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

Question Paper Code : 73260

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Sixth Semester

Civil Engineering

CE 2352/CE 62/CE 1354/10111 CE 603 — DESIGN OF STEEL STRUCTURES

(Regulations 2008/2010)

(Common to PTCE 2352/10111 CE 603 — Design of Steel Structures for B.E. (Part-Time) Fourth Semester – Civil Engineering – Regulations 2009/2010)

Time : Three hours Maximum : 100 marks

Use of IS 800-2007, IS 883-875-1994 and steel tables is permitted.

Relevant data may be suitably assumed if found necessary.

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What is meant by design load?

2. How do you calculate effective throat thickness?

3. What is block shear failure?

4. What are lug angles?

5. Sketch neatly a typical gusseted base connection.

6. When are laced columns preferred?

7. What is called beam column?

8. Enlist the purposes of providing bearing stiffeners.

9. List the various components of a roof truss.

10. What is the purpose of principal rafter in a truss?

PART B — (5 × 16 = 80 marks)

11. (a) Design a doubly bolted lap joint for plates 16 mm thick to carry its full load. Take permissible axial tension in plate 150 N/mm^2. Use 16 mm diameter bolts of grade 4.6.

Or

(b) A 100 mm × 10 mm plate is to be welded to another plate 150 mm × 10 mm by fillet welding on three sides. The size of the weld is 6 mm. Find out necessary over lap of the plate, for full strength of the joint. Take allowable tensile stress in plate equal to 150 N/mm^2 and allowable stress in weld as 110 N/mm^2.

12. (a) Find the tensile capacity of 2 ISA 100 × 100 × 10 connected back to back using a single row of 4 nos. of 16 mm diameter bolts. Assume suitable pitch and end distance. Take yield stress as 250 MPa.

Or

(b) Design a tension splice to connect two plates of size 300 × 18 mm and 250 × 10 mm if the design load is 350 kN.

13. (a) A built up column made of ISMC 350 @ 38.8 kg/m placed back to back such that the distance between centroids is 300 mm. If the column carries 1400 kN load, design a laced system for the column for an effective length of 6 m. Take yield stress as 250 MPa.

Or

(b) A built-up column consists of ISHB 400 @ 77.4 kg/m with one 300 × 15 mm flange plate on either side. The column carries an axial load of 2500 kN. Design the gusseted base, if the column is supported in concrete pedestal with a bearing capacity of 5 N/sq.mm.

14. (a) Design a simply supported laterally restrained beam of effective span 4 m carrying a factored point load of intensity 50 kN at the midspan. Design an appropriate section using Fe 410 grade steel. Bearing length = 75 mm.

Or

(b) Design a laterally unsupported beam of 4 m effective span, carrying a factored bending moment of 350 kNm and factored shear force of 100 kN. Use Fe 410 grade steel.

15. (a) Design an I-section purlin, for an industrial building situated in the outskirts of Chennai to support a GI sheet for the following data.

Spacing of the truss c/c = 5 m

Span of truss = 10 m

Spacing of purlins c/c = 1.5 m

Intensity of wind pressure = 2 kN/m^2

Weight of GI sheets = 125 N/m^2.

Or

(b) (i) Elaborate the steps involved in the design of a gantry girder. (10)

(ii) Write the steps involved in the design of the principal rafter of a truss. (6)

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