Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER– VI • EXAMINATION – SUMMER-2017

Subject Code: X60604 **Date: 04/05/2017**

Subject Name: Structural Design - I

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.**
4. **Use of IS 800:2007, IS 875 Part I, II, II, SP-6 and Steel Table are permitted.**
5. **Consider fy = 250 N/mm^2 and fu = 410 N/mm^2 for steel, if not mentioned.**

Q.1	**(a)**	Enlist various limit states as per Indian Standard. Explain any one in detail.	**07**
	(b)	Explain different types of load to be considered for the design of steel structure.	**07**
Q.2	**(a)**	Design seat angle connection between the beam ISMB 250 @ 37.3kg/m and column ISHB 250 @ 51kg/m. The beam reaction is 100kN due to factored load. Use M16 bolts of 4.6 grade and steel Fe 410.	**07**
	(b)	An ISLB 300 @ 37.7kg/m transmits an end reaction of 300kN (due to factored load); to the web of ISMB 450 @ 72.4kg/m. Design a suitable web cleat connection.	**07**
		OR	
	(b)	Give advantages and disadvantages of steel structures.	**07**
Q.3	**(a)**	Considering non-sway column in a building frame with flexible joints of 6.0m height and subjected to the factored axial load = 1000kN at an eccentricity of 50mm. Design a suitable column, if the column is hinged at both ends.	**14**
		OR	
Q.3	**(a)**	Select suitable section of the simply supported gantry girder and show the check for buckling resistance for the following data: Span of gantry girder = 6m, Span of crane girder = 12m, Crane capacity = 150kN, Self-weight of crane girder excluding trolley = 100kN, Self-weight of trolley = 50kN, Minimum hook approach = 1m, Distance between wheels = 3m, Self-weight of rails = 0.25 kN/m.	**14**
Q.4	**(a)**	Select suitable configuration of the truss and determine panel point load due to dead load, live load and wind load; using following data: Location – Ahmedabad, Span of truss = 20m, spacing of truss = 5m c/c, rise of truss = 3m, height of eaves = 10m. Also, design any one member of the truss.	**14**
		OR	
Q.4	**(a)**	Design web and flange of simply supported plate girder of 20m span subjected to factored uniformly distributed load of 50kN/m throughout. In this plate girder transverse stiffener should be avoided. Use simple post critical method for checking of shear buckling of web. Assume $\mu = 0.3$, $E = 2 \times 10^5$ N/mm^2.	**14**
Q.5	**(a)**	A portal frame consists of two hinge supported column of 5m height separated by a beam of span 7m and loaded up to collapse with downward uniformly distributed load of 20kN/m. Find the plastic moment of resistance if it is of uniform strength.	**14**
		OR	

Q.5 (a) Design the foot bridge for N - type lattice girder having 10 Nos. of panels and laterally supported by rakers. The span of bridge is 20 m and width of walk way is 3.0 m. The RCC flooring slab of 110mm thick subjected to floor finish load and live load of 1.0kN/m^2 and 3.0kN/m^2 respectively. **14**

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