Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER V–EXAMINATION – SUMMER – 2014

Subject code: 150605 **Date: 26-06-2014**

Subject Name: Structural Analysis - III

Time: 10.30AM to 01.00PM **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)**	Derive an expression for meridional thrust and hoop force for a spherical Dome Subjected to concentrated load at the crown.	**07**
	(b)	Fill in the blanks and rewrite the whole sentence : (1) Shape factor is a property of the _____ shape. It is independent of the _____ properties. (2) The final size of the stiffness matrix depends on _____ indeterminacy while the same of the flexibility matrix depends on _____ (3)Spherical dome is obtained by revolution of _____ about its _____ diameter. (4)For a circular beam supported symmetrically on four or more than four columns _____will be zero at the supports and at the centre of each span.	**07**
Q.2	**(a)**	Explain plastic bending of beams with sketches.	**07**
	(b)	Explain Torsion factor and list out its value for various shapes of the section for the beams curved in plan.	**07**
		OR	
	(b)	A beam is in the form of quarter circle in plan with both the ends fixed. If the radius of the beam is 5m and is loaded by a udl of 20 kN/m, draw the bending moment, shear force and torsion moment diagrams.	**07**
Q.3	**(a)**	A fixed beam of span L meter carries an eccentric point load W at a distance 'a' meter from left support A. Determine the value of W at collapse.	**07**
	(b)	A beam circular in plan is loaded with uniformly distributed load of 80 kN /m inclusive of self weight. The radius of the beam is 8 meter. The beam is supported by six symmetrically placed columns. Draw Shear force, bending moment and Twisting moment diagram for one of the span.	**07**
		OR	
Q.3	**(a)**	Calculate the Mp required for a fixed beam of span 12 meter and loaded by a collapse udl of 30 kN /m over left half 6 meter and a collapse concentrated load of 80 kN at 8 meter from left support.	**07**
	(b)	A conical Dome has the following details.: Span of the Dome = 20 meter Rise = 4 meter Live load , etc. = 2.0 kN/m^2 Calculate maximum meridional thrust and hoop force in the conical dome.	**07**

Q.4 **(a)** Explain the following matrix equations used in stiffness method of analysis. **07**

1. AD = ADL+ SD
2. AR = ARL+ARD.D,
3. AM = AML+AMD.D

(b) For the structure shown in fig.1 calculate load vector (AD-ADL) and stiffness matrix (S). **07**

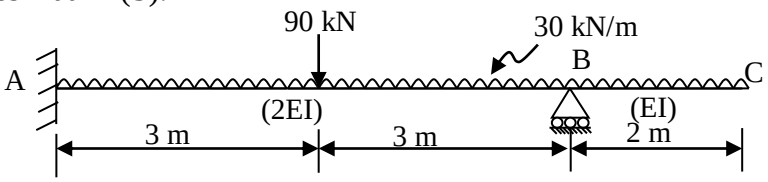


fig.1

OR

Q.4 **(a)** For the structure shown in fig.2 calculate the flexibility matrix and displacement vector. **07**

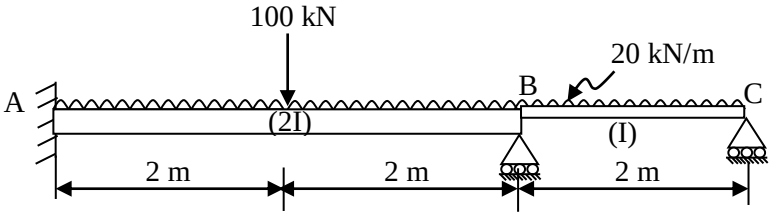


fig.2

(b) For the structure shown in fig.2 calculate the member end actions and draw shear force and bending moment diagrams. **07**

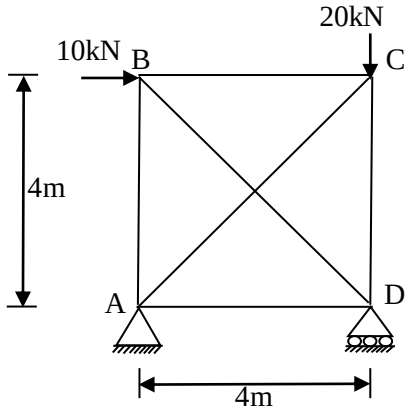
Q.5 **(a)** A Spherical dome with a span of 18 meter and central rise of 4 meter has all inclusive load of 14 kN/m^2. Calculate all the stresses at the mid height. **07**

(b) Find shape factor for a beam of circular section of radius R. **07**

OR

Q.5 **(a)** Derive the expression for Mø and Tø for a curved beam fixed at ends. **07**

(b) .Using flexibility method analyse the pin jointed plane truss shown in fig.3. The cross-sectional areas A and modulus of elasticity E for all members is the same. **07**



A

fig.3.

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