Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (OLD) EXAMINATION – WINTER 2018

Subject Code:150605 **Date: 27/11/2018**

Subject Name: Structural Analysis - III

Time: 10:30 AM TO 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)	Explain type of domes with neat sketches and state their uses.	7
	(b)	Differentiate between stiffness method and flexibility method.	7
Q-2	(a)	A beam in plan has radius of 8m and is supported at equally spaced 8 supports. It is loaded by a UDL of 40 KN/m. calculate the maximum values of bending moment and shear force.	7
	(b)	Give the properties of flexibility and stiffness matrix.	7
		OR	
	(b)	Define the following terms: Dome, Shape factor, Load factor, collapse load, Plastic hinge, Released structure, Restrained structure.	7
Q-3	(a)	State and explain the basic assumptions made in the plastic theory.	7
	(b)	For the beam section shown in figure-1, determine the shape factor and the fully plastic moment. Take f_y = 250 MPs.	7
		OR	
Q-3	(a)	Calculate the shape factor for the hollow rectangular section having outer dimension 300 mm × 150 mm and thickness 10mm.	7
	(b)	State and explain static theorem and kinematic theorem of plastic theory.	7
Q-4	(a)	Differentiate between straight beam and curved beam.	7
	(b)	A roof of a hall having diameter 20 m is to be covered by a conical dome of 100 mm thickness and 4 m rise. Assuming live load and other loads as 1.5 KN/m^2 , calculate stresses in the dome.	7
		OR	
Q-4	(a)	Derive an expression for M_ϕ and T_ϕ for a curved beam fixed at the ends.	7
	(b)	A spherical dome with a span of 15m and central rise of 3m has all inclusive load of 10 KN/m^2. Calculate all the stresses at the mid height.	7
Q-5	(a)	Find the matrices: [A_D] , [A_{DL}] , [S] and [D] with usual notations for the beam shown in Figure-2, using Stiffness method.	7
	(b)	Find the matrices: [D_Q], [D_{QL}] , [F] and [Q] with usual notations for the beam shown in Figure-2. Use Flexibility method assuming vertical support reaction at B (R_B) and vertical support reaction C (R_C) as redundant.	7
		OR	
Q-5	(a)	Derive the Flexibility Matrix [F] for the beam shown in Figure-3, assuming vertical reactions at supports B, C and D as redundant.	7

(b) Derive the Stiffness matrix [S] for the beam shown in Figure-3. 7

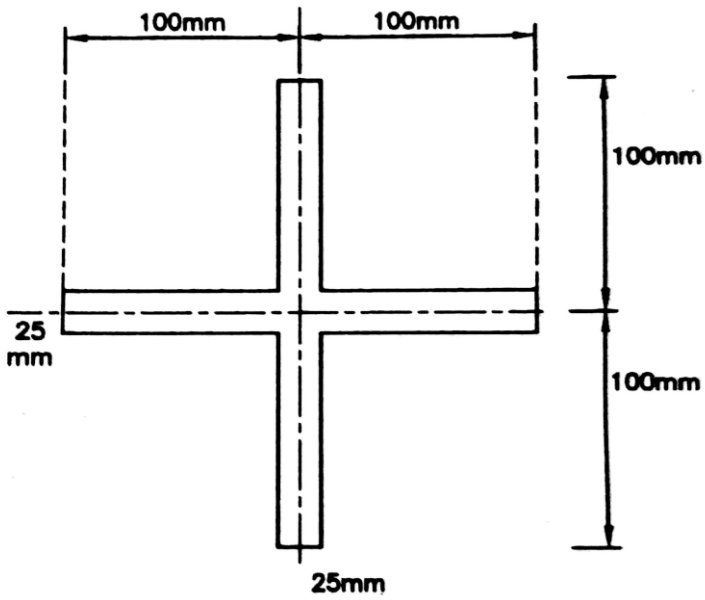

Figure: 1

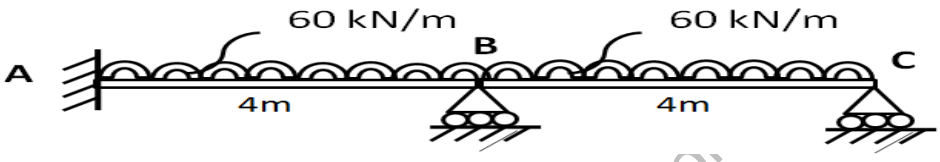

Figure: 2

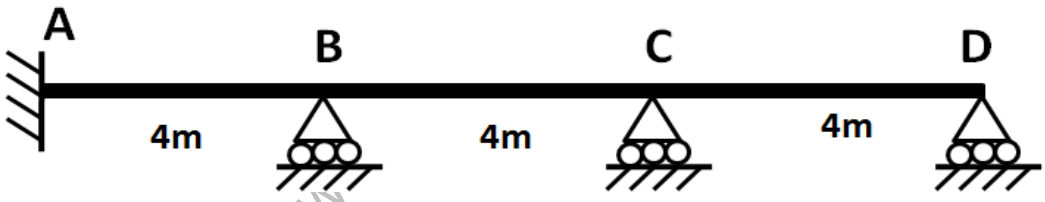

Figure: 3