

(c) Develop the stiffness matrix for space frame member. 14

(d) Explain the approach followed in direct stiffness method in generating the member stiffness matrix for the structure axis. 6

(e) Analyse the frame shown below by stiffness method. 14

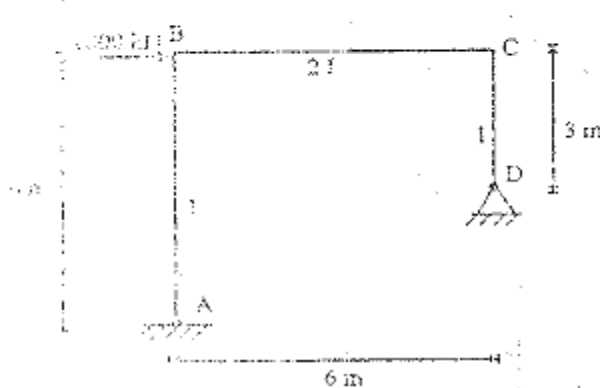


Fig. 7

(f) Short notes on any four of the following : 5 each

- Comparison between Frame methods (Displacement method)
- Unit load method
- Static Indeterminacy
- Gaussian Elimination method
- Assembling the structural stiffness matrix

Total No. of Questions : 8 ] Total No. of Printed Pages : 4

Roll No. ....

## MVSE-103

M. E./M. Tech. (First Semester)

EXAMINATION, March, 2010

ADVANCED STRUCTURAL ANALYSIS

(MVSE-103)

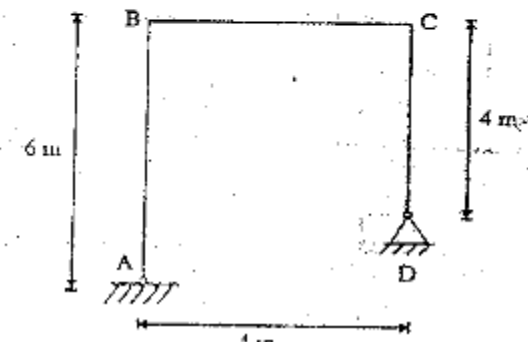
Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any five questions. All questions carry equal marks. Standard results for deflections and fixed moments are allowed.

- (a) Describe kinematic indeterminacy. Find the degree of kinematic indeterminacy of a plane frame shown below if the axial deformations are neglected. The support at A is fixed and support D is hinged. 6



- b) Calculate the unknown displacement at support B and C by stiffness method. Assume EI constant. 14

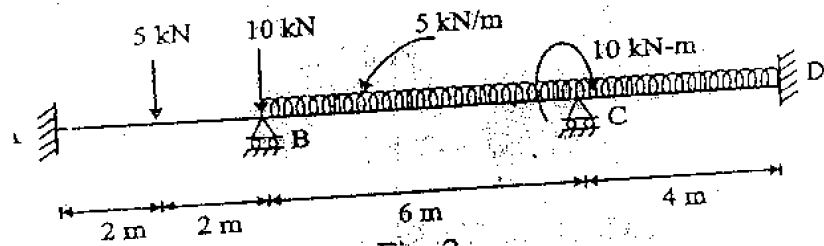


Fig. 2

- a) Prove that the flexibility coefficient matrix of any structure is inverse of the stiffness coefficient matrix of the same structure. 6

- b) Analyse the following fixed end beam by flexibility method. Also draw SF diagram and BM diagram. Assume E. I. constant. 14

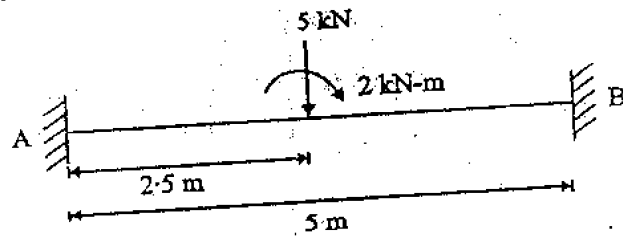


Fig. 3

Analyse the continuous beam of flexibility method as shown in fig. 4. The downward settlement of support B and C in kN-m units are  $\frac{200}{EI}$  and  $\frac{100}{EI}$  respectively. Assume EI constant. 20

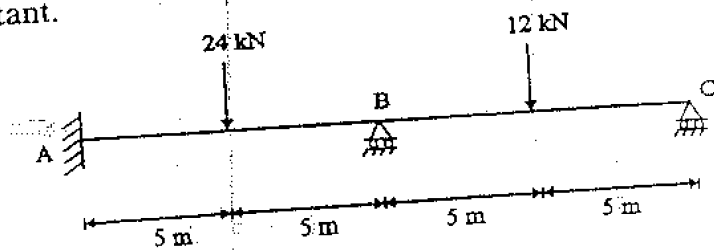


Fig. 4

4. (a) Describe the basic concept of stiffness method. 8  
 (b) Determine the displacements in the x and y directions at joint B and C of the plane truss shown below. Assume EA constant for all members. 15

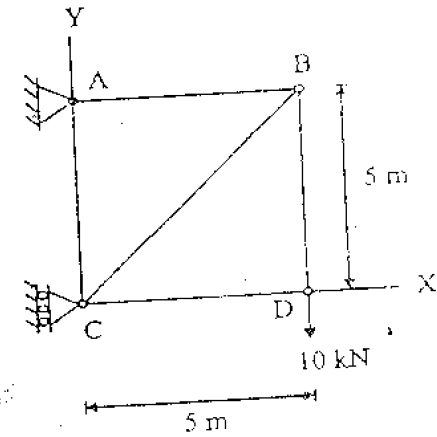


Fig. 5

5. (a) Describe the basic concept of stiffness method. 8  
 (b) Analyse the Portal frame shown below by stiffness method. 15

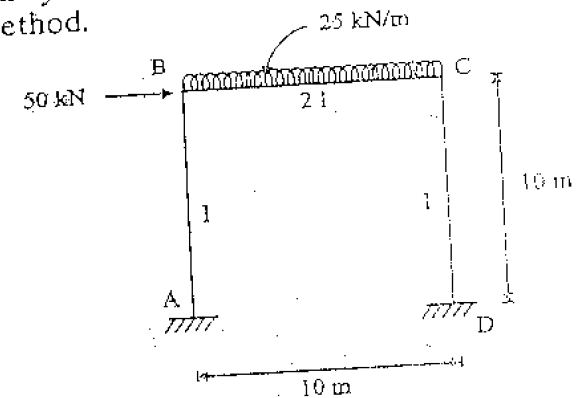


Fig. 6

6. Explain the following :  
 (i) Member co-ordinate system.