Seat No.: ________ **Enrolment No.___________**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2150610 **Date: 05/05/2017**

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		**Short Questions**	**14**
	1	Define Load Factor.	
	2	Define Plastic Hinge.	
	3	Define Plastic Section Modulus.	
	4	The shape factor of diamond shape c/s is ___________.	
	5	Define Dome.	
	6	The displacement due to unit force is known as __________.	
	7	Define degree of Kinematic Indeterminacy.	
	8	Define degree of redundancy.	
	9	The force due to unit displacement is known as__________.	
	10	The conical dome obtained by revolution of __________about its ________ axis.	
	11	The dome obtained by revolution of elliptical curve about one of its axis is known as __________________.	
	12	The dome is subjected to __________and __________stresses.	
	13	The shape factor is the ratio of _________ and __________.	
	14	At the plastic hinge formation the resisting moment is known as ________.	
Q.2	**(a)**	Explain in brief with neat sketches, the type of domes and its uses.	**03**
	(b)	Determine the shape factor of an Inverted T-Section having flange and web size 200 mm x 20 mm.	**04**
	(c)	Analyze the frame as shown in **fig.01** by stiffness method.	**07**
		OR	
	(c)	Analyze the beam as shown in **fig.02** by flexibility method.	**07**
Q.3	**(a)**	Determine Fixed end moments only of a beam as shown in **fig.03** Support sinks by 25 mm. Take EI = 3800 kN.m^2	**03**
	(b)	For the Problem above, determine final end moments by stiffness method of analysis.	**04**
	(c)	Analyze the pin jointed truss as shown in **fig.04** by flexibility method. AE is constant.	**07**
		OR	
Q.3	**(a)**	Explain in brief with neat diagram, the Meridional thrust and Hoop stresses acting on dome.	**03**
	(b)	A conical dome of 12 m diameter with a central rise of 4 m supports total UDL of 4 kN/m^2 inclusive of self weight. Calculate meridional and hoop force at ring beam level.	**04**
	(c)	A spherical dome with a span of 15 m and central rise of 3 m has all inclusive load of 10 kN/m^2. Calculate all stresses at the mid height.	**07**
Q.4	**(a)**	A spherical dome of 100 mm thickness, base diameter of 14 m and central rise 3.5 m supports total UDL of 4.0 kN/m^2 including self	**03**

weight. Determine the meridional and hoop stress at ring beam level.

	(b)	A spherical dome with 20 m span and 6 m central rise has an opening 4 m horizontal diameter at top. If all inclusive UDL of 6 kN/m^2 is acting on it, calculate the maximum value of hoop tension/compression in top and bottom ring beams.	**04**
	(c)	A conical dome has 9 m span and 4.5 m rise. It has a thickness of 100 mm. It is subjected to load of 4.9 kN/m^2 including self weight and a concentrated load at vertex of 9 kN. Calculate stresses in dome.	**07**
		OR	
Q.4	**(a)**	State and explain in brief various collapse mechanism of a frames in plastic theory with neat diagrams.	**03**
	(b)	State the assumptions in plastic analysis.	**04**
	(c)	Determine the collapse load for the frame as shown in **fig.05**	**07**
Q.5	**(a)**	Explain in brief the methods of Plastic analysis.	**03**
	(b)	Determine the plastic moment capacity of a beam as shown in **fig.06** if the load shown are working loads. Take load factor as 1.5. Use kinematic method.	**04**
	(c)	Determine the collapse load for propped cantilever beam subjected to UDL on entire span.	**07**
		OR	
Q.5	**(a)**	Write the steps of Flexibility method of analysis.	**03**
	(b)	Differentiate between Force Method and Displacement Method of Analysis.	**04**
	(c)	Determine the end moments of a continuous beam as shown in **fig.07** by stiffness matrix method if support B sinks by 12 mm and support C sinks by 15 mm. Take EI = 7000 kN.m^2.	**07**

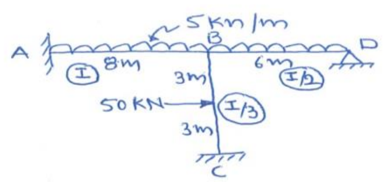

Fig.01 - Q.2(c)

Fig.02 - Q.2(c) OR

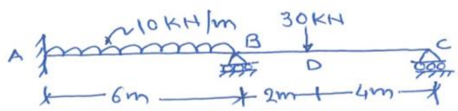

Fig.03 - Q.3(a)&(b)

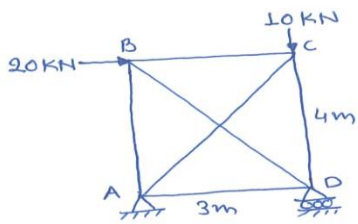

Fig:04 - Q.3(c)

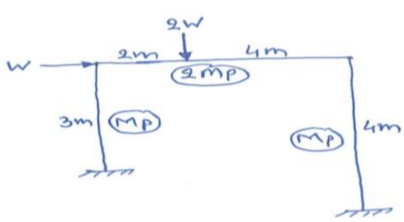

Fig:05 - Q.4(c) OR

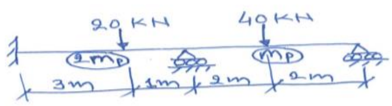

Fig: 06 - Q.5(b)

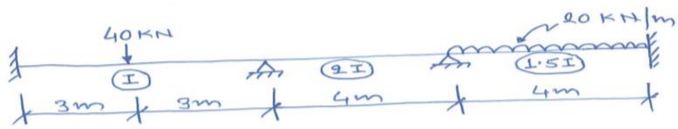

Fig: 07 - Q.5(c) OR

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