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17CV62

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 and steel tables is permitted.

Module-1

- 1 a. Explain the advantages and disadvantages of steel structure. (08 Marks)
b. What are the different types of rolled steel section used in construction? Mention any six shapes used as structural elements with sketches. (12 Marks)

OR

- 2 Find the shape factor for the following sections:
(i) Rectangular section (ii) Circular section. (20 Marks)

Module-2

- 3 a. Briefly explain different types of bolts. (06 Marks)
b. Design a lap joint between the 2 plates each of width 120 mm if the thickness of one plate is 16 mm and other is 12 mm. The joint has to transfer a design load of 160 kN. The plates are of Fe410 grade. (14 Marks)

OR

- 4 a. What are the advantages and disadvantages of welded connections? (08 Marks)
b. Design a welded connection for an angle (80×80×6) mm subjected to a force of 210 kN. Provide welding on three sides. (12 Marks)

Module-3

- 5 a. Explain Laced and Battened columns with sketches. (08 Marks)
b. Design a single angle strut connected to the gusset plate to carry 180 kN factored load. The length of the strut between centre to centre intersection is 3 m. (12 Marks)

OR

- 6 Design a laced column with two channels back to back of length 10 m to carry an axial factored load of 1400 kN. The column may be assumed to have restrained in position but not in direction at both ends (Hinged ends). (20 Marks)

Module-4

- 7 Design a tie member consisting of a single angle section to carry a working load of 150 kN. Used bolted connection with M₁₈ bolts of property class 5.6. If the length of the member is 2 m check for slenderness ratio. (20 Marks)

OR

- 8 Design a slab base for a column ISHB300@58.8 kg/m subjected to a service load of 1500 kN. The grade of concrete for pedestal is M₂₀ and SBC of soil is 180 kN/m². (20 Marks)

Module-5

- 9 A simply supported beam ISMB 350@52.4 kg/m is used over a span of 5 m. The beam carries an UDL, live load = 20 kN/m and dead load = 15 kN/m. The beam is laterally supported throughout. Check safety of the beam. (20 Marks)

OR

- 10 A roof hall measuring 6m*13.7m consists of 120 mm thick RCC slab supporting on a steel I section spaced @ 3.5 M C/C. The hall is having wall of 30 cm thick all around. The finishing load on the roof is 1 kN/m and LL is 2 kN/m². Design steel beam and apply all necessary details. Check for the design. (20 Marks)
