24287

B. Tech. 5th Sem. (Civil Engg.)
Examination – December, 2011

DESIGN OF STEEL STRUCTURE-I

Paper : CE-301-F

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

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

(ii) All questions carry equal marks.

(iii) Assume suitable data wheresoever required or missing.

(iv) Use of is code – 800 – 2007 + 1984 and steel tables for rolled section are allowed.

1. Complete the following statements :

(a) Poisson ratio of steel in elastic range is ....

(b) Is : 800 – 2007 specifies the minimum thickness of steel section as ....

(c) Which of the following sections has minimum value of shape factor (i) Tube section (ii) I-section (iii) Circular section.

(d) For reversal of stress, the most suitable bolt is ....

(e) The slenderness ratio for a tension member in a roof truss subjected to possible reversal of stress is limited to ....

(f) A tension member splice is designed for ....

(g) Which of the following is not a compression member (i) strut (ii) Tie (iii) Rafter (iv) Boom.

(h) The effective length of a battered column is increased by ....

(i) A beam section is selected and provided on the basis of .... and .... and ....

(j) Web crippling in steel beams occur due to .... $10 \times 2 = 20$

SECTION – A

2. (a) How will you calculate the strength of riveted joints ? Explain.   4

   (b) Define 'Rivet Value' and 'Efficiency of the joint'.   4

   (c) Design a double cover butt joint to connect two plates each 12 mm thick. The load to be transferred by the joint is 400 kN.   12

3. (a) Give in detail various types of tension members. 4

(b) Define Axial stress and slenderness Ratio of a tension member.   4

(c) Design a splice for tension member section 160 × 10 mm and 250 × 14 mm. The member is subjected to a pull of 200 kN. Assume $f_y = 250\,N/mm^2$.   12

SECTION – B

4. A single angle section ISA 60 × 60 × 8 mm, 3.0 m long is used as a strut. The ends are welded to the gusset plate. Compute the maximum load it can carry. Use steel of yield stress 250 MPa.   20

5. Enumerate the design procedure to be adopted for the design of gusset plate, step by step.   20

SECTION – C

6. (a) What are Beams and what considerations should be kept in view for the design of beams ?   8

(b) A simply supported steel joist with 4^m effective span carries a uniformly distributed load of 40 kN over its span inclusive of self weight. The beam is supported laterally throughout. Select suitable section if $f_y = 250\ N/mm^2$ and check its safety ?

12

7. (a) What is a gantry girder and where is it used ?   6

(b) How will you proceed to design a gantry girder ? Enumerate design procedure, step by step.   6

(c) What are the laid out specifications for a gantry girder ? 8

SECTION – D

8. (a) What are the elements of a plate girder ? 8

(b) What is the role of stiffeners in a plate girder and what design steps should be taken for design of a bearing stiffeners ? 12

9. Design a plate girder 30 m span to be provided in a hall. The Superimposed load exlcusive of self-weight is 200 kN/m. Design the web-splice at one-third of span and flange angle splice at one fourth of the span.
20