Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 712001N **Date: 01-12-2014**

Subject Name: Advanced Structural Analysis

Time: 10:30 am - 01:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q 1 (a) What is nonlinearity? Explain types of nonlinearity in brief. 07

Q 1 (b) Develop overall joint stiffness matrix for a beam shown in figure 1. 07
Take $K_B = 2\times10^5$ KN/m and $K_C = 1\times10^5$ KN/m

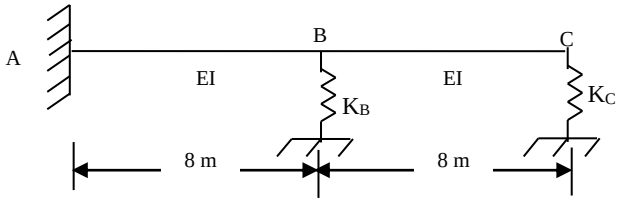


Fig:1

Q 2 (a) Differentiate between stiffness matrix and flexibility matrix method along with their advantages and disadvantages. 07

Q 2 (b) Discuss how shear deformations can be included in the analysis of structures. 07

OR

Q 2 (b) Analyse the beam as shown in figure 2 using the stiffness matrix member approach. 07

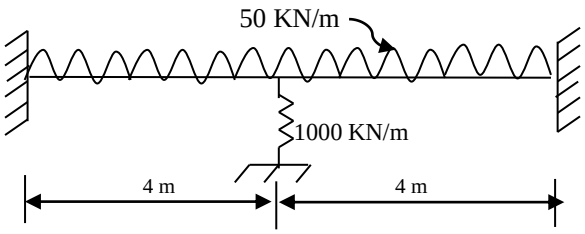


Fig:2

Q 3 (a) Calculate the joint displacements of joints B and C as shown in figure 3 using Flexibility Matrix member Approach. 07

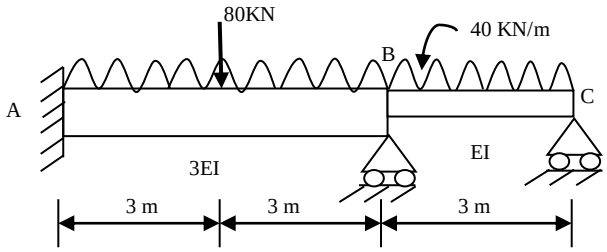
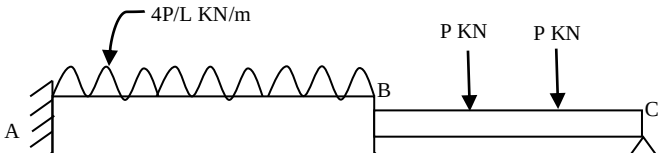


Fig:3

Q 3 (b) Draw the shear force and bending moment diagram of the beam as shown in figure 3 by analyzing it by Flexibility Member Approach. 07

OR

Q 3 (a) Calculate the joint displacements of joints B and C as shown in figure 4 using Flexibility Matrix member Approach. 07



Q 3 (b) Draw the shear force and bending moment diagram of the beam as shown in figure 4 by analyzing it by Flexibility Member Approach. 07

Q 4 (a) Calculate the joint displacements of the plane frame as shown in figure 5 using Flexibility Matrix member Approach. 07

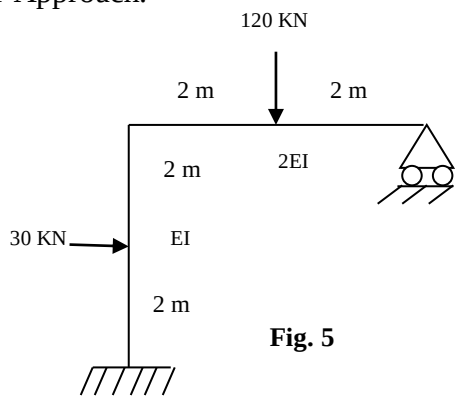


Fig. 5

Q 4 (b) Analyse and draw the shear force and bending moment diagram of the plane frame as shown in figure 5 using Flexibility Matrix member Approach. 07

OR

Q 4 (a) Calculate the Action Transformation matrix and Assembled Flexibility matrix for the plane truss as shown in figure 6 07

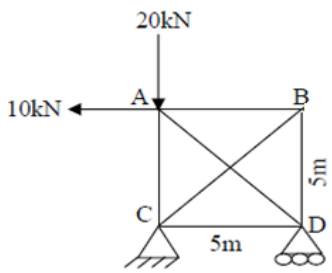


Fig. 6

Q 4 (b) Calculate the support reactions of the plane truss as shown in figure 6 using Flexibility Matrix member Approach. 07

Q 5 (a) Obtain the rearranged joint stiffness matrix of the beam as shown in figure 7. 07

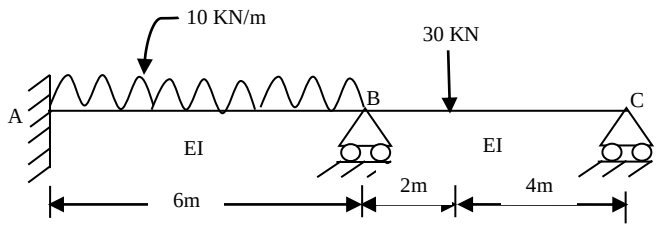


Fig:7

Q 5 (b) Analyse draw the shear force and bending moment diagram of the beam as shown in figure 7 using the stiffness matrix member approach. 07

OR

Q 5 (a) Obtain the rearranged joint stiffness matrix of the truss as shown in figure 8.Assume all members have same cross sectional area. 07

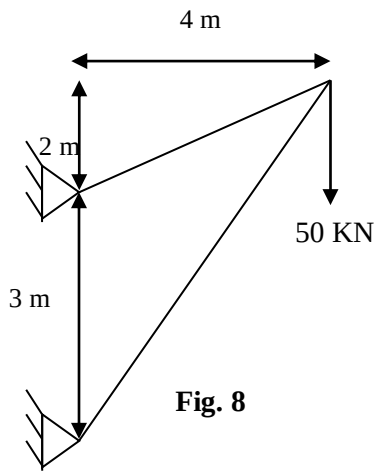


Fig. 8

Q 5 (b) Calculate the support reactions of the plane truss as shown in figure 8 using the stiffness matrix member approach. 07