

Seventh Semester B.E. Degree Examination, June/July 2014
Design of Steel Structures

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer FIVE full questions, selecting atleast TWO question from each part.
 2. Use of Is : 800 – 2007 and steel tables is permitted.

PART – A

1.
 - a. What are rolled structural steel sections? What are the various types of rolled steel sections manufacturing? (06 Marks)
 - b. Explain briefly the necessity of partial safety factors and codes in structural design. (08 Marks)
 - c. How plastic method of design is different from limit state method of design? (06 Marks)
2.
 - a. Write a note on HSFG bolt. (05 Marks)
 - b. Determine the safe load P that can be carried by the joint shown in figure. The thickness of the flange of I – section is 9.1 mm and that of bracket plate 10 mm use M20 bolts of grade 4.6. (15 Marks)

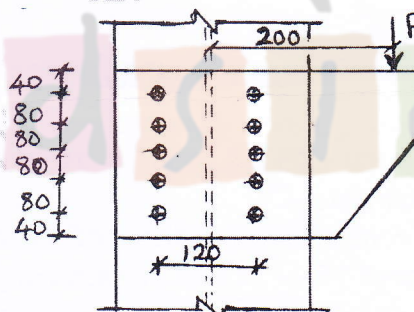


Fig. Q2(b)

3.
 - a. Explain the common defects in the welded connections. (05 Marks)
 - b. A joist cutting is used as bracket to support a factored load of 200 kN. It is welded to the column flange as shown in Fig. compute the size of the fillet weld. (15 Marks)

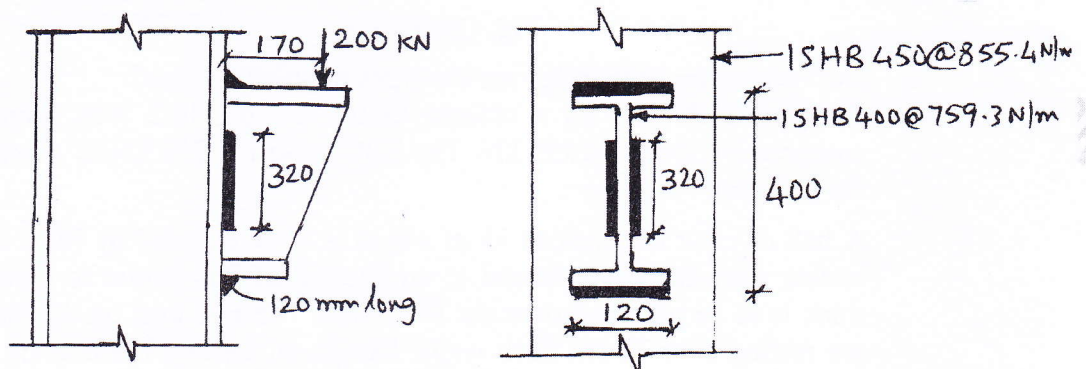


Fig. Q3(b)

- 4 a. Determine Z_p and M_p about ZZ axis for the channel section shown in Fig. Q4(a). Given $f_y = 250$ MPa. Also find shape factor. (10 Marks)

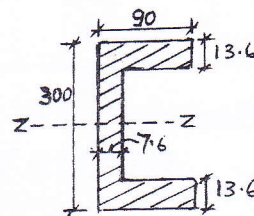


Fig. Q4(a)

- b. Determine the plastic moment for a continuous beam having uniform cross section as shown in Fig Q4(b). (10 Marks)

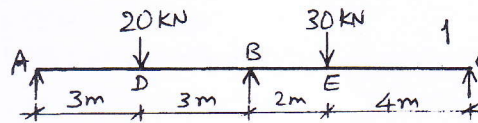


Fig. Q4(b)

PART - B

- 5 a. Explain with the aid of sketches : i) LUG angle ii) Gusset plate. (05 Marks)
- b. A single unequal angle $100 \times 75 \times 6$ mm is connected to a 8 mm thick gusset plate at the ends by 4 mm welds as shown in Fig. Q5(b). Determine the design tensile strength of the angle if the gusset is connected to the 100 mm leg. The yield strength and ultimate strength of the steel used are 250 MPa and 400 MPa. (15 Marks)

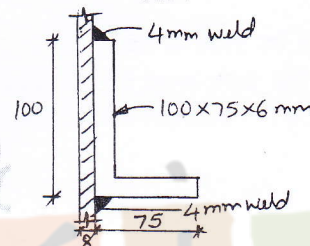


Fig. Q5(b)

- 6 a. Calculate the strength of a discontinuous street of length 3.2 m. The steel consists of two unequal angles $100 \times 75 \times 8$ mm ($f_y = 250$ N/mm² with long legs connected on the opposite sides of a gusset plate). (05 Marks)
- b. Calculate the compressive resistance of a compound column consisting of ISHB 300 with one cover plate of 350×20 mm on each flange and having a length of 5m. Assume that the bottom of the column is fixed and top is rotation fixed, translation free and $f_y = 250$ MPa. (15 Marks)

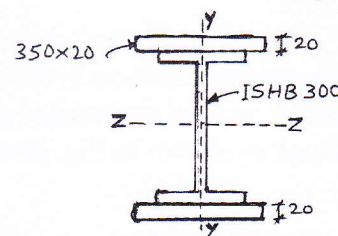


Fig. Q6(b)

- 7 a. Define column base. What are the types of column bases? (10 Marks)
- b. Design a slab base for a column ISHB 350 @ 710.2 N/m subjected to a factored axial compressive load of 1500 kN. The SBC of soil is 250 kN/m². Use M20 grade concrete for the pedestal. (10 Marks)
- 8 A hall of clear dimensions 15 m \times 6 m is to be covered by RCC slab flooring 12 cm thick resting over RS joists spaced at an interval of 3m, centre to centre. Floor finishing 2 cm thick is to be provided over the RCC slab. The live load on the slab is 4 kN/m². The joists are resting over 30 cm thick walls. Design an interior beam using code specifications. The unit weight of RCC and floor finish is 24 kN/m³. Apply all the necessary checks. (20 Marks)
