Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 150605 **Date: 13/05/2016**

Subject Name: Structural Analysis - III

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.**

Q.1	**(a)**	Differentiate between Stiffness method and flexibility method.	**07**
	(b)	Differentiate between a straight beam and a curved beam.	**07**
Q.2	**(a)**	Calculate the shape factor for a square section arranged as diamond shape having size of 100mm and x axis passing through one of the diagonals.	**07**
	(b)	A spherical dome with a span of 14 m and central rise of 3.5 m supports total uniformly distributed load of 3.5 kN/m^2 over the surface inclusive of self-weight. Find the meridional and hoop stress at ring beam level. Assume dome thickness to be 105 mm.	**07**
		OR	
	(b)	Calculate the M_p required for a fixed beam of span 8 m and loaded by a collapse udl of 25 kN/m over left half 4m and a collapse concentrated load of 60 kN at 6 m from left span.	**07**
Q.3	**(a)**	Formulate the Flexibility matrix [F] and vector {DQL} for the beam shown in figure 1. Assume M_A and M_B as redundant.	**07**
	(b)	For the beam shown in Figure 1, calculate values of all unknown reactions using Flexibility method. Also draw SF and BM diagram.	**07**
		OR	
Q.3	**(a)**	Formulate the Stiffness matrix [S] and load vector {AD – ADL} for the beam shown in figure 1.	**07**
	(b)	For the beam shown in Figure 1, calculate joint displacements and final end moments using stiffness method. Also draw SF and BM diagrams.	**07**
Q.4	**(a)**	Analyze the frame shown in Figure 2 by Stiffness Method.	**07**
	(b)	Determine the bending moment equation and torsional moment equation for a curved beam in plan with fixed supports subjected to UDL w kN/m.	**07**
		OR	
Q.4	**(a)**	A conical dome of 6 m diameter and central rise of 4 m supports a total udl including self weight of 10 kN/m^2 over the entire surface. The thickness of dome is 100 mm. Calculate meridional stress and hoop stress at the base of the dome.	**07**
	(b)	Explain the terms. (i) shape factor (ii) collapse load.	**07**
Q.5	**(a)**	Explain term "Plastic hinge". State (i) Upper bound theorem and (ii) Lower bound theorems for collapse load in plastic analysis.	**07**
	(b)	Determine the variation of SF and BM at an interval of 10^0 for a circular curved beam of radius 5 m in plan symmetrically supported on six columns subjected to a UDL of 5 kN/m throughout. Draw the diagrams of variation of SF and BM for one span between two supports in curved form.	**07**
		OR	
Q.5	**(a)**	Obtain the formula to calculate plastic moment of resistance of a propped cantilever beam of span *L* carrying uniformly distributed load of *W* throughout the span.	**07**

(b) Explain Torsion factor and list out its value for various shapes of the section for the beams curved in plan. **07**

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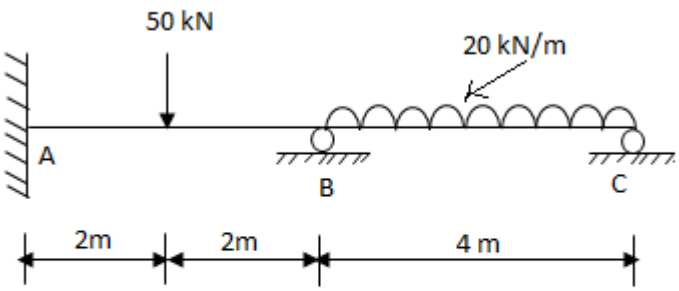

Figure 1 Q-3 (a),(b) Or
Q-3 (a),(b)

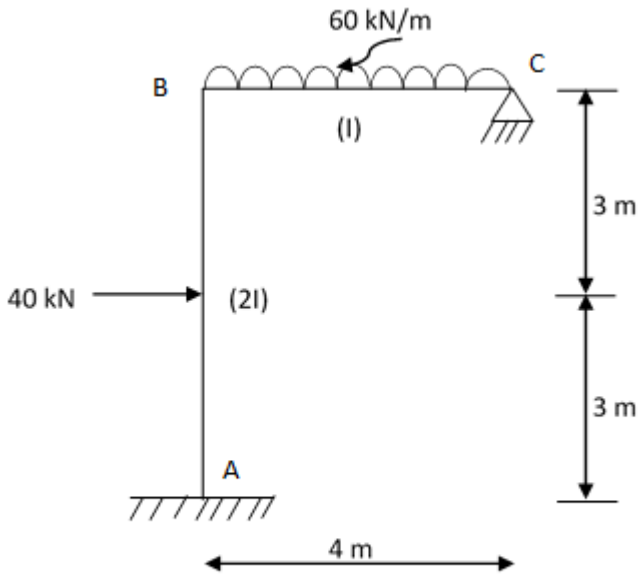

Figure-2 Q-4 (a)