CE010 601: DESIGN OF STEEL STRUCTURES (CE)

(Regular-New Scheme)

Time : Three Hours Maximum : 100 Marks

Missing data if any, may be suitably assumed and stated

IS 800-2007, IS 875, IS 805, IS 801, IS 811, IS 6533 Part I, Part 2, & Steel Tables are allowed.

Part A

Answer **all** questions

Each question carry 3 marks

1. Explain what is structural steel. List out the important properties of such steel.
2. Draw neat sketches for
   (a) Different types of splices
   (b) Different types of base connections.
3. What is the advantage of having hemispherical bottom as compared to a flat bottom for a cylindrical tank?
4. Mention three common uses of light gauge sections.
5. Explain how the stability of a chimney is checked during the design process.

(5 × 3 = 15 marks)

Part B

Answer **all** questions

Each question carry 5 marks

6. Write short notes on block shear failure.
7. Determine the load carrying capacity of a strut made with ISA 10075, 10 mm , length 2.8 m when only one bolt is used as an end connection.
8. What are the loads to be considered in the design of elevated tanks?
9. Explain the following with sketches with reference to light-gauge sections

(a) Stiffened and unstiffened compression elements
(b) Flat-width ratio
(c) Effective design width
(d) Torsional flexural buckling
(e) Point symmetric section

10. Explain how the base plate of a chimney is designed.

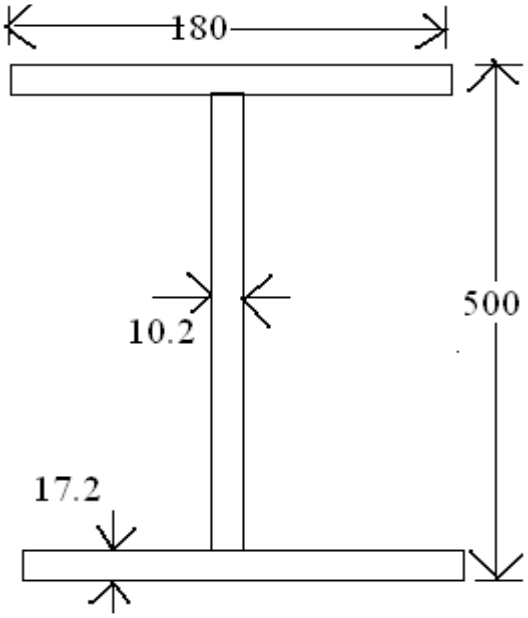
(5 × 5 = 25 marks)

Part C

Answer **all** questions

Each questions carry12 marks

11. Determine the plastic modulus for the section shown. If the area of the section is neglected, what percentage of plastic modulus of the section is reduced.



Or

12. Design a tension a tension member to carry a factored force of 340 kN. Use 20 mm diameter black bolts and a gusset plate of 8 mm thick.

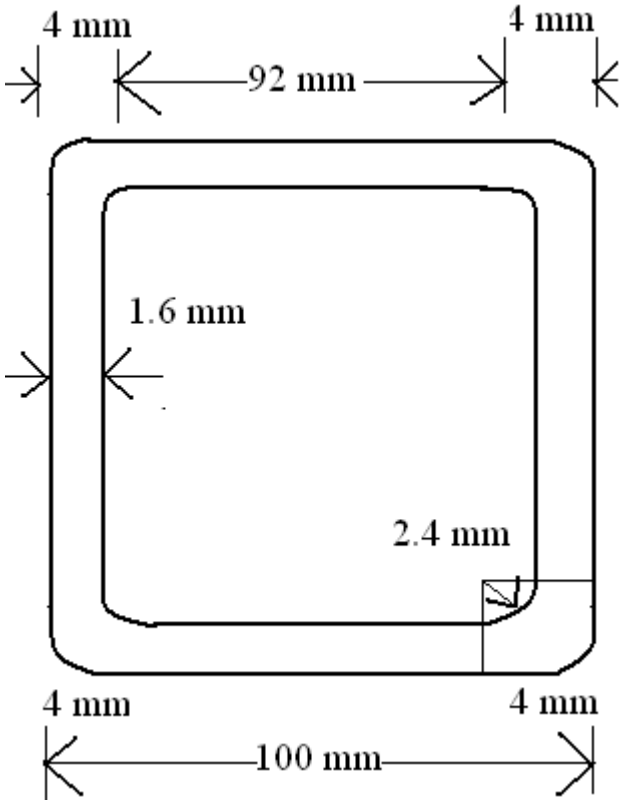
13. Determine the load carrying capacity of a strut made with 2 ISA 7575, 6 mm, back to back if the length of member is 3.0 m and welded to a 12 mm gusset plate.

