Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1721507 **Date: 02-01-2013**

Subject Name: Advanced Steel Structure 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 Calculate design wind forces using gust factor approach on a steel multi-storey building 60m tall with plan size 12m x 24m to be constructed in Mumbai about 200m from sea shore. Assume average storey height to be 3.0m. The frames are to be spaced at 6m c/c in both directions. The building has its smaller dimension facing the sea. **14**

Q.2 **(a)** List various structural systems of steel buildings. Explain briefly framed tube system and trussed tube system **07**

(b) Explain important mechanical properties of steel with reference to various loads like static load, impact load and repeated load. **07**

OR

(b) Describe the advantages of cold form steel sections **07**

Q.3 A through type Pratt truss bridge has simply supported span of 32m with ten panels each of 4m. Top chord joints are U_1 to U_9 while bottom chord joints are L_0 to L_{10}. Diagonal members are 45^0 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**

OR

Q.3 A warren type truss has 18m span with six panels of 3m each and height is 2.6m. Top chord joints are U_1 to U_6 while bottom chord joints are L_0 to L_7. Design members U_3U_4, L_3L_4, and U_3L_3 while a when a train of 30kN/m longer than span passes from left to right. **14**

Q.4 Design a floor joist consists of two channels welded back to back to form a stiffened I-section. The effective span of joist is 4.8m. The joist is carrying UDL of 6.4 kN/m and one central point load of 8 kN. Use cold formed light gauge steel section. Design should confirm IS:801-1975. **14**

OR

Q.4 Top chord of welded cold formed light-gauge steel roof truss has average member length 2.5m and subjected to maximum compressive force of 16kN. Proportionate suitable cross-section of chord which should confirm all checks as per IS:801-1975 codal provisions **14**

Q.5 **(a)** Explain the general behavior of a beam column and compare the same with beams and columns **07**

(b) A non-sway column in a building frame with flexible joints is 4m high **07**

and subjected to the following load and moment:
Factored axial load = 500 kN
Factored moment at top of column = 27.0 kNm and
Factored moment at bottom of column = 45.0 kNm
Design a suitable beam-column assuming f_y = 250 N/mm^2.
Take the effective length of the column as 0.8L along both the axes.

OR

Q.5 A simply supported plate girder with effective span of 30m is subjected to uniformly distributed load of 32kN/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. **08**

(b) Design for curtailment of flanges and design vertical and/or horizontal stiffeners (whichever is applicable). **06**

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