Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2019

Subject Code: 2150610 Date: 06/06/2019

Subject Name: Advanced Structural Analysis

Time: 02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

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

			MARKS
Q.1	**(a)**	Write the steps of Flexibility method of analysis.	**03**
	(b)	Explain term collapse load.	**04**
	(c)	Differentiate between stiffness method and flexibility method.	**07**
Q.2	**(a)**	Write the steps of Stiffness method of analysis.	**03**
	(b)	Calculate the shape factor for the section shown in Figure no.1.	**04**
	(c)	Explain types of domes with neat sketches and state their uses.	**07**
		OR	
	(c)	Analyze the typical spherical dome subjected to point load at crown.	**07**
Q.3	**(a)**	A propped cantilever beam has a uniform section, span l and flexural rigidity EI. What is the stiffness coefficient corresponding to rotation of the propped end?	**03**
	(b)	For a given beam shown in figure no.2 that F and S matrices are reciprocal to each other or prove that F×S= unit matrix.	**04**
	(c)	Explain with neat sketches "Stresses generated in Conical Dome".	**07**
		OR	
Q.3	**(a)**	Explain in brief the methods of Plastic analysis.	**03**
	(b)	List the essential features of stiffness methods.	**04**
	(c)	Analyze the frame shown in figure no.3 and draw B.M. diagram. EI= constant.	**07**
Q.4	**(a)**	Define the flexibility coefficient fij and stiffness coefficient sij.	**03**
	(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.	**04**
	(c)	A spherical dome with a span of 15 m and central rise of 3 m has all inclusive load of 10kN/m^2. Calculate all the stresses at the mid height.	**07**
		OR	
Q.4	**(a)**	Differentiate between Force Method and Displacement Method of analysis.	**03**
	(b)	An ISLB 300 section is used as a simply supported beam of span 5 m. find the shape factor of the beam section. If the beam carries a point load of 80 kN at mid span, find the load factor. Take fy=250 N/mm^2.	**04**

	(c)	A spherical dome with 20 m span and 6 m central rise has an opening of 4 m horizontal diameter at top. If all inclusive udlof 6 kN/m^2 is acting on it, calculate the maximum value of hoop tension/compression in top and bottom ring beams.	**07**
Q.5	**(a)**	State basic assumptions made in the "Plastic theory".	**03**
	(b)	Calculate the shape factor for a square section arranged as diamond shape having size of 100 mm and x axis passing through one of the diagonals.	**04**
	(c)	Analyze the beam ABC fixed at A and supported on rollers at B and C, as shown in figure no.4 EI for each span is indicated in the figure	**07**

OR

Q.5	**(a)**	Explain term load factor.	**03**
	(b)	Enlist advantages and disadvantages of plastic design.	**04**
	(c)	A fixed beam of 6 m span carried a uniformly distributed load of 175 kN/m over the left half of the span. Determine the fully plastic moment for the beam. Also calculate plastic section modulus required. fy=250MPa.	**07**

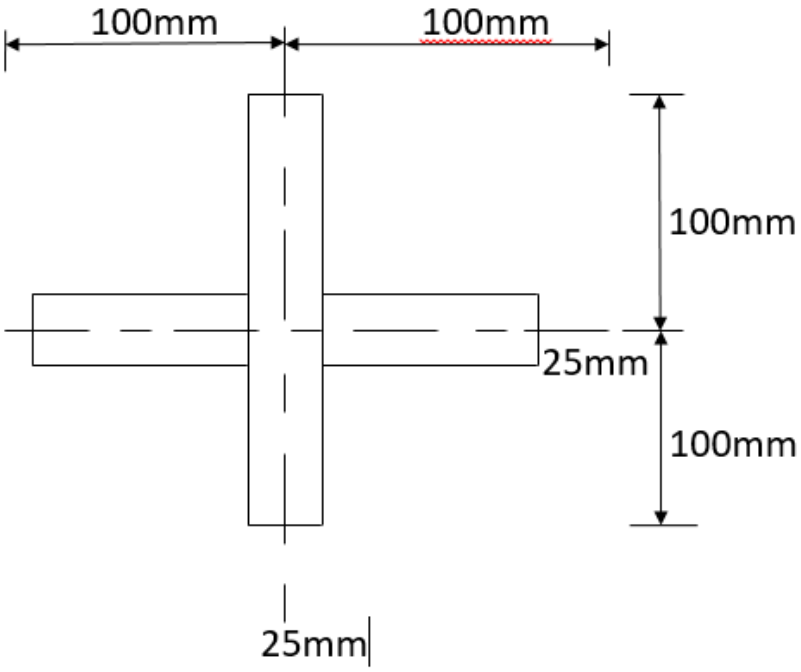

FIGURE NO.1 (Q-2b)

L (EI=constant)

FIGURE NO.2 (Q-3b)

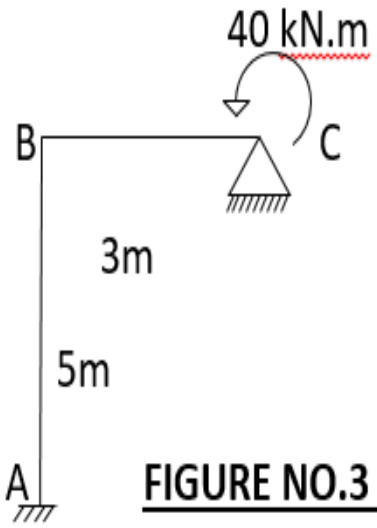

FIGURE NO.3 (Q-3c or)

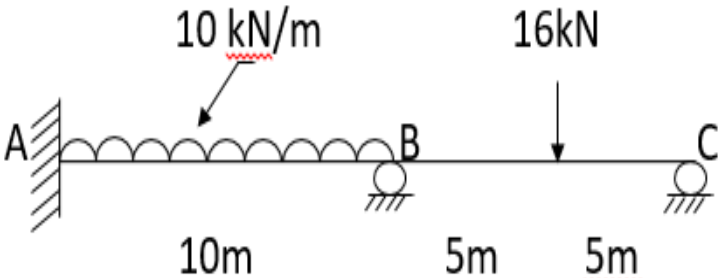

FIGURE NO.4 (Q-5c)

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