15CV62

USN

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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 IS800-2007 and steel tables are allowed.

Module-1

1   a. Explain the advantages and disadvantages of steel structure.   **(08 Marks)**
    b. Distinguish between Working stress design and Limit state design of steel structure.
                                                                                        (08 Marks)

OR

2   a. Calculate the "Shape factor" for the Triangular section.   **(06 Marks)**
    b. Analyse the continuous beam "ABC" subjected to working loads show in Fig.Q2(b) and
       determine the plastic moment. Use load factor is 1.5.   **(10 Marks)**
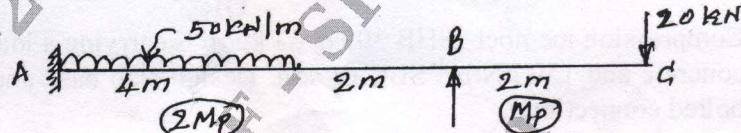

Fig.Q2(b)

Module-2

3   a. Explain with neat sketches of various 'Mode of failure' of bolts connection?   **(06 Marks)**
    b. Determine the "bolt value" for a bolt M16 and property class 4.6. Used to connect lap joint
       as shown in Fig.Q3(b). Take ultimate Tensile Strength of plate 410 MPa.   **(10 Marks)**
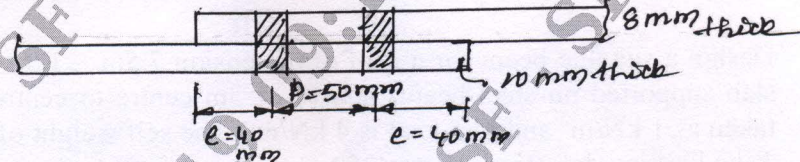

Fig.Q3(b)

OR

4   a. What are the advantages and disadvantages of welded connection?   **(06 Marks)**
    b. Determine the bracket load that can resisted by the bracket shown in Fig.Q4(b) by fillet weld
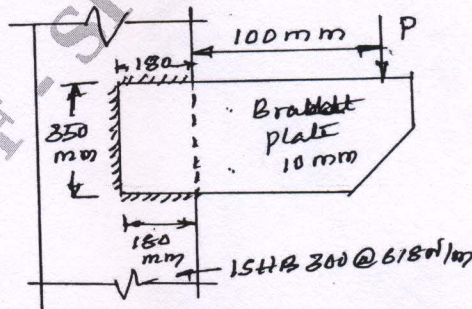   of size 8mm.   **(10 Marks)**

Fig.Q4(b)

Module-3

5 a. Explain the behavior of compression member. (06 Marks)

   b. Determine the compressive strength of a strut of ISA 150×75×8 mm connected to a gusset plate when (i) with one bolt (ii) with more than two bolts (iii) Welded.
   Assume angle is axially loaded. Take length of the member is 3m. (10 Marks)

OR

6 Design a column section using double channels back to back to carry a factored load of 2000 kN. The height of the column is 5m with the column is hinged at both ends. Also design the column with lacing with bolted connection. (16 Marks)

Module-4

7 a. What is Lug Angle/ Explain in brief with a neat diagram. (04 Marks)

   b. Determine the tensile strength of a plate 160mm × 10mm connected with bolts of M18 in two lines. (12 Marks)

OR

8 Compression member ISHB 300@ 63 kg/m is carrying a load of 800 kN. Take M20 grade of concrete and 150 kN/m² SBC of soil. Design slab base and concrete base using welded or bolted connection. (16 Marks)

Module-5

9 a. What are the factors, which affects lateral stability? (04 Marks)

   b. Determine the design bending strength of a beam ISMB 300@ 434 N/m. Assume that the factored shear force is less than the design shear strength. Use Fe-410 grade of steel. (12 Marks)

OR

10 Design a suitable beam for a roof of dimension 7.5m × 12m consists of 100mm thick R.C. slab supported on steel beams spaced at 3m centre to centre. The floor finishing may be taken as 1 kN/m² and live load is 4 kN/m². The self weight of beam is assumed as 1 kN/m². Take limiting defection as span/250. (16 Marks)

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