



- 4 a. Analyze the propped cantilever subjected to the loadings as shown in the Fig.Q4(a), using strain energy method.  $EI$  is constant. Calculate "R" and " $M_A$ ".

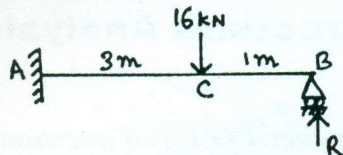


Fig.Q4(a)

(08 Marks)

- b. Analyze the fixed beam subjected to the loadings as shown in the Fig.Q4(b), using strain energy method. Calculate the fixed end moments and the vertical reactions at A and B.

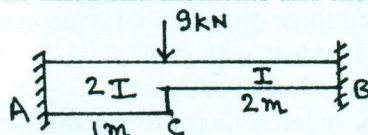


Fig.Q4(b)

(12 Marks)

**PART - B**

- 5 a. Prove that the bending moment diagram follows the Funicular polygon in a three hinged parabolic arch subjected to uniformly distributed load throughout. (10 Marks)
- b. A symmetrical suspension cable is parabolic in shape, and has a span of 250 m and a dip of 25 m. It supports a UDL of 25 kN/m over the whole span. If the maximum allowable stress is  $130 \text{ N/mm}^2$ , determine the length of the cable and area of the cable. (10 Marks)
- 6 a. Analyze the propped cantilever beam subjected to the loadings as shown in the Fig.Q6(a), by consistent deformation method. Support B sinks by 25 mm. Take  $E = 10 \text{ GPa}$  and  $I = 20 \times 10^6 \text{ mm}^4$ . Draw BMD and SFD.

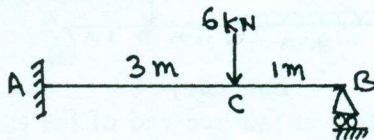


Fig.Q6(a)

(10 Marks)

- b. Analyze the fixed beam subjected to the loadings as shown in the Fig.Q6(b), by consistent deformation method. Draw SFD.

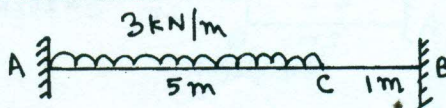


Fig.Q6(b)

(10 Marks)

- 7 Analyze the continuous beam subjected to the loadings as shown in the Fig.Q7, using Claperons three moment theorem. Draw BMD.  $EI$  is constant throughout.

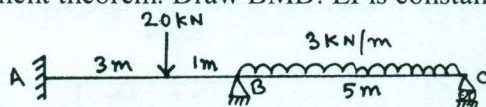


Fig.Q7

(20 Marks)

- 8 A parabolic arch hinged at the ends has a span of 60 m, and a rise of 12 m. A concentrated load of 8 kN acts at 15 m from the left hinge. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and the reactions at the hinges. (20 Marks)

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