

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° 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 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 $f_y = 250 \text{ N/mm}^2$.

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 throughout 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**
