U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

August 2024 Supplementary Examinations

Programme: B.E **Semester: IV**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 19CV4PCSTA **Max Marks: 100**
Course: Structural Analysis

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) Show that the bending moment at any section of a three hinged symmetric parabolic arch subjected to uniformly distributed load throughout is zero. **06**

b) A path way of width 1.5 m is constructed by using two suspension cables. The span of suspension cable is 10 m. The path way on either side is connected to the cable by vertical suspenders at a spacing of 1.25 m c/c. The total load on path way is 2.4 KN/m^2 and maximum dip of cable is 1 m. Sketch the cable profile indicating tension in different parts. Also find the length of the cable. **14**

UNIT - II

2 a) Analyze the beam shown in Fig. 1 for maximum slope, maximum deflection and deflection under 36 kN load using conjugate beam method. Take EI= 50000 KN-m^2. **10**

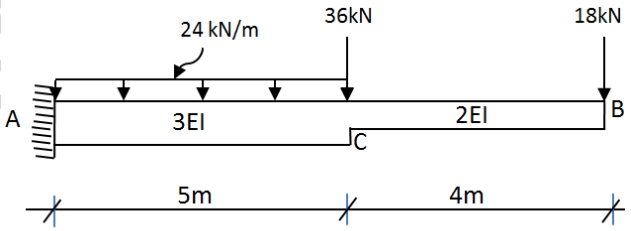

Fig. 1

b) Find the maximum deflection and maximum slope for the beam shown in Fig. 2 using moment area method. Take EI= 20000 KN-m^2. **10**

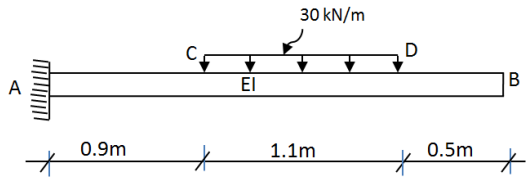

Fig. 2

OR

3 a) Find the slope and deflection at the free end 'C' of the beam loaded as shown in Fig. 3 using conjugate beam method. Take E=200 GPa, I=1.2x10^8 mm^4 **10**

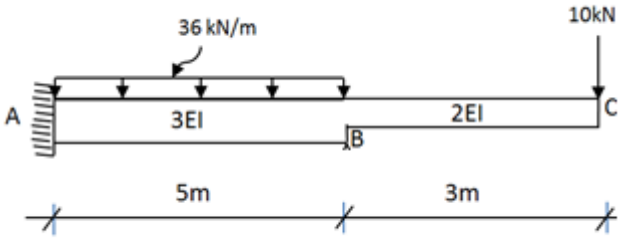

Fig. 3

b) Find the maximum slope and deflection for the cantilever beam loaded as shown in Fig. 4 using moment area method. Take E=200 GPa, I=1.2x10^8 mm^4 **10**

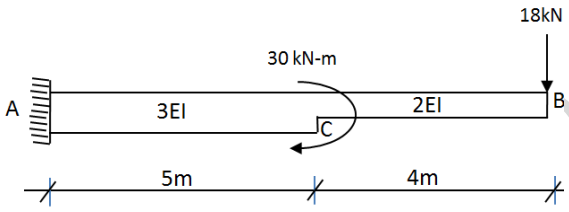

Fig. 4

UNIT - III

4 a) Analyse the propped cantilever beam shown in Fig. 5 for the reactions by consistent deformation method. **06**

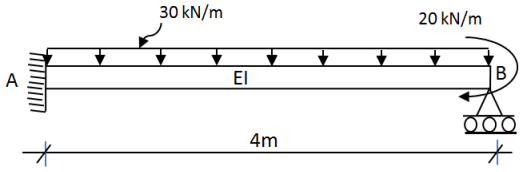

Fig. 5

b) Using the theorem of three moments analyze the continuous beam shown in Fig. 6. Take E=200 KN/mm^2, I=1.8 x 10^8 mm^4. Draw BMD and elastic curve. **14**

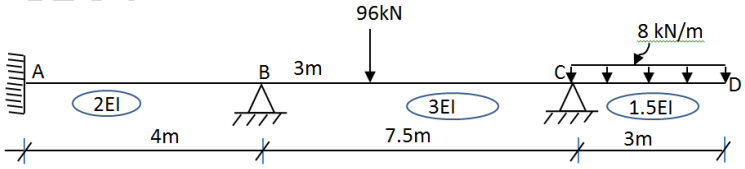

Fig. 6

UNIT - IV

5 a) Derive an equation for strain energy stored in a member due to bending. **05**

b) Determine the horizontal and vertical displacement at the point C of the rigid frame shown in Fig. 7 using Castigliano's theorem. Take EI= 12000 KN-m^2. **15**

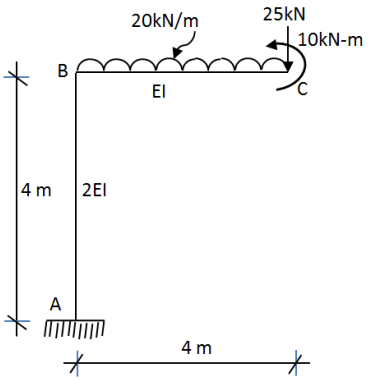

Fig. 7

OR

6 a) State and explain Castigliano's first theorem. **05**

b) A simply supported beam ACB with varying cross section is loaded as shown in Fig. 8. Determine deflection at 'C'using Castigliano's theorem. Take EI= 12000 KN-m^2. **15**

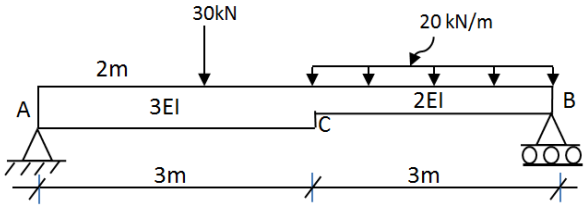

Fig. 8

UNIT - V

7 Determine the vertical and horizontal deflection at the point 'C' of the truss shown in Fig. 9 using unit load method. Assume area of cross-section of all members as 600 mm^2. Take E = 200 GPa. **20**

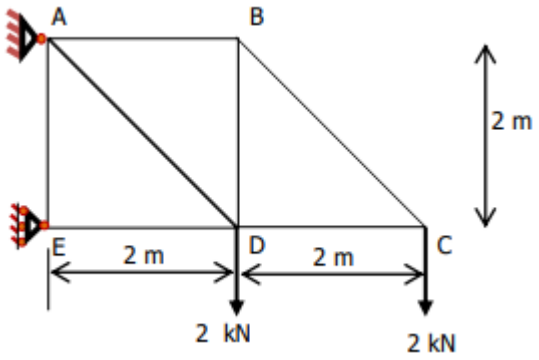

Fig. 9

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