

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.E Sem-II Remedial Examination December 2010****Subject code: 721507****Subject Name: ADVANCED STEEL STRUCTURE DESIGN****Date: 22 /12 /2010****Time: 02.30 pm – 05.00 pm****Total Marks: 60****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** Calculate design wind forces using the gust factor approach on a steel multi-storey building 60m tall and plan size 10mx20m to be constructed in Delhi. Assume average storey height to be 3.0m. The frames are to be spaced at 5m c/c in both directions **12**
- Q.2** (a) Using schematic diagram explain structural design process. **06**  
(b) Explain important mechanical properties of steel with reference to various loads like static load, impact load and repeated load. **06**
- OR**
- (b) Give the height comparisons of various steel building systems. Explain briefly Staggered Truss system and Interacting System of Braced and Rigid Frames. **06**
- Q.3** Top chord of welded cold formed light-gauge steel roof truss has average member length 2.2m and subjected to maximum compressive force of 14kN. Proportionate suitable cross-section of chord which should confirm all checks as per IS:801-1975 codal provisions. **12**
- OR**
- Q.3** Design a floor joist consists of two channels welded back to back to form an unstiffened I-section. The effective span of joist is 4.5m. The joist is carrying UDL of 9 kN/m and one central point load of 4kN. Use cold formed light gauge steel section. Apply all checks as per IS:801-1975. **12**
- 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 4.,(ii) Height of column 4.2m. and (iii) Sheathing material is standard wood with modulus of elastic support 60N/mm. Wall sheathing is sufficiently rigid to prevent buckling of channel section in direction of minor axis. Use codal provisions of IS:801-1975. **12**
- OR**
- Q.4** A through type Warren truss bridge has simply supported span of 20m with five panels each of 4m. Top cord is  $U_1-U_2-U_3-U_4-U_5$  while bottom chord is  $L_0-L_1-L_2-L_3-L_4-L_5$ . Diagonal members are  $60^\circ$  inclined to bottom chord. Design any three of following members when a train of 30kN/m longer than span passes from left to right:  $U_2U_3$ ,  $L_2L_3$ ,  $U_2L_3$  and  $U_1L_0$ . **12**

- Q.5** A simply supported plate girder with effective span of 27m is subjected to uniformly distributed load of 35kN/m and two concentrated load of 300 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. **05**
  - (b) Design for curtailment of flanges and design vertical and/or horizontal stiffeners (whichever is applicable). **07**

**OR**

- Q.5** A simply supported plate girder with effective span of 24m is subjected to uniformly distributed load of 40kN/m and three concentrated load of 225 kN at 1/4 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. **05**
  - (b) Check last panel for shear and moment capacity & design end bearing stiffeners. **07**

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