



**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/July - 2015

Matrix Method of structural analysis

Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least TWO full questions from each part.

**PART - A**

1 a. Explain the following terms :

i) Internal and External static Indeterminacy

ii) Degrees of freedom

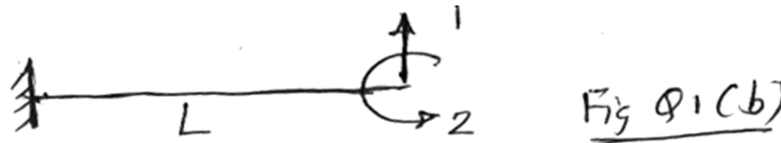
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iii) Local and Global axis

iv) Force Transformation matrix

b. Generate the flexibility and stiffness matrix for the beam shown in Fig. Q1(b) and prove that

$[F][K] = 1$



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2. a. Analyse the continuous beam shown in Fig.Q.2 by flexibility method using force transformation method. Also, draw the BMD and elastic curve.

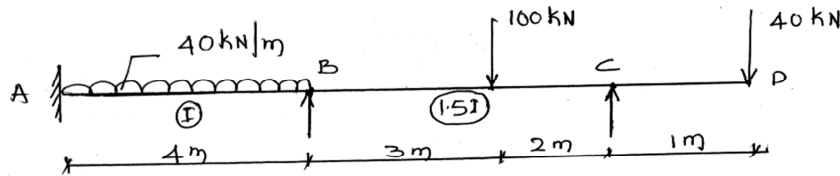


Fig. Q(2)

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3. Analyse the portal frame shown in Fig. Q. (3) by flexibility method. Also, sketch the elastic curve and BMD.

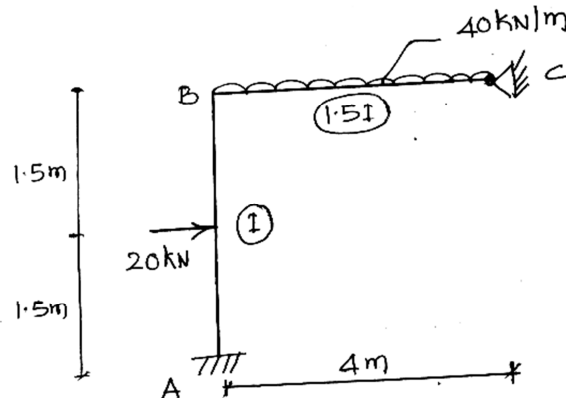


Fig. Q(3)

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4 Analyse the pin Jointed plane truss shown in truss shown in Fig. Q(4) using displacement transformation method. Assume AE/L Same for all members. N

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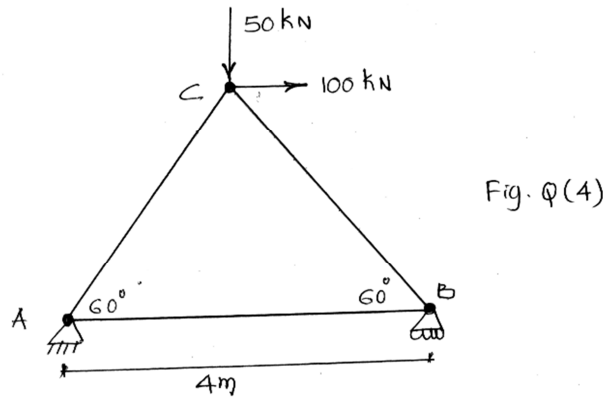


Fig. Q(4)

**PART - B**

- 5 Analyse the continuous beam shown in Fig. Q.(5) using displacement transformation method. Draw BMD and elastic curve.

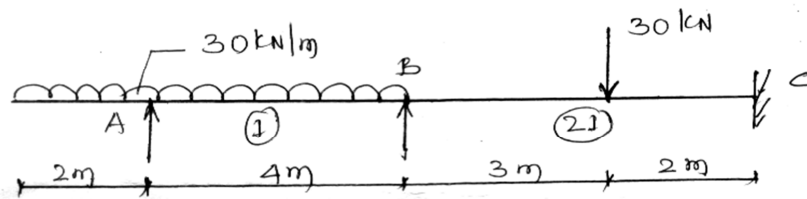


Fig. Q(5)

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6. Analyse the portal frame shown in Fig. Q.(6) by stiffness method using displacement – transformation method and draw the BMD and elastic curve.

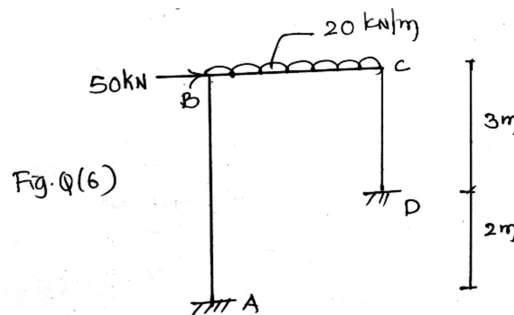


Fig. Q(6)

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- 7 a. Explain the following: i) Rotation transformation Matrix  
ii) Principle of contragradience
- b. Obtain the relation  $[K] = [T]^T [H_m] [T]$  relating the global and local. Stiffness matrices for a member.
- c. Write  $[K_m]$  and  $[T]$  matrices for a truss member
8. Analyse the continuous beam shown in Fig. Q (B). By direct stiffness method. Assume EI same for all members. Draw BMD and elastic curve.

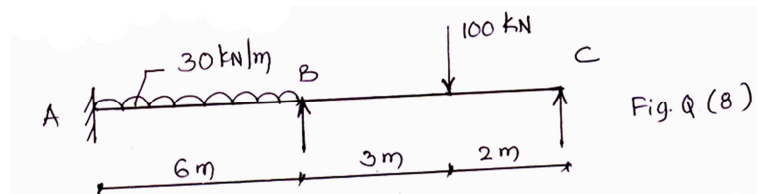


Fig. Q (B)

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