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10CV72

Seventh Semester B.E. Degree Examination, June/July 2018
Design of Steel Structures

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. What are the advantages and disadvantages of steel structures? (08 Marks)
 b. Mention different types of loads and load combination. (04 Marks)
 c. Explain design consideration of steel structures. (08 Marks)
- 2 a. Explain with neat sketch on modes of failures in bolted joint. (06 Marks)
 b. Determine the strength and efficiency of lap joint consist of 10 mm and 8 mm thick plates. Use M18 grade 5.6 black bolt and Fe440 grade plate. Edge distance = 40 mm, Pitch = 50 mm of Fig. Q2 (b). Assume fully threaded bolt. (14 Marks)

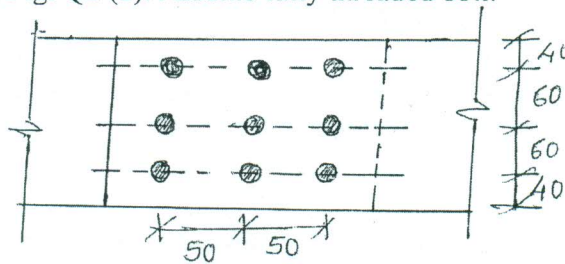


Fig. Q2 (b)

- 3 a. What are the advantages and disadvantages of welding? (06 Marks)
 b. Determine the Bracket load 'P' the column can carry as shown in Fig. Q3 (b). Take size of weld as 8 mm, $f_u = 410 \text{ N/mm}^2$. (14 Marks)

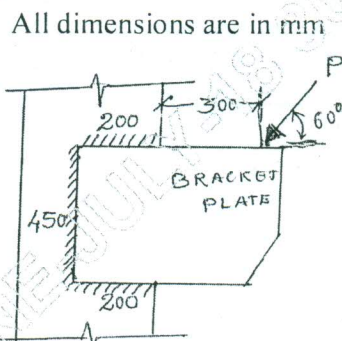


Fig. Q3 (b)

- 4 a. Calculate the shape factor of a T section having a flange of 200 mm and 20 mm thickness, web of 180 mm depth and 10 mm thickness. (08 Marks)
 b. Calculate plastic moment for the beam shown in Fig. Q4 (b), Use load factor 2. (12 Marks)

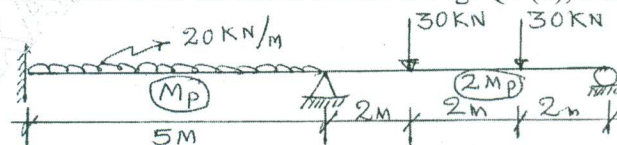


Fig. Q4 (b)

PART – B

- 5 a. Explain the different modes of failure of tension members. (06 Marks)
- b. Determine the strength of the plate 160mm × 10mm thick, connected with bolts subjected to a force as shown in Fig. Q5 (b). Use M18 dia bolts, take $f_y = 250 \text{ N/mm}^2$, $f_u = 410 \text{ N/mm}^2$. (14 Marks)

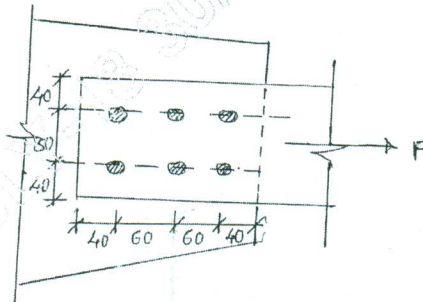


Fig. Q5 (b)

- 6 a. Design a compression member using double channel section to carry a load of 1500 KN, the height of column is 6 m and both ends are fixed, channels are arranged back to back. Assume $f_{cd} = 150 \text{ N/mm}^2$. (10 Marks)
- b. Design a compression member using four angle sections arranged in a box shape of size 400mm × 400mm to carry a load of 2500 kN. The height of the column is 5 M with one end fixed and other end hinged. Assume $f_{cd} = 180 \text{ N/mm}^2$. (10 Marks)
- 7 a. Mention type of column base. Explain the terms with a neat sketch. (06 Marks)
- b. 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, safe bearing capacity of soil is 200 KN/m². Draw neat sketch with bolted connection (M22 grade 9.8 HSFG Bolt). (14 Marks)
- 8 The RCC floor of a class room 6m × 12m is supported on beam kept @ 3 m C/C. The beams are simply supported at ends over a span of 6 m, and rest on 300 mm thick masonry walls. Assuming the thickness of slab = 125 mm, Live Load on slab = 4 KN/m². Design an interior beam using IS specification. Apply all the necessary checks. (20 Marks)

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