

CBCS SCHEME

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15CV62

Sixth Semester B.E. Degree Examination, June/July 2018 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 IS:800-2007, SP(6)-I or Steel table is permitted.*

Module-1

- a. What are the advantages and disadvantages of steel structures? (08 Marks)
b. What are rolled steel sections? Mention any six shapes used as structural elements with sketches. (08 Marks)

OR

- a. Identify plastic hinge distance 'X' is $0.414l$ from the simple support of a propped cantilever beam supporting a UDL of w kN/m over the entire span. (08 Marks)
b. Analyse the continuous beam ABC subjected to working loads shown in Fig.Q2(b) and determine the maximum plastic moment. Take load factor of 1.85. (08 Marks)

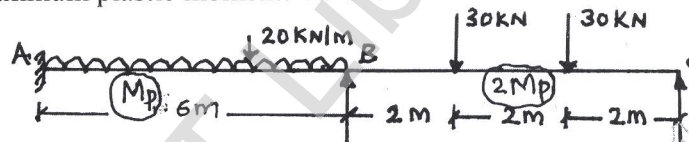


Fig.Q2(b)

Module-2

- a. What are HSFG bolts? What are the advantages of HSFG bolts? (06 Marks)
b. Design a bolted connection for a lap joint of plate thickness 10 mm and 12 mm to carry a factored load of 150 kN. Use M_{16} and 4.6 grade bolt. Assume the bolts as fully threaded. (10 Marks)

OR

- a. What are the advantages and disadvantages of welded connections? (08 Marks)
b. 18 mm thick plate is joined to a 16 mm thick plate by 200 mm (Effective) butt weld. Determine the strength of joint if, (i) A double V-butt weld is used (ii) A single V-butt weld is used. Take $f_u = 410 \text{ N/mm}^2$ and $\gamma_{mw} = 1.25$. (08 Marks)

Module-3

- a. Explain Laced and Battened columns with sketches. (06 Marks)
b. Determine the design strength of a column section ISHB 350@67 kg/m. The column is 3m height with one end fixed and other end hinged. Take $f_y = 250 \text{ N/mm}^2$. (10 Marks)

OR

- Design a compression member using double channel section (2ISLC300@33.1 kg/m) face to face to carry a factored load of 1600 kN. The length of the column is 5 m with one end fixed and one end hinged. Assume M_{18} bolts and $f_{cd} = 200 \text{ N/mm}^2$. Also design single lacing system. (16 Marks)

1 of 2

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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.

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Module-4

- 7 a. What is lug angle? Explain briefly with sketch. (04 Marks)
b. A single unequal angle ISA 100×75×6 mm is connected to 10 mm thick gusset plate with six 16 mm ϕ bolts to transfer tension. Determine design tensile strength if longer legs are connected to gusset. Assume pitch and edge distance of 40 mm each. (12 Marks)

OR

- 8 a. Briefly explain types of column bases. (04 Marks)
b. Design a slab base for a column ISHB 300@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. Design slab base and concrete base with welded connection. (12 Marks)

Module-5

- 9 A floor of hall measuring 9m × 21m is of 150 mm thick R.C. slab supported on steel beams [I section] spaced at 3.5 m c/c. The finishing load of floor is 1.5 kN/m² and live load is 3 kN/m². Design the steel beam and apply the necessary checks. Assume self weight of beam = 1 kN/m and thickness of wall = 0.3 m. (16 Marks)

OR

- 10 Simply supported beam ISMB 350@52.4 kg/m is used over a span of 5 m. The beam carries an Udl live load of 20 kN/m and dead load 15 kN/m. The beam is laterally supported throughout check the safety of the beam. (16 Marks)

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