

CBCS Scheme

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15CT42

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Structural Analysis

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume missing data suitably.

Module-1

- 1 a. State and prove moment area theorems. (06 Marks)
b. Analyze the plane truss shown in Fig.Q1(b) using method of joints and tabulate the forces in members of truss.

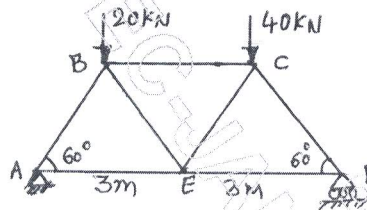


Fig.Q1(b)

(10 Marks)

OR

- 2 a. Distinguish between determinate and indeterminate structures. (04 Marks)
b. State the assumptions made in truss analysis. (04 Marks)
c. Find deflection at 'C' for the beam shown in Fig.Q2(c). Take $EI = 8000 \text{ kN-m}^2$. Use conjugate beam method.

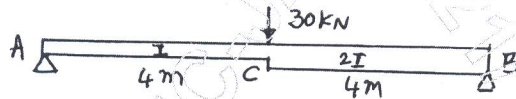


Fig.Q2(c)

(08 Marks)

Module-2

- 3 a. Distinguish between strain energy and complementary energy. (02 Marks)
b. Derive strain energy equation due to bending. (04 Marks)
c. Determine the deflection at 'C' of the beam shown in Fig.Q3(c) using Castiglione's theorem. Take EI constant.

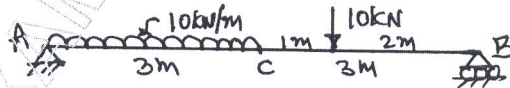


Fig.Q3(c)

(10 Marks)

OR

- 4 a. State and explain the principles of virtual work. (03 Marks)
b. State and explain Maxwell theorem of reciprocal deflection. (03 Marks)
c. Determine the vertical deflection of joint 'C' of the truss shown in Fig.Q4(c) using unit load method. Area of the inclined members 1300 mm^2 and other members area 1000 mm^2 . $E = 2 \times 10^5 \text{ N/mm}^2$.

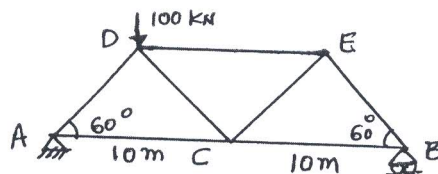


Fig.Q4(c)

(10 Marks)

Module-3

- 5 a. Derive the expression for the length of suspension cable of horizontal span ' l ' and dip ' h '. (06 Marks)
- b. Determine the normal thrust, radial shear and bending moment at quarter span and draw BMD for the three hinged parabolic arch is shown in Fig.Q5(b).

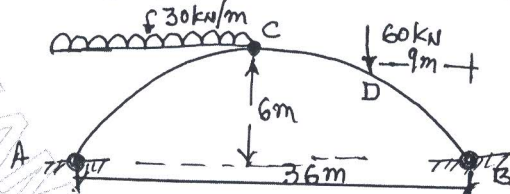


Fig.Q5(b)

(10 Marks)

OR

- 6 a. Prove that bending moment at any section on three hinged parabolic arch is zero when subjected to udl over whole span. (06 Marks)
- b. A suspension cable of 130 m horizontal span is supported at the same level. It is subjected to a udl of 28.5 kN/m overall if the maximum tension in the cable is limited to 5000 kN. Calculate the minimum central dip of the cable. (10 Marks)

Module-4

- 7 a. Derive the Clapeyron's three moment equation. (06 Marks)
- b. Analyze the propped cantilever beam using consistent deformation method. Draw BMD and SFD for the beam shown in Fig.Q7(b).

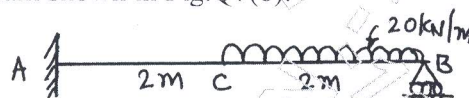


Fig.Q7(b)

(10 Marks)

OR

- 8 Analyze the continuous beam shown in Fig.Q8 by using three moment equation and draw BMD and SFD.

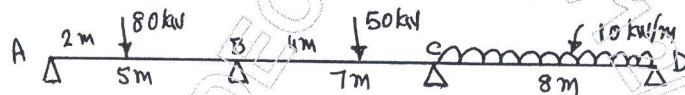


Fig.Q8

(16 Marks)

Module-5

- 9 Analyze the frame shown in Fig.Q9 by using slope deflection method. Draw BMD and elastic curve.

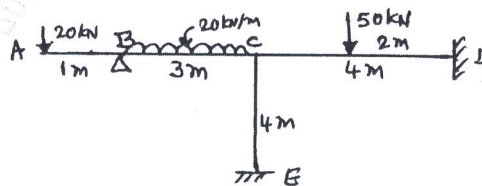


Fig.Q9

(16 Marks)

OR

- 10 Analyze continuous beam shown in Fig.Q10 by using moment distribution method. Draw BMD, SFD and EC.



Fig.Q10

(16 Marks)
