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06CV72



Seventh Semester B.E. Degree Examination, May/June 2010
Design of Steel Structures

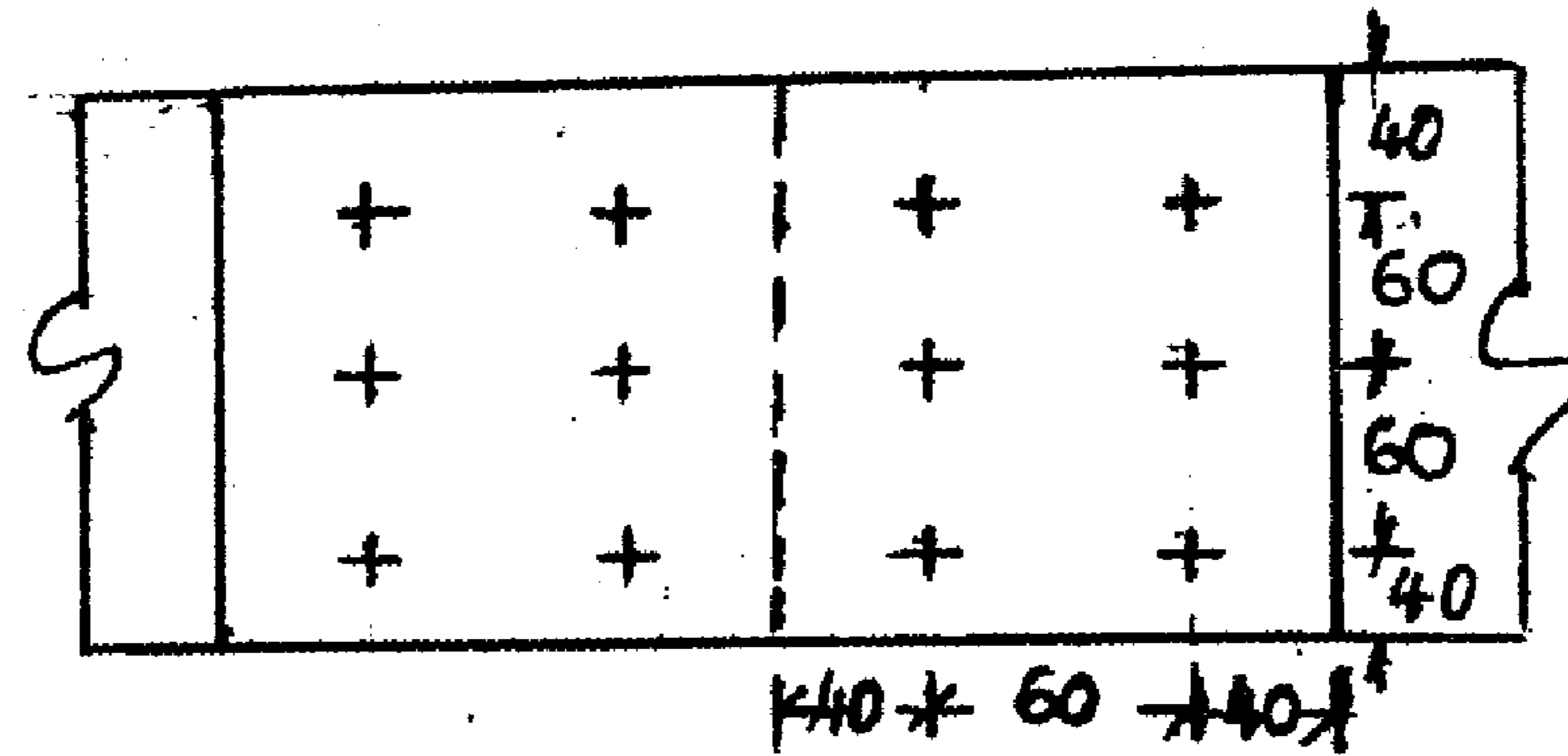
Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
 2. Use of IS800-2007 and Structural Steel hand book is permitted.
 3. Assume any missing data suitably.

PART - A

1. a. Explain the advantages and disadvantages of steel structures. (06 Marks)
 b. What are the design considerations to be adopted while designing a steel structure? (04 Marks)
 c. Distinguish between working stress design and limit state design of steel structures. State the failure criteria of steel. (10 Marks)
2. a. Explain the phenomenon of load transfer in high strength friction grip bolts. (06 Marks)
 b. Two plates 10 mm and 18 mm thick are to be joined by a double cover butt joint. Assuming cover plates of 6 mm thickness. Evaluate the joint strength and calculate its efficiency. Using M20 bolts of grade 4.6 and Fe410 plates. Assume a pitch of 60 mm and edge distance of 40 mm. (14 Marks)



All dimensions in mm

Fig. Q2 (b)

3. a. Explain the defects in welded connections with appropriate figures. (06 Marks)
 b. Calculate the load that can be transmitted through the eccentric welded connection shown in figure below. Weld size = 6 mm (14 Marks)

