Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2013

Subject code: 1721507 **Date: 02-01-2014**

Subject Name: Advanced Steel Structural Design

Time: 10.30 am – 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.**
4. **Use of IS:800, IS:801, IS:811, IS:875, IS:1893 and Steel Table is permitted.**

Q.1		Top chord of welded cold formed light-gauge steel roof truss has average member length 3.5m and subjected to maximum compressive force of 12kN. Proportionate suitable cross-section of chord which should confirm all checks as per IS:801-1975 codal provisions.	**14**
Q.2	**(a)**	Explain steps involved in structural design process with suitable logic.	**07**
	(b)	Explain important mechanical properties of structural steel with reference to various loads like static load, impact load and cyclic load.	**07**
		OR	
	(b)	Enlist various steel building systems for different height . Explain briefly any two systems.	**07**
Q.3		Calculate design wind forces using the gust factor approach on a steel multi-storey building 62m tall and plan size 15mx25m to be constructed in MUMBAI. Assume average storey height to be 3.1 m. The frames are to be spaced at 5m c/c in both directions	**14**
		OR	
Q.3		Design a floor beam consists of two channels welded back to back to formed an un-stiffened I-section. The effective span of joist is 5m. The joist is carrying UDL of 8 kN/m and one central point load of 8 kN. Use cold formed light gauge steel section. Apply all checks as per IS:801-1975.	**14**
Q.4		A through type N truss bridge has simply supported span of 24m with six panels each of 4m. Top chord joints are U_1 to U_7 while bottom chord joints are L_1 to L_7. Diagonal members are 60^0 inclined to bottom chord. Design any three of following members when a moving load of 70kN/m longer than span passes from left to right: U_3U_4, L_2L_3, U_2L_3 and U_1L_1.	**14**
		OR	
Q.4		Compute the allowable compressive load for wall stud(column) braced by wall sheathing having following data: (i) Cross-section is rectangular lipped channel of size 150 x 50 x 25 x 5.,(ii) Height of column 6.0m. and (iii) Sheathing material is standard wood with modulus of elastic support 86N/mm. Wall sheathing is sufficiently rigid to prevent buckling of channel section in direction of minor axis. Use codal provisions of IS:801-1975.	**14**
Q.5		A simply supported plate girder with effective span of 20 m is subjected to uniformly distributed load of 60kN/m and two concentrated load of 150 kN at 1/3 of span. Considering fully restrained condition at both the ends against lateral buckling through out the span	
	(a)	Design a section with flange plates and 8mm thick web plate.	**06**
	(b)	Design for curtailment of flanges and design vertical and/or horizontal stiffeners (whichever is applicable).	**08**

OR

Q.5 A simply supported plate girder with effective span of 18m is subjected to uniformly distributed load of 50kN/m and three concentrated load of 250 kN at 1/3 of span. Considering fully restrained condition at both the ends against lateral buckling through out the span

(a) Design a section with flange plates and 8mm thick web plate. **06**

(b) Check last panel for shear and moment capacity & design end bearing stiffeners. **08**

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