15CV652- MATRIX METHOD OF STRUCTURAL ANALYSIS

Module -1

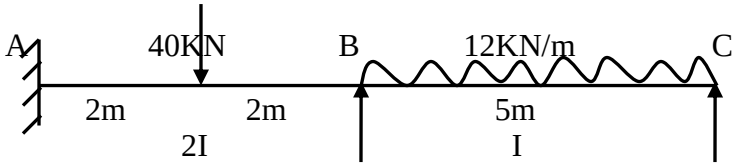
1. a) Obtain the relation between system stiffness matrix and element stiffness matrix. 05marks

b) Show that stiffness matrix is inverse of flexibility matrix 05marks

c) Write the member flexibility matrix for the beam shown in fig. 16marks

2. a) Define principle of contragradience. 05marks

b) Write the force transformation matrix for the beam shown in fig. by element approach.

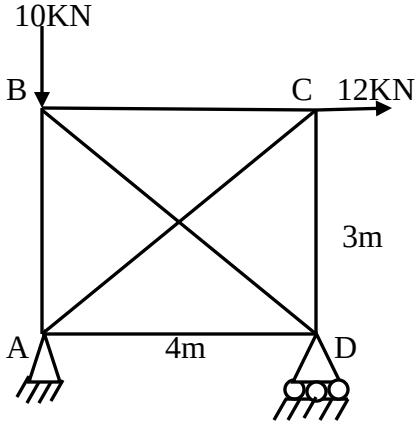


06marks

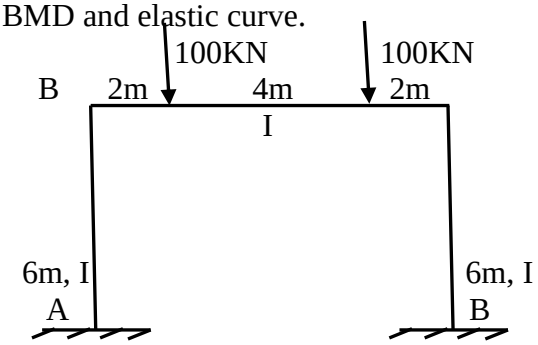
c) Write a note on system coordinator and element coordinators. 05marks

Module-2

3. Analyse the given truss shown in fig. by flexibility method using force transformation matrix. Draw BMD and elastic curve. Assume L/AE = 1 for all the members. 16marks

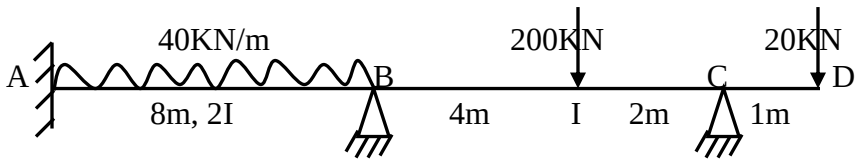


4. Analyse the rigid jointed frame shown in fig. by flexibility method using force transformation approach. Draw BMD and elastic curve. 16marks

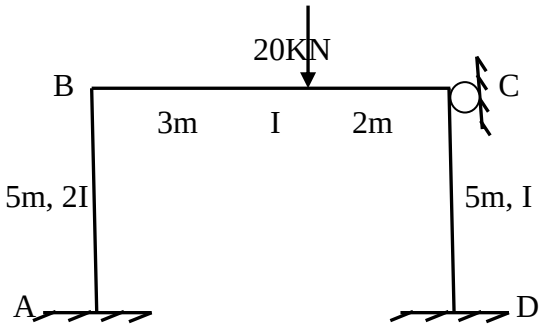


Module -3

5. Analyse the given beam by stiffness method using displacement transformation approach. Draw BMD and elastic curve. 16marks

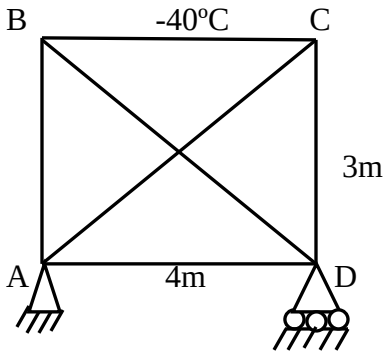


6. Analyse the given frame in fig. by stiffness method. Use element approach. Draw BMD. 16marks

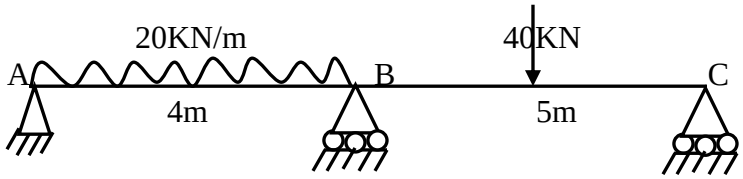


Module-4

7. Analyse the given truss shown in fig. by flexibility method using force transformation matrix. Draw BMD and elastic curve. Area for all the members, A = 5000mm^2, modulus of elasticity, E = 200 GPa, $\alpha = 12 \times 10^{-6}/^{o}$ C, Temperature changes in member BC is -40ºC. 16marks



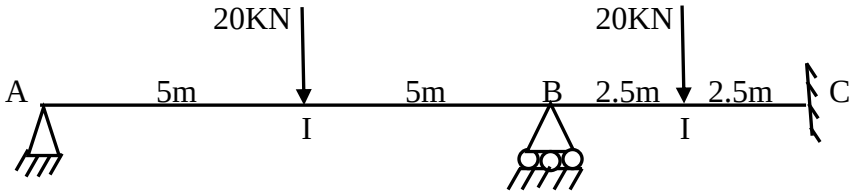
8. Analyse the given beam by force method of analysis, having temperature change in members AB and BC of 15ºC. Depth of the beam is 400mm, $\alpha = 10 \times 10^{-6}/^{o}$ C, E = 30000 N/mm^2, I = 50 x 10^6 mm^4. 16marks



9. a) Explain i) Local coordinates and global coordinates 04marks

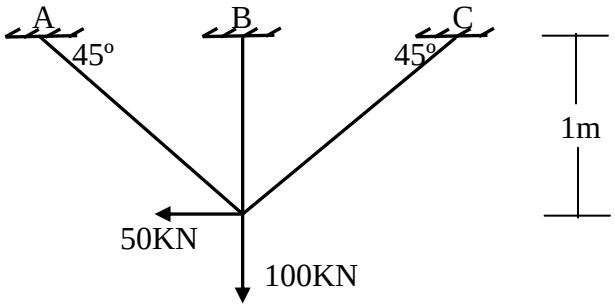
ii) Properties of stiffness matrix

b) Assemble structure stiffness matrix for the given beam in fig. EI is constant.



12marks

10. Analyse the given truss in fig., using direct stiffness method. Take AE = 1 for all members.



16marks