

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013

Subject code: 1721507

Date: 05-06-2013

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 (a) A deck type N-truss bridge has simply supported span of 32m with eight panels each of 4m. Top chord is U_1 to U_9 , while bottom chord is L_1 to 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 4m. Design any three of the following members: U_1L_2 , L_4L_5 , U_5U_6 & U_2L_2 . **14**

Q.2 (a) Explain the effect of fatigue and the design requirements to resist fatigue in steel building. **07**

(b) List various load combinations for design of steel structures. Explain load combination for Non-orthogonal buildings. **07**

OR

(b) Explain parameters for Design of Seismic Resistant Steel Building. **07**

Q.3 Calculate design wind forces using the gust factor approach on a steel multi-storey building 72m tall and plan size 15m x 25m to be constructed in Chennai. Assume average storey height to be 3.0m. The frames are to be spaced at 5m c/c in both directions **14**

OR

Q.3 (a) Explain the design steps of tension member made from cold form steel. **07**

(b) Explain the Dynamic Effects of wind on steel buildings. **07**

Q.4 (a) Explain the structural applications of cold form steel. **07**

(b) Explain the tension field method of determining post buckling strength in design of plate girder. **07**

OR

Q.4 A simply supported plate girder with effective span of 25m is subjected to uniformly distributed load of 60kN/m and two concentrated loads of 500 kN at 9m from each support. 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**

Q.5 A non-sway column in a building frame with flexible joints is 4.5m high and subjected to the following load and moments: **14**

Factored axial load = 400 kN

Factored moment at top of column = 30.0 kNm and

Factored moment at bottom of column = 42.0 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 Design a top chord of welded cold form light-gauge steel roof truss having following data: **14**

(i) Length of member 2.50m

(ii) Maximum compressive force of 18kN.

Design should confirm to IS:801-1975 codal provisions.
