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

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

2 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)**

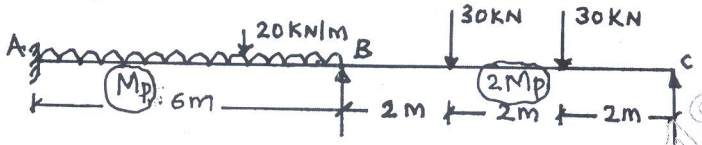

Fig.Q2(b)

Module-2

3 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

4 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 $f_u = 410$ N/mm^2 and $\gamma_{mw} = 1.25$. **(08 Marks)**

Module-3

5 a. Explain Laced and Battended 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 $f_y = 250$ N/mm^2. **(10 Marks)**

OR

6 Design a compression member using double channel section (2ISLC300@33.1 kg/m) face to fall 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 fcd = 200 N/mm^2. Also design single lacing system. **(16 Marks)**

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 M_{20} and SBC of soil is 180 kN/m^2. 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/m^2 and live load is 3 kN/m^2. 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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