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10CV72

Seventh Semester B.E.

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## Design of Steel Structures

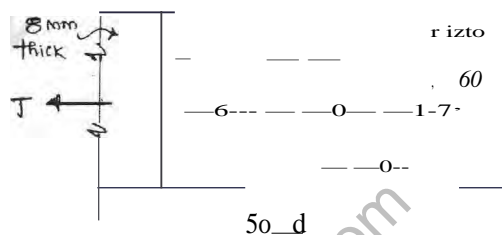
Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full, questions, selecting at least TWO questions from each part.  
 2. Use of IS-800-2007 and steel tables permitted.

### PART — A

- 1 a. Describe briefly advantages and disadvantages of steel structures. (06 Marks)
- b. Explain the load combinations adopted in the design of steel structures. (06 Marks)
- c. Explain the four classes of section as per IS-800-2007. (08 Marks)
- 2 a. Explain the various modes of failure of bolted connections with neat sketches. (06 Marks)
- b. Determine the strength and efficiency of lap joint consists of 10 mm and 8 mm thick plates. Use M18 grade 5.6 black bolts and Fe440 grade plate.



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Fig.Q2(b)

(14 Marks)

- 3 a. Describe briefly advantages and disadvantages of welded connections. (06 Marks)
- b. Determine the bracket load "P" the column can carry. Take size of weld as 8 mm.

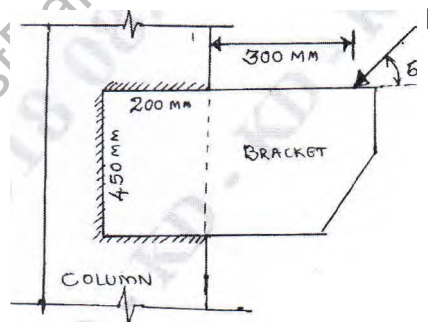


Fig.Q3(b)

(14 Marks)

- 4 a. Determine the shape factor of a 'T' section having a flange width 200 mm and 20 mm thick with a web of 10 mm thick and 180 mm depth. (06 Marks)
- b. Calculate "plastic moment" for the beam as shown in Fig.Q4(b). Use load factor = 2.

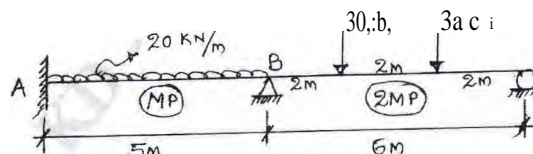


Fig.Q4(b)

(14 Marks)

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**PART — B**

- 5 Design a tie or tension member using double angle (equal legs) section connected on either side of gusset plate subjected to a force of 300 kN use suitable welded connection. If the length of member is 3m. Check for reversal of stresses. (20 Marks)
- 6 Design a compression member using double channel section "face to face" to carry a factored load of 1600 kN. The length of the column is 5m with one end is fixed and other end is hinged. Also design single lacing system. (20 Marks)
- 7 Design a column base (slab base) and concrete base for a column ISHB400 subjected to an axial load of 1000 kN. Use M20 grade concrete and safe bearing capacity of soil is  $200 \text{ kN/m}^2$ . Draw neat sketch. Use welded connection. (20 Marks)
- 8 The RCC floor of a classroom 6m x 12m is supported on beam kept at 3m c/c. The beams are simply supported at ends over a span of 6m and rest on 300 mm thick masonry wall. Assuming the thickness of slab is 125 mm, live load on slab is  $4 \text{ kN/m}^2$ . Design an interior beam using IS specifications. Apply all the necessary checks. (20 Marks)