Reg. No. : | | | | | | | | | | | |

J 3118

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Sixth Semester

(Regulation 2004)

Civil Engineering

CE 1352 — DESIGN OF STEEL STRUCTURES

(Common to B.E. (Part–Time) Fifth Semester Regulation 2005)

Time : Three hours Maximum : 100 marks

Use of IS 800, Steel Tables are permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the different limit states.

2. Define the strength of a riveted joint.

3. Write the use of lug angle in tension connection.

4. What is shear lag effect?

5. Write any two limitations of Euler's formula.

6. Define effective length.

7. Differential restrained beam and unrestrained beam behaviour.

8. How the flange area of a plate girder is designed?

9. How is economical spacing of roof trusses obtained?

10. List the various forces acting on a gantry girder.

PART B — (5 × 16 = 80 marks)

11. (a) A double riveted double cover butt joint is used to connect plates 12 mm thick. Determine the diameter of the rivet; rivet value, pitch and efficiency of the joint.

Or

(b) An equal angle 75 mm × 75 mm @ 11.0 kg/m is subjected to a load of 180 kN, whose line of action passed through the centroid of the section, which is at 22.2 mm from the heel. This angle is to be welded to a gusset plate. If the size of weld is to be 8 mm, find the length of the side fillet welds.

12. (a) A tie member in a roof truss consists of two ISA 90 × 60 × 8 mm. Determine the safe load carrying capacity of the member if (i) the angles are on the same side of the gusset plate (ii) the angles are on the either side of the gusset plate. 16 mm rivets are used for connection at the ends and members are suitably tracked along their length.

Or

(b) Design a single angle tension member subjected to axial pull of 250 kN and connected by suitable weld at the ends. Also design the welded connections at the ends. The effective length of the member is 3 m and it is subjected to possible reversal of stress due to action of wind.

13. (a) Design completely a built–up column composed of channel sections placed back to back and carrying an axial load of 1500 kN. Its length is 6 m and it is effectively held in position at both ends and restrained against rotation at one end. Take f_y = 250 N/mm².

Or

(b) Design a gusseted base for a column ISHB 450 @ 87.2 kg/m, carrying an axial load of 2000 kN. Take the allowable bearing pressure on concrete as 4 N/mm².

14. (a) A simply supported beam in both planes of 6 m effective span is subjected to biaxial bending forces (i) a vertical concentrated force of 65 kN at mid span and (ii) a lateral concentrated force of 8 kN at mid span. Design the beam using rolled beam sections.

Or

(b) A welded plate girder has (i) each top and bottom flange = 435 × 28 mm and (ii) web = 1250 × 10 mm. Design vertical and horizontal stiffeners.

15. (a) Design a purlin for the following data :

(i) Spacing of roof trusses - 4 m

(ii) Spacing of purlins – 1.4 m

(iii) Pitch of roof – 1/4

(iv) Weight of GI sheeting – 133 N/m^2

(v) Wind load intensity normal to roof – 1500 N/m^2.

Use channel section.

Or

(b) A fink roof truss is proposed to be constructed at Madurai. The pitch of the roof is 1/5 and the span is 18 m. The trusses are spaced at 4 m c/c. Use G.I. sheets. The height of the roof above the ground level is 12 m. Determine the loads acting on the roof. Consider the permeability is normal. The topography site is flat. The configuration of the girder is given in Fig. Q. No. : 15 (b).

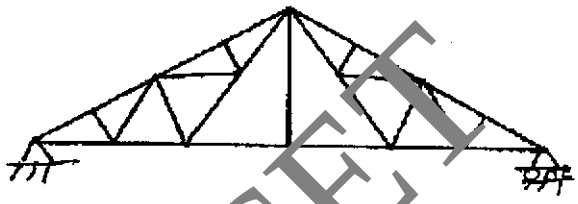

Fig. Q. No. : 15 (b)