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 15mx25m 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 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.

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