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18CV61

Sixth Semester B.E. Degree Examination, July/August 2022

Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS 800-2007, steel table is permitted.*

Module-1

- 1 a. What are the advantages and disadvantages of steel structures? (10 Marks)
b. Distinguish between working stress design and limit state design of steel structures. (10 Marks)

OR

- 2 a. Calculate the shape factor of triangle. (10 Marks)
b. Calculate ' M_p ' for the continuous beam shown in Fig.Q2(b). Take load factor 1.5.

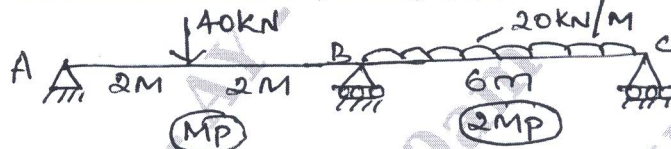


Fig.Q2(b)

(10 Marks)

Module-2

- 3 a. Explain the failure modes of bolted connection. (10 Marks)
b. Design a bolted connection for a lap joint of plate thickness 16 mm and 12 mm to carry a factored load of 160 kN. Use M_{16} and 4.6 grade bolts. (10 Marks)

OR

- 4 a. What are the advantages and disadvantages of welded connection? (10 Marks)
b. A tie member of Truss consisting of angle section ISA 65 × 65 × 6 mm of Fe 410 grade is welded to 8 mm gusset plate. Design a weld to transmit a factored load of 150 kN. (10 Marks)

Module-3

- 5 a. Explain the failure modes of axial loaded column. (10 Marks)
b. Determine the design compressive strength of ISHB300@576.8 N/m, Length of column is 3.5 m and both ends are pinned. (10 Marks)

OR

- 6 Design a single angle discontinuous strut to carry a factored load of 65 kN. The length of strut is 3m, between inter section. It is connected to 12 mm thick gusset plate by 20 mm diameter, 4.6 grade bolts. (20 Marks)

Module-4

- 7 a. Explain the factors effecting strength of tension members. (10 Marks)
b. Design a tension member to carry factored load of 400 kN connected to shorter leg back to back. Length of member is 3m. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. $42+8=50$, will be treated as malpractice.

OR

- 8 a. Explain Lug angles and column splices. (10 Marks)
b. Design slab base for a column made of ISHB250@536 N/m to carry axial working load of 520 kN. The grade of concrete is M₂₀ and grade of steel Fe 410. (10 Marks)

Module-5

- 9 a. Explain the factors effecting lateral stability of beams. (10 Marks)
b. Calculate the load carrying capacity of laterally restrained simply supported beam with ISMB500@86.9 kg/m section for an effective span of 5m. (10 Marks)

OR

- 10 Design a steel beam section for supporting hall for the following data:
Clear span = 6.5 m
End bearing = 200 mm
c/c spacing of beams = 3 m
Live load on beams = 12 kN/m²
Dead load = 3 kN/m²

(20 Marks)
