

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.E Sem-II Examination July 2010****Subject code: 721507****Subject Name: Advanced Steel Structure Design****Date: 08 /07 /2010****Time: 11.00am – 1.30pm****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 Chennai about 600m from sea shore. Assume average storey height to be 3.0m. The frames are to be spaced at 5m c/c in both directions. The building has its bigger dimension facing the sea. **12**

**Q.2 (a)** Discuss about role and responsibility of the structural designer. **06**  
**(b)** List various combinations for design of steel structures. Explain load combination for Non-orthogonal buildings. **06**

**OR**

**(b)** Enlist various structural systems of steel buildings. Explain briefly framed tube system and trussed tube system. **06**

**Q.3** Design a floor joist consists of two channels welded back to back to form a stiffened I-section. The effective span of joist is 4.0m. The joist is carrying UDL of 8 kN/m and one central point load of 5kN. Use cold formed light gauge steel section. Design should confirm IS:801-1975. **12**

**OR**

**Q.3** Design a top chord of welded cold formed light-gauge steel roof truss for following data: (i) Length of member 2.0m (ii) Maximum compressive force of 15kN. Design should confirm to IS:801-1975 codal provisions. **12**

**Q.4** Determine the allowable compressive load for wall stud(column) braced by wall sheathing having following data: (i) Cross-section is rectangular lipped channel of size 180 x 50 x 20 x 3.15, (ii) Height of column 4.6m. and (iii) Sheathing material is standard wood with modulus of elastic support 80N/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 deck type N-truss bridge has simply supported span of 24m with eight panels each of 3m. Top chord is  $U_1-U_2-U_3- \dots -U_9$ , while bottom chord is  $L_1-L_2-L_3- \dots -L_9$  (Vertical  $U_1L_1$  &  $U_9L_9$  and horizontal  $L_1L_2$  &  $L_8L_9$  are not provided). The height of truss is 3m. Design any **three** of the following members:  $U_1L_2$ ,  $L_4L_5$ ,  $U_5U_6$  &  $U_2L_2$ . **12**

**Q.5** A welded simply supported plate girder with effective span of 32m is subjected to uniformly distributed load of 30kN/m and three concentrated loads each of 200kN at equidistance. Considering fully restrained,  
**(a)** Design a section with flange plates & 8mm thick web plate. **05**  
**(b)** Design for curtailment of flange plates and design vertical and/or horizontal stiffeners (whichever are applicable) **07**

**OR**

**Q.5**

A simply supported plate girder with effective span of 30m is subjected to uniformly distributed load of 50kN/m and one concentrated load of 400 kN at center of the span. Considering fully restrained condition at both the ends against lateral buckling through out the span

- (a) Design a section with flange plates & 8mm thick web plate. **05**
- (b) Check for shear buckling using simple post critical method and/or tension field method. **07**

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