Seat No.: _____ Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER • 2014

Subject Code: 170605 **Date: 29-11-2014**

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.**
4. **Take $E=2x10^8$ kN/m^2, $I= 1.5 x10^{-5}$ m^4 , $A=0.002$ m^2,$G=0.8x10^8$kN/m^2 and $J=3.0x10^{-5}$ m^4 if not given.**

Q.1		Analyse the beam shown in fig.1 using stiffness member approach. In addition to loading consider effect due to sinking of support at B by 4 mm.	**14**
Q.2	**(a)**	Enlist different loading facilities available in the structural analysis professional software that you have learned. Explain assignment of floor loading facilities in detail.	**07**
	(b)	What is discretization? Explain how discretization is done in finite element analysis?	**07**
		OR	
	(b)	Determine the shape functions for the Constant Strain Triangle.	**07**
Q.3		Analyze the frame for fig.2 by stiffness matrix method using member approach.	**14**
		OR	
Q.3	**(a)**	Find the displacements for the pin jointed truss shown in the fig.3 using stiffness member approach. Adopt cross sectional area of all members = 900 mm^2 and E=200 kN/mm^2.	**07**
	(b)	Determine the elements of the stiffness matrix for a grid member.	**07**
Q.4		Analyze the assembly of bars shown in the fig.4 using FEM. Plot the variation of displacement, stress and strain along the length.	**14**
		OR	
Q.4		Analyse the beam shown in fig.5 using FEM. Plot SF & BM diagrams.	**14**
Q.5	**(a)**	What is preprocessing and post-processing? Enlist different pre and post processing facilities available in the structural analysis professional software you have learned.	**07**
	(b)	Explain symmetry and anti-symmetry . Sketch at least one beam, one plane truss and one plane frame having symmetry and anti-symmetry.	**07**
		OR	
Q.5		Prepare an input file matrix.in to store data of n x 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 sample input file.	**14**

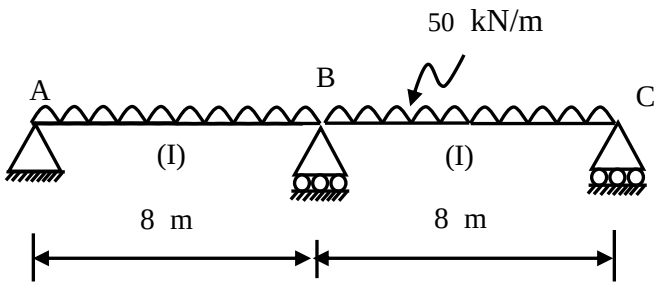

Fig.1 Q.1

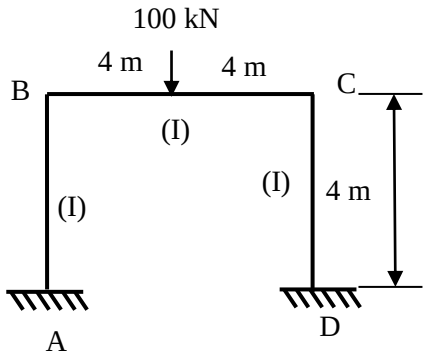

Fig.2 Q.3

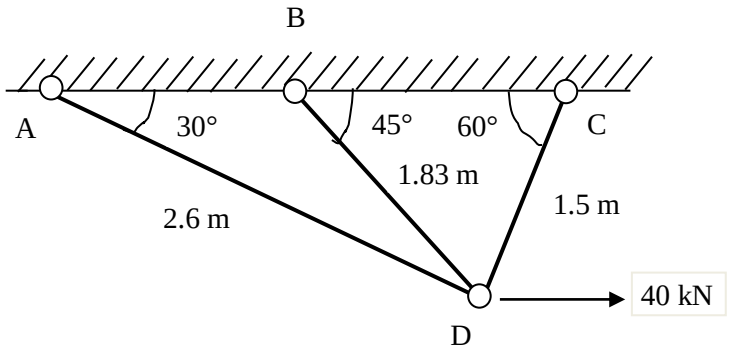

Fig.3 Q.3(a) OR

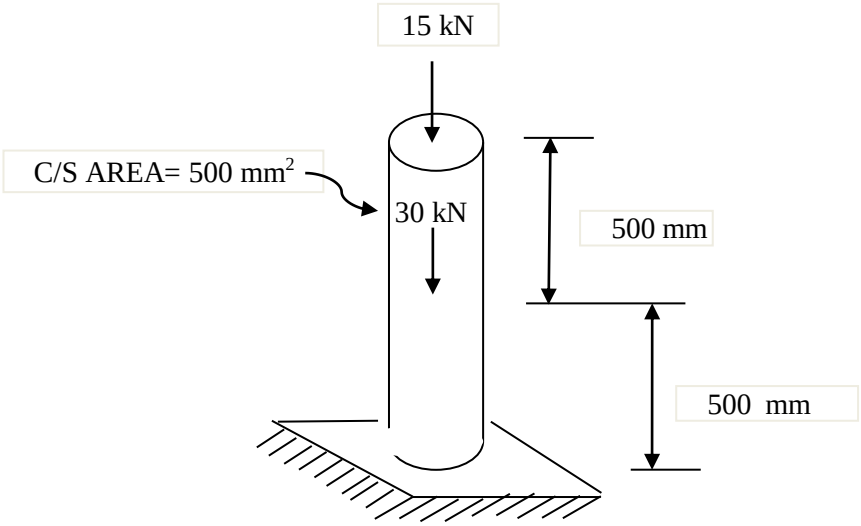

Fig.4 Q-4

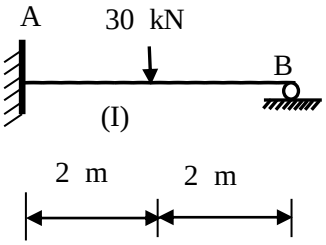

Fig.5 Q.4 OR