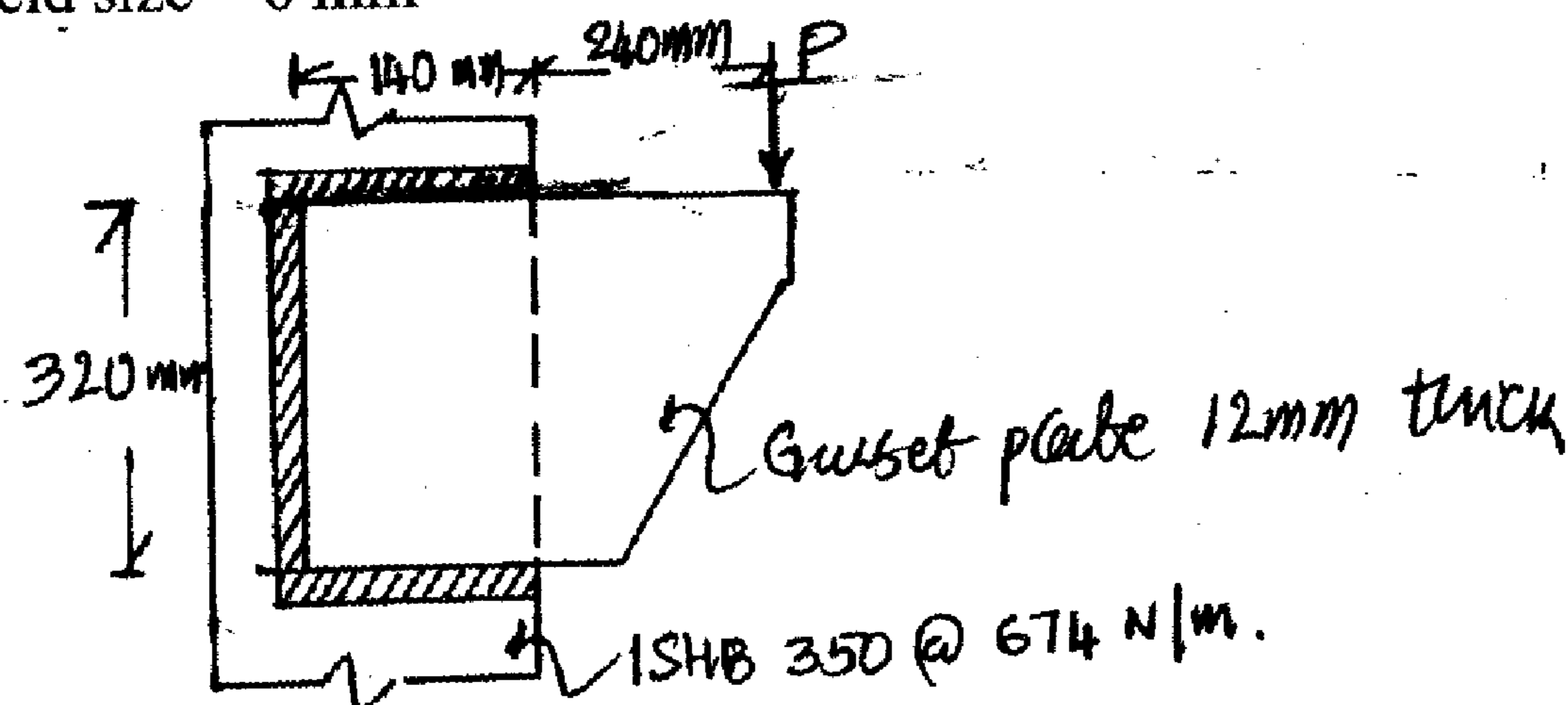


Fig. Q3 (b)

4. a. Explain the terms; plastic hinge and mechanism. (06 Marks)
 b. A hollow box section of outer dimensions 300 mm (width) × 60 mm (depth) is made up of 12 mm thick plates throughout. Determine its shape factor and plastic moment capacity ($f_y = 250$ MPa). (14 Marks)

Important Note : 1. On completing your answer, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = () will be treated as malpractice.

PART – B

- 5 a. What are lug angles? Explain. (05 Marks)
- b. A tie member consists of two angles $75 \times 75 \times 6$ mm connected on either sides of a 10 mm thick gusset plate using a single row of bolts. Determine the tensile capacity of the member and the number of bolts required to develop full capacity of the member. Adopt 20 mm dia bolts, pitch = 50 mm and edge distance = 35 mm. The members are tack bolted. What is the effect on tensile strength if the members are not tack bolted and connected on the same side of gusset plate? (15 Marks)
- 6 Design a compression member made up of two channel sections held back to back to carry a factored load of 750 kN over a length of 10 m. The ends of the compression member are restrained against displacement only. Design single lacing system with 18 mm dia bolts for connection. (20 Marks)
- 7 a. Calculate the compressive strength of a compound column made up of ISMB400 at 616 N/m with two cover plates of size 300 mm \times 20 mm, one on each side of the flanges of the column. $L = 4.5$ m; Ends of column: fixed at one end and hinged at the other. (10 Marks)
- b. Design a slab base for a column ISHB300 at 577 N/m carrying an axial load of 1000 kN. Adopt M20 concrete and welded connection between column and base plate. (10 Marks)
- 8 The RCC floor of a class room 6 m \times 12 m is supported on beams kept at 3 m c/c. The beams are simply supported at ends over a span of 6 m and rest on 30 cm thick masonry walls. Assuming the thickness of slab = 125 mm, L.L on slab = 4 kN/m^2 , design an interior beam using I.S. specifications. Apply all the necessary checks. (20 Marks)
