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15CV62

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS800-2007 and steel table are permitted.*

Module-1

- 1 a. What are the advantages and disadvantages using steel structure? (08 Marks)
- b. Distinguish between working stress design and limit state design of steel structure. (08 Marks)

OR

- 2 a. Determine the shape factor of a circular section of diameter 'D'. (06 Marks)
- b. Determine the plastic moment capacity of the beam shown in Fig.Q.2(b). (10 Marks)

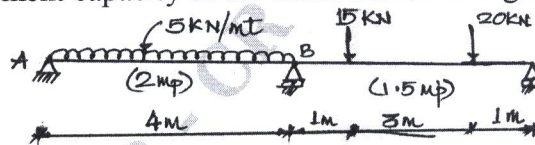


Fig.Q.2(b)

Module-2

- 3 a. Write a short notes on HSFG bolts. (04 Marks)
- b. Two plates of size 150mm × 6mm are connected by a double bolted lap joint using 4 no's of 16mm diameter unfinished bolts of grade 4.6, as shown in Fig.Q.3(b). Determine the efficiency of the joint. Use diameter of bolt as 16mm. (12 Marks)

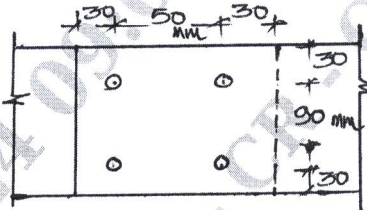


Fig.Q.3(b)

OR

- 4 a. List the advantages and disadvantages of welding. (04 Marks)
- b. A tie member of a truss consisting of an ISA 65 × 65 × 6 of Fe410 grade is welded to an 8mm gusset plate as shown in Fig.Q.4(b). Design a weld to transmit a load equal to full strength of the member. Adopt shop weld. (12 Marks)

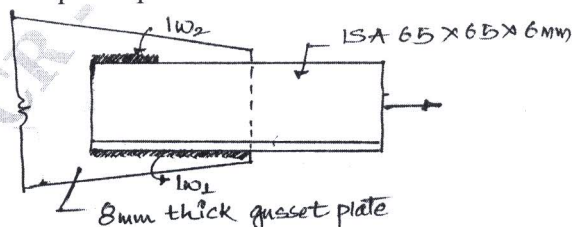


Fig.Q.4(b)

Module-3

- 5 a. Explain the possible modes of failure of axially loaded columns. (04 Marks)
 b. Design a single angle strut for roof truss carrying a compressive load of 100kN. The length of strut between c/c intersection is 210cm. Also design bolted end connection with 20 diameter, 4.6 grade bolt. (12 Marks)

OR

- 6 Design a built up column consisting of two channels placed back to back so as to support a factored load of 1600kN. The length of the column is 18.5mt and it is fixed at the both end. (16 Marks)

Module-4

- 7 a. What is lug angle and why is it not preferred? Explain. (04 Marks)
 b. Design an unequal single angle section to carry a load of 200kN in tension use M20, 4.6 grade bolts. The length of the member is 3mt. Design strength of bolt = 45.3kN. (12 Marks)

OR

- 8 a. Distinguish between slab base and gusseted base. (04 Marks)
 b. Design a gusseted base of column ISHB 350@ 674N/m with 400mm × 20mm flange plates carrying an axial load of 2000kN. Assume M20 grade concrete and M24 bolts of grade 4.6 SBC = 200kN/m². (12 Marks)

Module-5

- 9 a. Write a note on laterally supported and up supported beam. (04 Marks)
 b. A roof of hall measuring 8m × 12m consists of 100mm thick RCC slab supported on steel I section spaced at 3m c/c. Take live load 1.5kN/m² and floor finish is 1.5kN/m². Bearing of wall = 300mm. The beam is laterally restrained. Design one of the interior beam supporting the roof. (12 Marks)

OR

- 10 a. Explain the different types of failure in beam. (04 Marks)
 b. Determine the load carrying capacity of ISMB600 @ 1.202 kN/m, used as a cantilever beam of 3m effective span. Also check for shear, check for deflection. Take $F_y = 250\text{N/mm}^2$, $E = 2 \times 10^5\text{N/mm}^2$. (12 Marks)

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