CBCS SCHEME

USN | | | | | | | | | | 18CV61

Sixth Semester B.E. Degree Examination, Feb./Mar. 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 SP 6 or Steel table is permitted.

Module-1

1   a. What are the advantages and disadvantages of steel structures?   (10 Marks)
    b. What are the rolled steel sections? Explain briefly with neat sketch different rolled steel sections used in steel construction.   (10 Marks)

OR

2   a. Define the terms, plastic hinge, shape factor, collapse mechanism and upper bound theorem.   (08 Marks)
    b. Determine plastic moment capacity for the beam shown in the Fig.Q2(b). Take factor load of 2.5 .

Fig.Q2(b)   (12 Marks)

Module-2

3   a. What are the advantages and disadvantages of bolted connection?   (10 Marks)
    b. Design a bolted connection for a lap joint of plate thickness 10mm and 12mm to carry a working load of 100 kN. Use M16 bolts of property class 4.6. Assume bolts with threads.   (10 Marks)

OR

4   a. What are the common defects in welding? Explain briefly with neat sketch.   (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 10mm gusset plate, by longer legs back to back. Factored axial force in the member is 500 kN. Design the weld joint by providing weld
    (i) Along two parallel sides of angle.
    (ii) Along all three sides of connected angle.
    Assume shop weld.   (12 Marks)

Module-3

5   a. Explain the different modes of failure of compression members.   (08 Marks)
    b. Determine the compressive strength of double angle strut 2ISA 90×60×8 mm connected to gusset plate of 10mm thick when
    (i) Two angles on same side [Shorter legs Back to Back]
    (ii) Two angles back to back of a either side of gusset plate [Longer leg back to back]
    Take length of member as 2.5m.   (12 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.

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OR

6. Design a build up column consisting of two channels sections placed back to back to carry a load of 1000 kN over a length of 10m. The ends of compression member are restrained in position but not in direction / rotation. Design single lacing system. Use 20mm diameter bolts of property class 4.6 for connection. Given load is working load. **(20 Marks)**

Module-4

7. a. Explain different modes of failure of a tension member with neat sketch and formulae. **(06 Marks)**

   b. Design an unequal single angle section to carry a load of 140 kN. Use M_{20} bolts of grade 4.6. The length of member is 3m. **(14 Marks)**

OR

8. a. Explain slab base and gusseted base with neat sketch. **(08 Marks)**

   b. Design a slab base for a column ISHB 300@58.8 kg/m subjected to a service load of 1500 kW. The grade of concrete for pedestal is M_{20}, SBC of soil is 180 kN/m². **(12 Marks)**

Module-5

9. A floor of hall consist of beams spaced @ 3.5m c/c with clear span of 6m. The beam supports 130 mm thick R.C.C slab. Take imposed load of 5 kN/m² and floor finish of 1.5 kN/m². Bearing wall is 300mm thick. The beam is laterally supported. Design the beam with necessary checks. **(20 Marks)**

OR

10. a. Briefly explain the factors affecting lateral stability of beams. **(06 Marks)**

    b. Explain with neat sketch :
       (i) Beam to Beam connection (Bolted)
       (ii) Beam to Column connection (Bolted). **(14 Marks)**

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