Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V EXAMINATION – SUMMER 2015 Date:19/05/2015

Subject Code: 150605

Subject Name: Structural Analysis III

Time: 2.30PM-5.00PM

Instructions:

- Attempt all questions.
- Make suitable assumptions wherever necessary.
- Figures to the right indicate full marks.
- Q.1 (a) Define plastic hinge and discuss assumptions made in plastic analysis of structure.
 (b) i. Write stiffness matrix for the frame shown in fig. 1 considering axial deformation.
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- Q.2 (a) Determine shape factor for a 'T' section, having web 10 x 90 mm and flange 100 x 10 mm.
 - (b) A semicircular beam fixed at both ends of 10 m radius is subjected to concentred load of 100 kN at its center. Determine shear force, bending moment and torsional moment at $\theta = 30^{\circ}$, 60° and 120° .

OR

- (b) A beam circular in plan has radius of 6 m is supported on 8 columns, spaced equally on the circumference. It is loaded by uniformly distributed load of 25 kN/m, calculate twisting moment and bending moment at support and mid span. Also find maximum twisting moment.
- **Q.3 (a)** Analyse the frame shown in fig. 3 using flexibility method. Draw shear force and bending moment diagram.

OR

- Q.3 (a) Analyse the beam shown in fig. 4 using stiffness method. Draw shear force and bending moment diagram.
- Q.4 (a) Determine the collapse load for the fixed beam shown in fig. 5 in which plastic 07 moment capacity is 2Mp in half length and Mp in other half length of beam.
 - (b) Derive an expression of shear force and bending moment at support for a circular beam 07 supported symmetrically.

OR

- Q.4 (a) Define Dome. Derive an expression for meridional thrust and hoop stress for spherical dome subjected to uniformly distributed load.
- Q.5 (a) A conical dome of 12 m diameter with a central rise of 3.5 m supports total uniformly distributed load of 5 kN/m², over the surface inclusive of self weight, calculate meridional thrust and hoop stress and ring beam level. Consider thickness of dome 120 mm.
 - (b) A quarter circular beam of radius R curved in plan is fixed at one end and free at other end. It carries vertical load P at its free end. Determine the deflection at free end and sketch shear force, bending moment and twisting moment diagrams. Take EI = GJ.

OR

- **Q.5** (a) Draw different released structures, for the structures shown in fig. 6 (i to iii) and give **07** the redundant.
 - (b) Find the plastic modulus of triangular section of height 'h' and base width 'b'. 07

Total Marks: 70



Fig- 6 (i) Que 5(a)