

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem. – IInd - Examination – June/July- 2011

Subject code: 1721507

Subject Name: Advanced Steel Structure Design

Date: 29/06/2011

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** Calculate design wind forces using the gust factor approach on a steel multi-storey building 62m tall and plan size 12mx24m to be constructed in Mumbai. Assume average storey height to be 3.1m. The frames are to be spaced at 6m c/c in both directions **14**
- Q.2** (a) Describe structural design process with suitable algorithm. **07**
(b) Explain important mechanical properties of steel with reference to various loads like static load, impact load and repeated load. **07**
- OR**
- (b) Give the height comparisons of various steel building systems. Explain briefly tube in tube system and Interacting System of Braced and Rigid Frames. **07**
- Q.3** Top chord of welded cold formed light-gauge steel roof truss has average member length 2.5m 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**
- 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 6m. The joist is carrying UDL of 8 kN/m and one central point load of 5kN. Use cold formed light gauge steel section. Apply all checks as per IS:801-1975. **14**
- 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 4.0m. and (iii) Sheathing material is standard wood with modulus of elastic support 70N/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**
- OR**
- 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 45° inclined to bottom chord. Design any three of following members when a train of 40kN/m longer than span passes from left to right: U_3U_4 , L_2L_3 , U_2L_3 and U_1L_1 . **14**
- Q.5** A simply supported plate girder with effective span of 16 m is subjected to uniformly distributed load of 50kN/m and two 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) 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 20m is subjected to uniformly distributed load of 45kN/m and three concentrated load of 250 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. **06**
- (b) Check last panel for shear and moment capacity & design end bearing stiffeners. **08**