Or

14. An ISMB 150 is used as a column. It is laterally supported in the plane of the major axis at a height of 2.5 m and in the plane of the minor axis at a height of 4.5 m. The ends may be assumed as hinged. What will be the allowable load on the column?
15. Design the elevated portion of a cylindrical steel tank with hemispherical bottom for 1,60,000 litres capacity. The tank has conical roof. Take $f_y = 250$ n/mm^2.

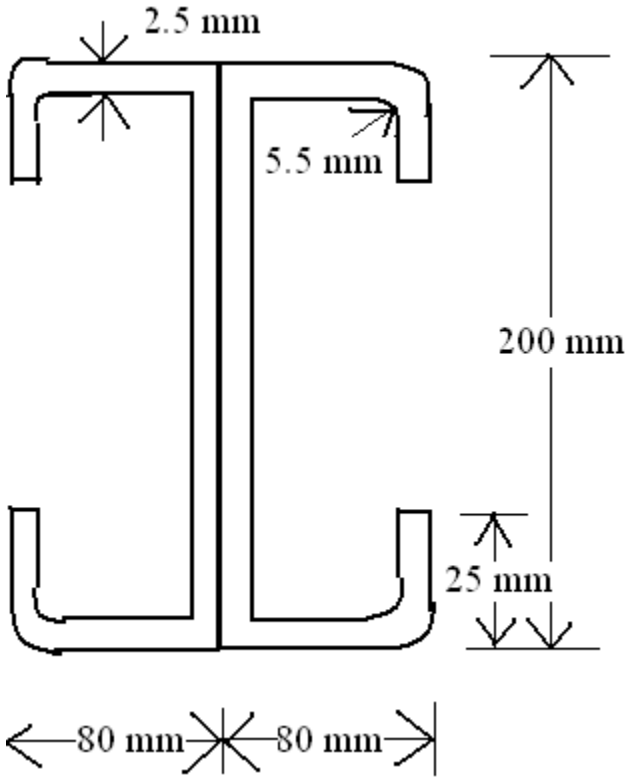
Or

16. Design the overhead portion of a rectangular tank of 80000 litres capacity.
17. Find the column section properties and allowable load for the column section shown below. The effective length of the column is 3.2 m. Take $f_y =$ 235 n/mm^2.



Or

18. Two channel 200 mm × 80 mm with bent lips are connected with webs to act as beam as shown. The thickness of plate is 2.5 mm and the depth of lip is 25 mm. The beam has an effective span of 4 m. Determine the allowable load per metre on the beam. Also, determine the deflection at the allowable load. The steel has a yield point of 235 N/mm^2. Take E = 2 × 105 N/mm^2.



19. Design only the chimney of a self-supporting stack of height 72 m above the foundation. The diameter of the cylindrical part of the foundation is 3 m. The thickness of fire brick work lining is 100 mm, and the lining is supported by the stack throughout the height. The chimney has one breech opening. The topography at the site is almost flat, and the location is of terrain category 2.

Or

20. Design only the chimney of a self-supporting stack of effective height 30 m, having its diameter at top equal to 2 m. Take wind pressure intensity as 1.5

kN/mm^2 uniform throughout its height. Assume uniform values of permissible tensile and compressive stresses as 120 N/mm^2 and 90 N/mm^2.

(5 × 12 = 60 marks)