the arch and draw the BMD. (10 Marks)
- b. A cable carrying a load of 10kN/m run of horizontal span, is stretched between supports 100m apart. The supports are at the same level and the central dip is 8m. Find the greatest and the least tensions in the cable. (06 Marks)

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OR

- 8 a. A three hinged parabolic arch of 20m span and 4m central rise, carries a point load of 150 kN at 4m horizontal distance from left hand hinge. Calculate the normal thrust and radial shear force at the section under the load. (08 Marks)
- b. The suspension cable hinges between two points 40m apart horizontally with one end 4m above the other. The sag of the cable measured from the highest point is 6m. It carries an udl of 20 kN/m. Find the diameter of cable if allowable stress is  $190 \text{ N/mm}^2$ . Also determine the maximum force transmitted to the supporting tower if the cable is connected to smooth roller on the top of tower. The anchor cable makes an angle of  $30^\circ$  with the horizontal. (08 Marks)

**Module-5**

- 9 Determine the maximum +ve SF, maximum -ve SF and BM at a section 6m from the left support of a simply supported beam of span 20m when a udl of 40kN/m of length 4m moves from left support to right by influence line principles. (16 Marks)

OR

- 10 a. What do you understand by an influence line diagram? What are the advantages of ILD? (04 Marks)
- b. Find the maximum bending moment at a section 12m from left support of beam of span 30m. The loads are 30kN, 40kN, 50kN, 140kN and 60kN spaced at 3m, 4, 2m and 3m respectively moving from left to right with 60kN leading. (12 Marks)

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