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

(An Autonomous Institution affiliated to VTU, Belgaum)

Sixth Semester, B.E. - Civil Engineering

Semester End Examination; June - 2016

Matrix Methods of Structural Mechanics

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each **unit**.*
ii) Assume missing data if any.

UNIT - I

1 a. Prove that the stiffness and flexibility matrices are symmetrical using the strain energy concept. 10

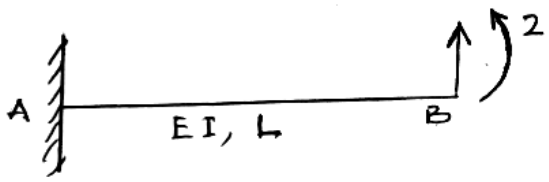
b. Define strain energy and obtain the strain energy stored in a beam member. 10

2 a. Explain the following :

i) Static and Kinematic indeterminacy 10

ii) Geometric and Material non linearity

b. Generate the flexibility and stiffness matrices for the system shown in Fig. Q2(b) along the Co-ordinates.



10

Fig. Q 2(b)

UNIT - II

3. Analyze the pin jointed plane truss shown in Fig. Q3 by force transformation method. Assume the same material and cross section area for all the members.

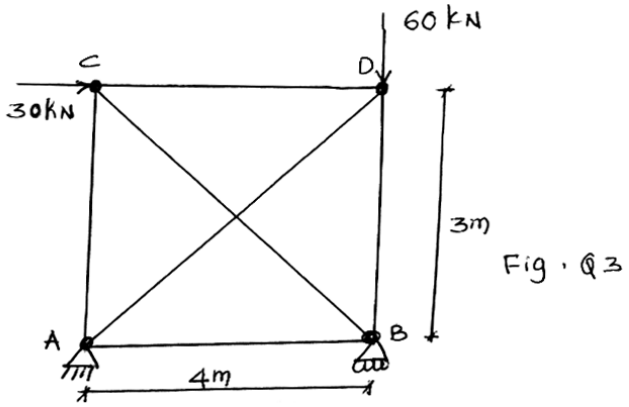


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Fig. Q3

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4. Analyse the continuous beam shown in Fig. Q4. By force-transformation method. Sketch the BMD and elastic curve. 20

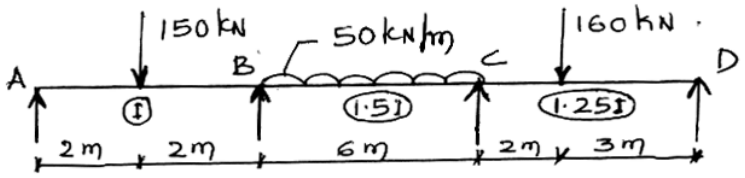

Fig. Q.4.

UNIT - III

5. Analyze the plane frame. Shown in Fig. Q.5 by force transformation method of flexibility approach. Sketch the BMD and elastic curve. 20

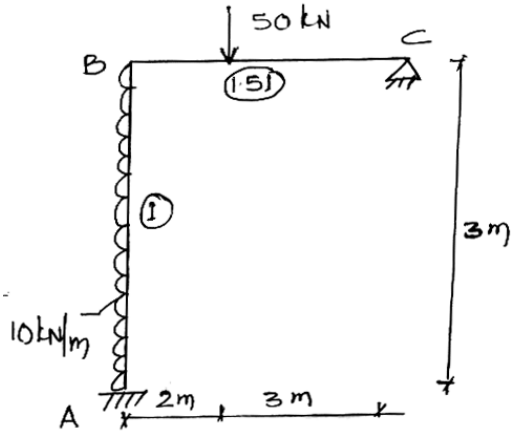

Fig. Q.5

6. Obtain the axial forces in the members at the plane truss shown in Fig. Q6 by displacement transformation method of stiffness approach. Assume 'EA' to be same for all the members. 20

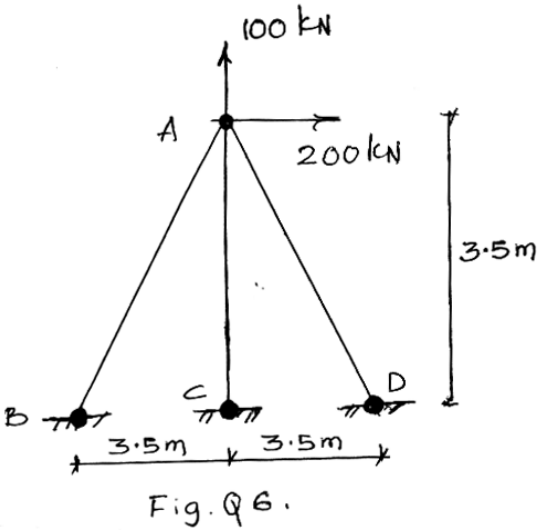

Fig. Q 6.

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UNIT - IV

7. Analyze the continuous beam shown in Fig. Q 7 using displacement transformation method and draw BMD and elastic curve. 20

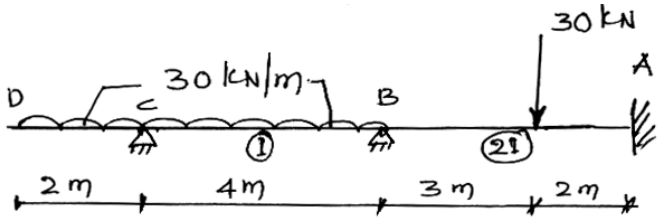

Fig. Q 7.

8. Analyze the plane frame shown in Fig. Q 8 using displacement transformation method. Draw the BMD and elastic curve. 20

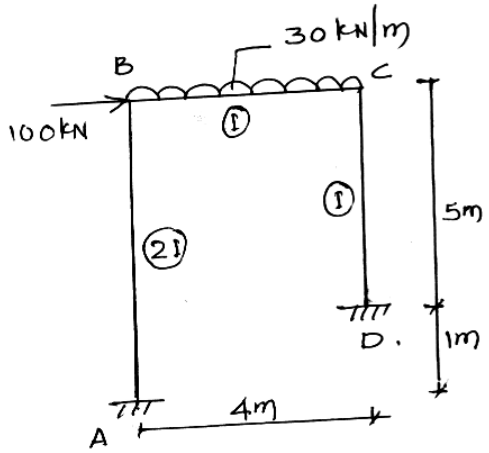

Fig. Q.8

UNIT - V

9 a. Obtain the relating $[K] = [T]^{\tau} [k_m][\tau]$ relating the global and local stiffness matrices for a members. 10

b. Write the transformation matrix [T] and the global stiffness matrix of a plane truss member with usual notations. 10

10. Using direct stiffness method analyse the continuous beam shown in Fig. Q.10. Draw BMD. 20

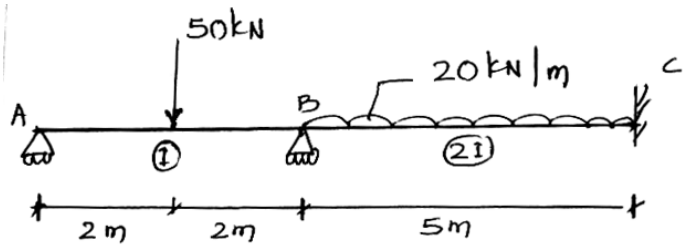

Fig. Q. 10

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