

Seat No.: _____

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GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- V (New) EXAMINATION – WINTER 2019****Subject Code: 2150610****Date: 25/11/2019****Subject Name: Advanced Structural Analysis****Time: 10:30 AM TO 01:00 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) Define: 1. Flexibility 2. Stiffness 3. Shape Factor.	03
(b) Enlist advantages and disadvantages of plastic design.	04
(c) Differentiate between stiffness method and flexibility method.	07
Q.2 (a) Explain in brief the methods of Plastic analysis.	03
(b) Calculate the shape factor for the section shown in Figure no.1.	04
(c) A spherical dome with a span of 10 m and central rise of 2 m has a shell which is 120mm thick. The wind load on the dome is estimated to the equivalent to 1.2 kN/m ² . Estimate stresses in the dome.	07
OR	
(c) Derive the formula for M_p required for the propped cantilever beam loaded by a collapse uniformly distributed load of W_c kN/m.	07
Q.3 (a) Explain any two types of skeleton structures with their internal forces and deformations.	03
(b) Explain. Meridian stress & Hoop stress.	04
(c) Analyze the frame shown in figure no.2 and draw B.M. diagram. $EI = \text{constant}$.	07
OR	
Q.3 (a) Explain Domes and write application of it.	03
(b) 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?	04
(c) Analyse the typical spherical dome subjected to point load at crown.	07
Q.4 (a) Derive equation of collapse load for the propped cantilever beam subjected to uniformly distributed load.	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) Derive equations of shape factor of (i) Circular section (ii) Square section.	07
OR	
Q.4 (a) Derive the equation of collapse load for the propped cantilever beam subjected to central point load.	03
(b) State and explain in brief various collapse mechanism of a frames in plastic theory with neat diagrams.	04
(c) Find the collapse load for a fixed beam of span L and subjected to an UDL of w /unit length using static method and kinematics method.	07
Q.5 (a) Differentiate between Force Method and Displacement Method of Analysis.	03

- (b) Explain Equations of static Equilibrium. **04**
- (c) Find the shape factor and plastic moment capacity of a Tee section with a Flange 100X12 m and web 180X10 mm, Assume $f_y=250$ MPa. Also find collapse load if it is used for a simply supported span 3m. **07**

OR

- Q.5**
- (a) Explain term load factor. **03**
 - (b) A continuous steel beam consists of three equal spans 10m each carrying an u.d.l. of 50 kN/m under working conditions. Determine fully plastic moment required for the beam. Take load factor =1.7 assume uniform beam section. **04**
 - (c) An ISLB 300 section is used as a simply supported beam of span 5m. find the shape factor of the beam section. If the beam carries a point load of 80kN at mid span, find the load factor. Take $f_y=250$ N/mm². **07**

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