

24287

**B.Tech. 5th Semester (Civil Engg.) Examination,**

**December-2012**

**DESIGN OF STEEL STRUCTURE-I**

**Paper-CE-301-F**

*Time allowed : 3 hours]*

*[Maximum marks : 100*

**Note :** (i) *Attempt five questions in all. Question No. 1 is compulsory and attempt one question from each section thereof.*

(ii) *All questions carry equal marks.*

(iii) *Assume suitable data. wheresoever required.*

(iv) *Use of IS Code 800-2000 and 1984 and steel tables for Rolled Sections are allowed.*

**1. Fill in the blanks and/or correct/complete the following statements :**

(i) **If the design wind speed is  $V$  then the wind pressure will be given as .....**

(ii) **For welded plate girder, the width to thickness ratios of flanges and web are respectively 6.7 and 9.1; then the section will be classed as .....**

(iii) **The rivets subjected to unpredictable tension during the placement are called .....**

(iv) **The effective length of fillet weld is .....**

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**[P.T.O.]**

- (v) A steel plate is 30 cm wide and 10 mm thick. If the diameter of the box hole is 20 mm, the net section of the Plate is .....
- (vi) The best tension member section will be double .....
- (vii) Which section will be suitable for a steel column out of ISLB, ISMB, ISWB, ISHB.
- (viii) Minimum number of battens required in a built up column are .....
- (ix) In bolted plate girder flange, the angle section used should be .....
- (x) Gantry girders are designed as ..... and .....  
 $10 \times 2 = 20$

### Section-A

2. (a) Define Revet value and Efficiency of the joint. 8  
 (b) Design a suitable fillet welded joint between two plates of size 150 mm  $\times$  6 mm and 200 mm  $\times$  8 mm to develop the full strength of smaller in tension. Permissible tensile stress in plate is 150 N/mm<sup>2</sup>. 12
3. Design a tension member consisting of pair of unequal angles to carry an axial pull of 450kN. Use 18mm dia rivets. 20

**Section-B**

4. Design a two tier grillage foundation for a steel column to transmit load of 3500 kN. The size of base plate for column is 900 mm  $\times$  900 mm. The safe Bearing Capacity of the soil is 220 kN/m<sup>2</sup>. 20
5. Design a suitable built-up section for a steel column to carry an axial load of 1250 kN. The effective length of column is 6 m. Use two channel sections placed toe to toe. Design double lacing system also. 8+12=20

**Section-C**

6. (a) List various loads and forces for the classification in design of a gantry girder. 10
- (b) Show by neat diagram the X-section of a gantry girder across load handling godown, clearly showing important details, hence label it. 10
7. Design a plated built up beam section to carry a udl of 80 kN/m inclusive of self weight of beam over an effective span of 12.5m. The beam is laterally restrained. Also apply the usual checks. 10

**Section-D**

8. (a) Draw the x-section of plate girder and label it.

8

- (b) What do you understand by :

(i) Web buckling and web crippling

(ii) Curtailment and Flange Plates

(iii) Web and flange splices

 $3 \times 4 = 12$ 

9. Design a plate girder of an effective span of 20m simply supported at ends. It carries two concentrated loads of 800 kN, each acting at 6m from end and support u.d.l. of 50 kN/m exclusive of its self weight. The girder is laterally un-restrained. Use stresses as per is code 800-2007 read with 800-1984 and steel tables. 20