Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VI EXAMINATION – WINTER 2015

Subject Code:X60604 **Date:05/12/2015**

Subject Name: Structural Design-I

Time: 02:30pm to 05:00pm **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 is permitted.**
5. **Consider f_y = 250 N/mm^2 and f_u = 410 N/mm^2 for steel if not given in data.**

Q.1	**(a)**	Differentiate between Limit State Method and Working Stress Method of Design.	**07**
	(b)	Explain advantages and disadvantages of various types of connections used in steel structure.	**07**
Q.2	**(a)**	Draw neat sketches of beam to column stiffened and un-stiffened connection.	**07**
	(b)	Explain concept of Plastic design method. Give advantages of plastic design method.	**07**
		OR	
	(b)	A beam ISMB 400 transfers a factored load of 500 kN to a column ISHB 450. Using Fe 410 grade steel, design the stiffened seat connection.	**07**
Q.3		Design a simply supported welded plate girder of span 16 m to carry u.d.l. of 45 kN/m over entire span. Provide end bearing stiffners. Assume suitable data if necessary. (Connection design is not required)	**14**
		OR	
Q.3		Design a simply supported gantry girder to carry one electric overhead travelling crane. Considering following data: Span of gantry girder = 6.5 m Span of crane girder = 16 m Crane capacity = 200 kN Self weight of crane girder excluding trolley =150 kN Self weight of trolley = 40 kN Minimum hook approach = 1.2 m Distance between wheels = 3.0 m Self weight of rails = 0.5 kN/m	**14**
Q.4		Design the foot bridge for the following data: Type of truss: N- Type lattice girder Span: 24 m Width of walk way: 3.0 m, Flooring: RCC slab 120 mm with floor finish 1.0 kN/m^2 Live Load: 3 kN/m^2 Design Cross Girders and any one member of Top Chord. Assume Suitable data if required.	**14**
		OR	

Q.4		Considering non-sway column in a building frame with flexible joints of 4.0 m height and subjected to the factored axial load = 1000 kN at an eccentricity of 40 mm. Design a suitable column, considering fy = 250 N/mm^2. The column is fixed at bottom and hinged at top.	**14**
Q.5		Calculate nodal loads due to dead load, live load and wind load for a truss situated in Vadodara. Length of truss = 20 m, Spacing of truss = 5 m c/c. Rise of truss = 4 m. Consider medium permeability and use A.C. Sheets. Height of eaves level is 12 m. Assume suitable data if necessary. Design any one member of Main Tie.	**14**
		OR	
Q.5	**(a)**	A portal frame consists of two hinge supported column of 5 m height separated by a beam of span 7 m and loaded up to collapse with downward uniformly distributed load of 20 kN/m and lateral point load of 100 kN at beam column junction . Find the plastic moment of resistance if it is of uniform strength.	**14**

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