CBCS SCHEME

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18CV61

Sixth Semester B.E. Degree Examination, June/July 2025
Design of Steel Structural Elements

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.
Use of IS:800 -2007, SP(6) or Steel table permitted.

Module-1

1 a. What are the advantages and disadvantage of steel structures. **(10 Marks)**

b. What are the rolled steel sections? Mention with neat sketch different types of rolled sections used in construction. **(10 Marks)**

OR

2 a. Explain the following terms.
i) Plastic Hinge
ii) Collapse mechanism
iii) Shapefactor **(08 Marks)**

b. Determine the plastic moment capacity (MP) for the beam loaded as shown in Fig. Q.2 (b) use load factor = 1.50

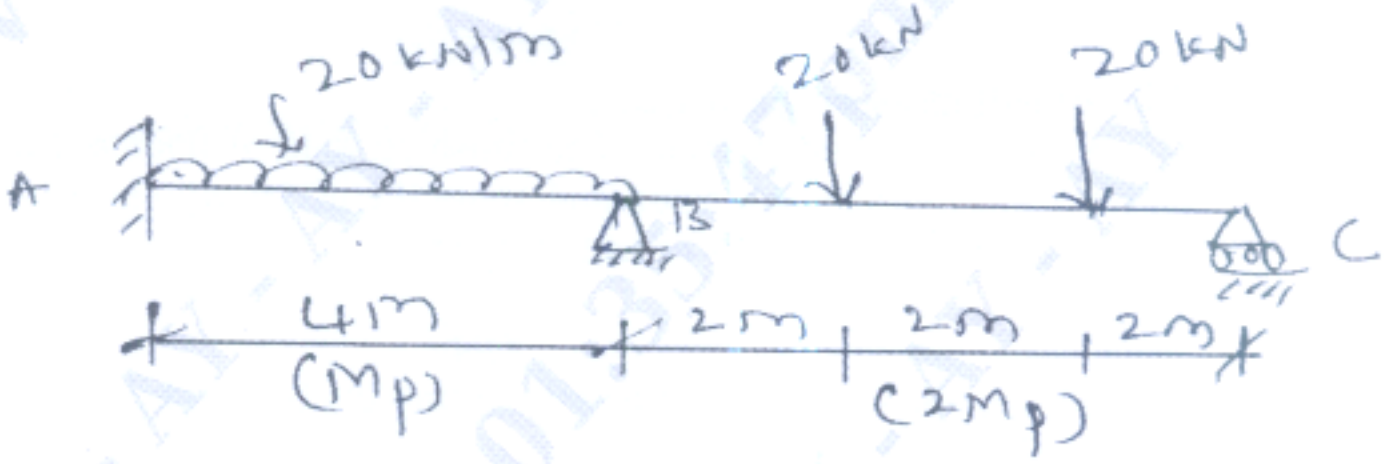

Fig. Q. 2 (b) **(12 Marks)**

Module-2

3 a. Explain the various modes of failure of bolted connections. **(10 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 bolt as fully threaded. **(10 Marks)**

OR

4 a. What are the advantages and disadvantages of welded connections. **(08 Marks)**

b. A tie member of roof truss consists of 2 ISA 100 × 75 × 8 mm and are connected to both the sides of 10 mm gusset plate, by longer legs. Factored axial force in the member is 500 KN. Design the welded joint by providing weld.
i) along two parallel sides of angle
ii) along all 3 sides of the connection angle. Assume shop weld. **(12 Marks)**

Module-3

5 a. Explain with neat sketch laced and Battened column's. **(08 Marks)**

b. Determine the design strength of a column section ISHB 350 @ 67 kg/m. The column is 3 m height with one end fixed and other end hinged. Use fy = 250MPa. **(12 Marks)**

OR

6 Design a builtup column comprising of two channel section placed back to back to carry a load of 1000 KN over a length of 10 m. The ends of compression member are restrained in position but not in direction / rotation. Design single lacing system with 20 mm diameter bolts for connection. **(20 Marks)**

Module-4

7 a. A single unequal angle ISA 100 × 75 × 6 mm is connected to 10 mm thick gusset plate with six numbers of 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. **(14 Marks)**

b. What are lug angles? Explain with neat sketch. **(06 Marks)**

OR

8 Design a gusseted base for a builtup column ISHB 350@ 674 N/M with 400mm × 20mm flange plates carrying an axial load of 2000KN. Assume M20 grade concrete and M24 bolts of grade 4.6. Take SBC = 200 KN/m^2. **(20 Marks)**

Module-5

9 A floor of hall measuring 9m × 21 m is of 150mm thick R.C. slab supported on steel beams (I – section) spaced at 3.5 mck. The finishing load of floor is 1.5 KN/m^2 and live load is 3 kN/m^2 . Design the steel beam and apply the necessary checks. Assume self weight of beam = 1KN/m and thickness of wall = 0.3m. **(20 Marks)**

OR

10 a. Briefly explain the factors affecting lateral stability of beams. **(08 Marks)**

b. Explain with neat sketch.

i) Beam to Beam connection

ii) Beam to column connection **(12 Marks)**

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