Seat No.: _____ Enrolment No._____

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 $E=2x10^8$ kN/m^2,$I=2.0x10^{-5}$ m^4 ,$A=0.0025$ m^2,$G=0.8x10^8$kN/m^2 and $J=4.0x10^{-5}$ 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 descritization? Enlist and explain different factors to be considered for the proper descritization.	**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 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 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**

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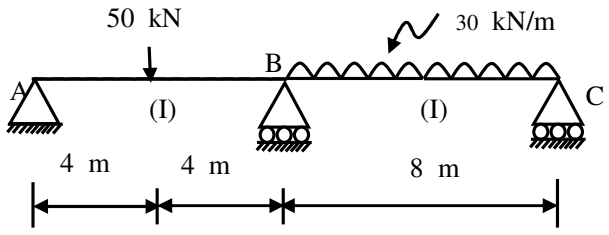

Fig.1 Q.1

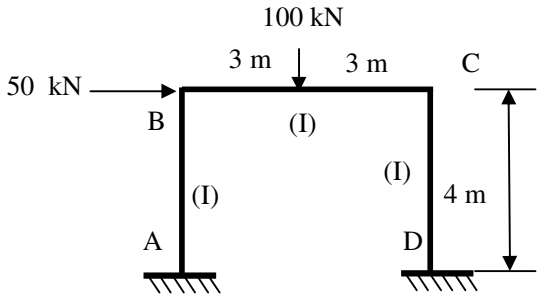

Fig.2 Q.3

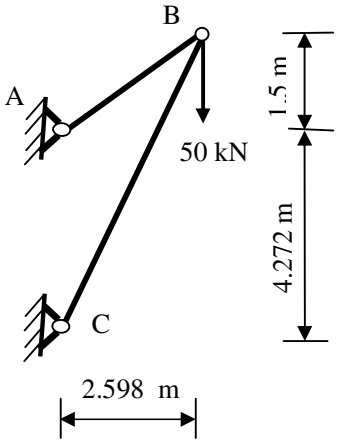

Fig.3 Q.3(a) OR

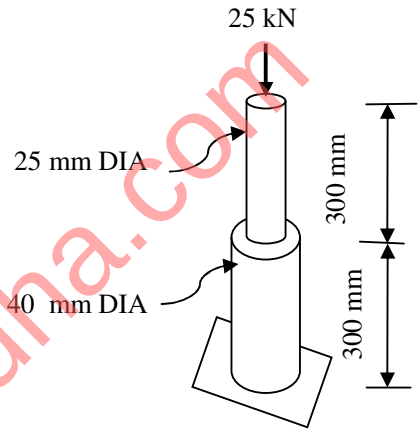

Fig.4 Q.5(b)

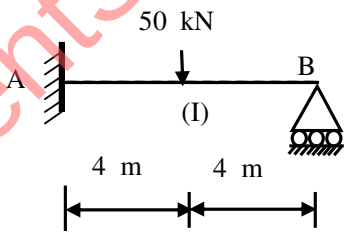

Fig.5 Q.5

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