

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII • EXAMINATION – WINTER 2013

Subject Code: 170605**Date: 03/12/2013****Subject Name: Advanced Structural Analysis****Time: 10:30 TO 01:00****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Take $E=2 \times 10^8 \text{ kN/m}^2$, $I=2.0 \times 10^{-5} \text{ m}^4$, $A=0.0025 \text{ m}^2$, $G=0.8 \times 10^8 \text{ kN/m}^2$ and $J=4.0 \times 10^{-5} \text{ m}^4$ if not given.

Q.1 Analyse the beam shown in fig.1 using stiffness member approach and plot SF & BM diagrams. **14**

- Q.2** (a) Define symmetry and anti-symmetry. Sketch at least one beam, one plane truss and one plane frame having symmetry and anti-symmetry. **07**
- (b) What is discretization? Enlist and explain different factors to be considered for the proper discretization. **07**

OR

- (b) Giving suitable example, explain any three loading assignment facilities available in the structural analysis software that you have learned. **07**

Q.3 Analyse a plane frame shown in fig.2 using stiffness member approach and construct BM diagram. **14**

OR

- Q.3** (a) Analyse a truss shown in fig.3 using stiffness member approach. All members have same cross sectional area. **07**
- (b) Determine the elements of the stiffness matrix for a grid member. **07**

Q.4 (a) Prepare an input file data.in to store data of $n \times n$ size S_{FF}^{-1} matrix and column vector A_{FC} . Prepare C or C++ program to read above data and containing function capable to handle the multiplication of these matrices and store result as D_F vector. Write ample input file. **14**

OR

- Q.4** (a) Enlist different pre and post processing facilities available in the structural analysis professional software you have learned. **07**
- (b) Explain how following issues are handled in analysis (i) Sinking of support (ii) Presence of inclined support. **07**

Q.5 (a) Determine the shape functions for the Constant Strain Triangle. Use natural coordinate systems. **07**

- (b) Using FEM, determine nodal displacements and stresses in elements for the Mild Steel column assembly shown in the fig.4. **07**

OR

Q.5 For a beam shown in the fig.5, using finite element method, determine:
 1. Member end actions 2. Deflection under load. **14**

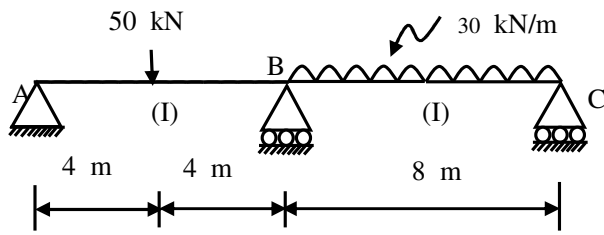


Fig.1 Q.1

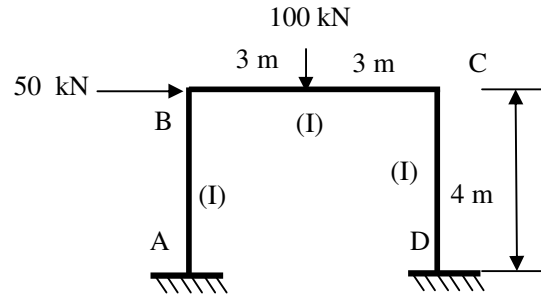


Fig.2 Q.3

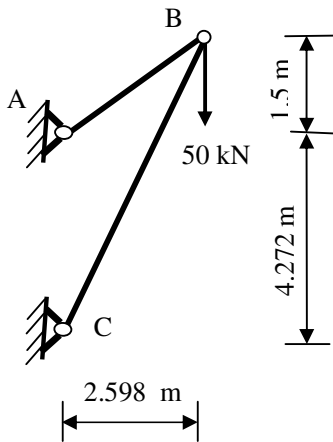


Fig.3 Q.3(a) OR

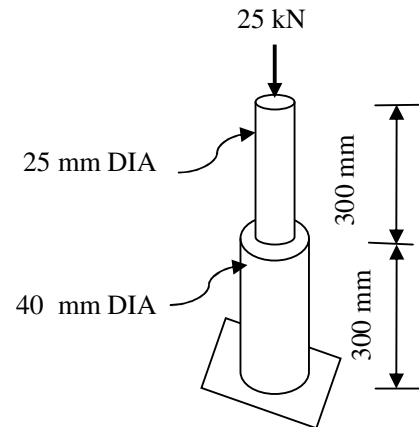


Fig.4 Q.5(b)

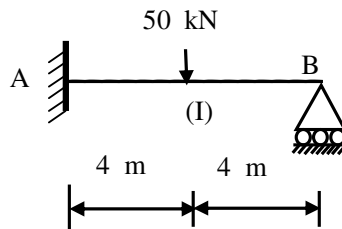


Fig.5 Q.5
