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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Civil Engineering

Semester End Examination; May / June - 2018

Matrix Method of Structural Analysis

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Briefly explain with examples; 10

i) Classification of structural systems ii) Degree of static and kinematic indeterminacy

b. Explain strain energy due to axial, shear and bending moment with expression. 10

2 a. What is flexibility and stiffness matrix? Derive the relation between flexibility and stiffness matrices. 10

b. Generate stiffness matrix of the structure shown in Fig. 2(b)

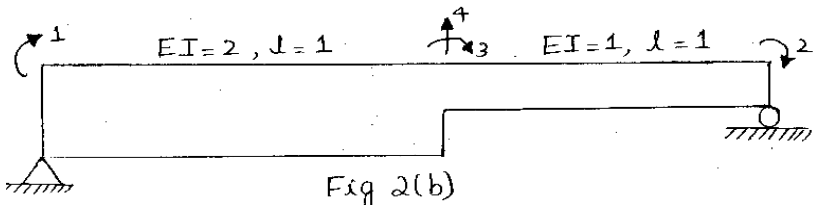

Fig 2(b) 10

UNIT - II

3. Analyze the pin jointed truss shown in Fig. 3 using matrix flexibility method. 'AE' is taken uniformly for all members. Use elements approach.

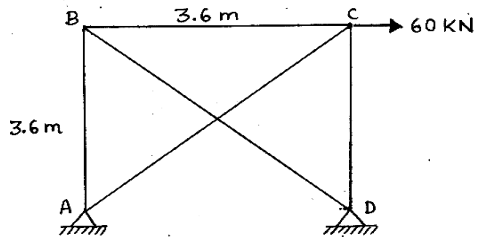

Fig (3) 20

4. Analyze the continuous beam loaded as shown in Fig. 4 by matrix flexibility method. Use element approach. Sketch BMD.

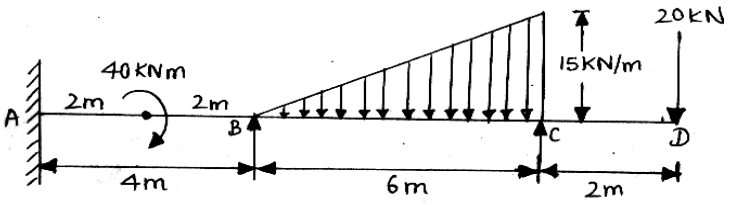

Fig (4) 20

UNIT - III

5. Analyze the pin- jointed truss shown in Fig. 5 by stiffness matrix method using element approach. Take area of C/S for all the members = 1000 mm^2 and modulus of elasticity E = 200 kN/mm^2 20

Contd...2

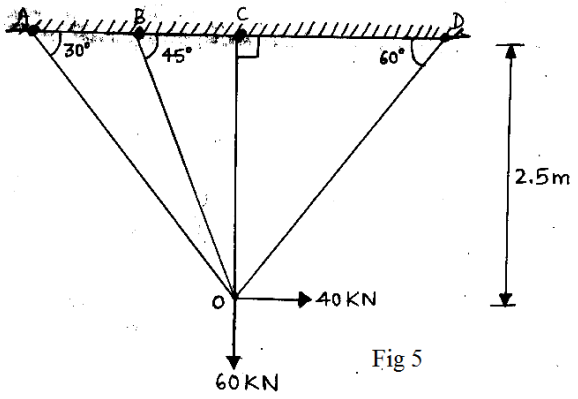

Fig 5

6. Analyse the frame shown in Fig. 6 using matrix flexibility method by element approach. Draw BMD. 20

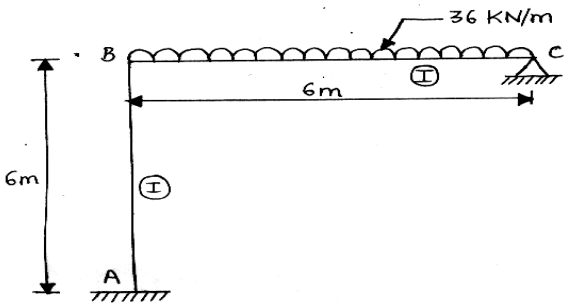

Fig (6)

UNIT - IV

7. Analyse the continuous beam shown in Fig. 7 by stiffness method. Draw BMD. 20

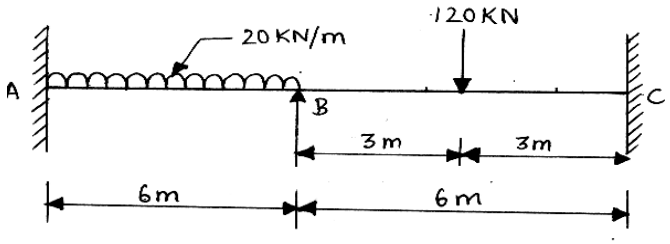

Fig (7)

8. Analyze the frame shown in Fig. 8 by matrix stiffness method using element approach. Draw BMD. 20

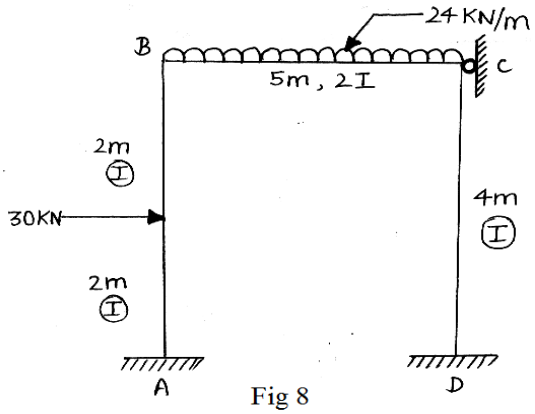

Fig 8

Contd...3

UNIT - V

9. Obtain overall stiffness matrix for 2 span continuous beam shown in Fig. 9 having two beam elements '*a*' and '*b*'. L = 1 meter, EI = unity. Use direct stiffness method. 20

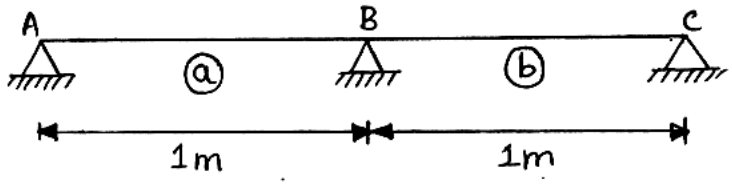

Fig (9)

10. Construct direct stiffness matrix 'k' for the truss shown in Fig. 10. 20

Take E = 200 x 10^6 kN/m^2 [200,000 MPa]

A = 2500 x 10^{-6} m^2 [2500 mm^2]

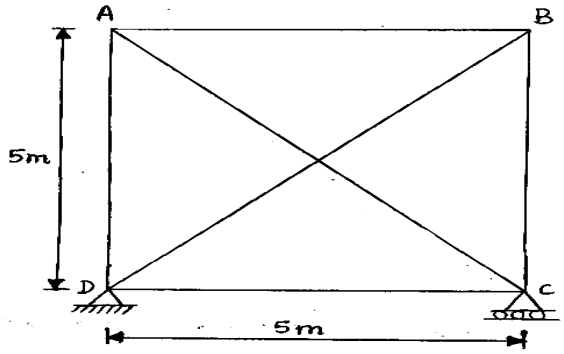

Fig (10)

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