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10CV43

Fourth Semester B.E. Degree Examination, June/July 2019
Structural Analysis – I

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Assume any missing data suitably.

PART – A

1 a. State and explain determinate and indeterminate structures with examples. **(04 Marks)**

b. Distinguish between linear structures and non linear structures. **(04 Marks)**

c. Derive the strain energy equation due to bending. **(06 Marks)**

d. Find the statistical and kinematic indeterminacy for the following structures shown in Fig.Q1(d). **(06 Marks)**

Fig.Q1(d)

2 a. State Moment area theorems. **(04 Marks)**

b. Find slope and deflection at free end of cantilever beam shown in Fig.Q2(b) using moment area method. Take EI constant. **(06 Marks)**

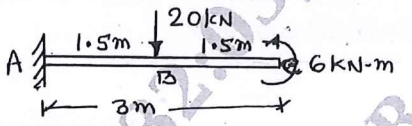

Fig.Q2(b)

c. Determine maximum slope and deflection for the simply supported beam shown in Fig.Q2(c) using conjugate beam method. Take E = 200 GPa and I = 10^8 mm^4. **(10 Marks)**

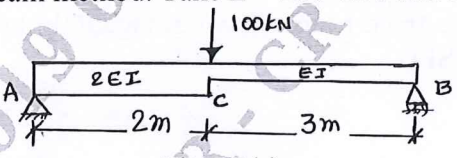

Fig.Q2(c)

3 a. State Castigliano's first and second theorems. **(04 Marks)**

b. State Clark Maxwell's law of reciprocal deflection. **(02 Marks)**

c. Determine the vertical and horizontal deflection at 'C' of the structure shown in Fig.Q3(c). **(14 Marks)**

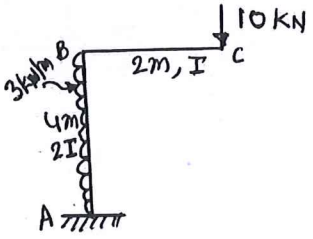

Fig.Q3(c)

4 a. Analyse the propped cantilever beam shown in Fig.Q4(a) using strain energy method. Draw BMD and SFD. Take EI is constant. **(10 Marks)**

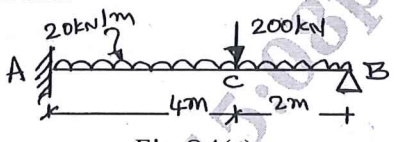

Fig.Q4(a)

b. Analyse the fixed beam shown in Fig.Q4(b) using strain energy method. Draw BMD and SFD. **(10 Marks)**

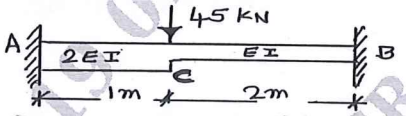

Fig.Q4(b)

PART – B

5 a. A three hinged parabolic arch of span 30m and central rise of 5 m. It is subjected to a concentrated load of 40 kN at 6m from left support and uniformly distributed load of 10 kN/m over right half of the span. Determine moment, normal thrust and radial shear at a section 6m from the left support. **(12 Marks)**

b. A cable of span 150 m and dip 15 m carries a load of 6 kN/m run of horizontal span. Find maximum tension and inclination of the cable at support. Also find the force transmitted to the supporting pier if the cable is passed over smooth roller on the top of the pier. The anchor cable is at 30° to the horizontal. Find moment on pier if height of pier is 20m. **(08 Marks)**

6 a. Analyse the propped cantilever beam shown in Fig.Q6(a) by using consistent deformation method. Draw BMD and SFD. **(10 Marks)**

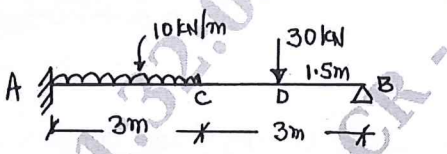

Fig.Q6(a)

b. Analyse the fixed beam shown in Fig.Q6(b) by using consistent deformation method. Draw BMD and SFD. **(10 Marks)**

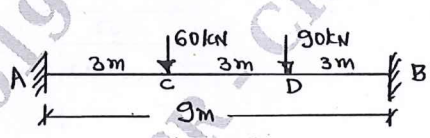

Fig.Q6(b)

7 a. Derive the Clapeyron's theorem of three moments. **(06 Marks)**

b. Analyse the continuous beam shown in Fig.Q7(b) by using Clapeyron's theorem of three moments. Draw BMD. **(14 Marks)**

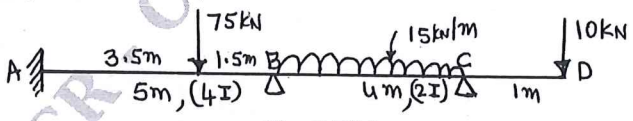

Fig.Q7(b)

8 A two hinged parabolic arch has a span of 32m and rise of 8m. A uniformly distributed load of intensity 10 kN/m covers 8 m horizontal length from the left support of the arch. Find horizontal thrust at supports and bending moment at 8m from left support. Also find normal thrust and radial shear at this section. **(20 Marks)**

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