USN | | | | | | | | | | | **10CV72**

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Design of Steel Structures

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting*
atleast TWO questions from each part.
2. Use of IS800-2007 and steel tables are allowed.

PART – A

1   a.   What are the advantages and disadvantages of using steel structures?   **(06 Marks)**
    b.   Distinguish between working stress design and limit state design of steel structures.
                                                                                  (08 Marks)
    c.   What are the different loads and load combinations to be considered in the design of steel structures?   **(06 Marks)**

2   a.   Explain the various modes of failure of bolted connections.   **(05 Marks)**
    b.   Design the bolted connection between flange of the column ISHB 350 @ 661.2 N/m and 10mm thick bracket plate. The bracket plate carries a load of 225kN at an eccentricity of 250mm. use M20 bolts of grade 4.6.   **(15 Marks)**

3   a.   What are the advantages and disadvantages of welded connections?   **(06 Marks)**
    b.   Determine the maximum load that can be resisted by the bracket shown in Fig Q3(b) by fillet weld of size 6mm.   **(14 Marks)**
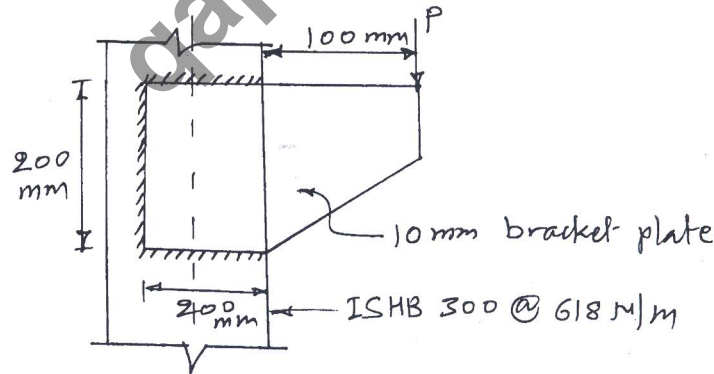

Fig Q 3(b)

4   a.   State the upper bound, lower bound and uniqueness theorems.   **(06 Marks)**
    b.   Analyze the continuous beam ABC subjected to working loads shown in Fig Q4(b) and determine the plastic moment. Adopt a load factor of 1.85.   **(14 Marks)**
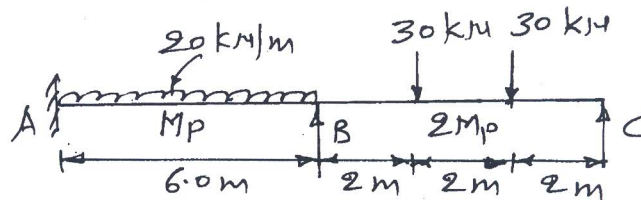

Fig Q4 (b)

PART – B

5 a. A single unequal angle ISA 90 × 60 × 6 is connected to a 10mm gusset plates at the ends with five numbers of 16mm bolts to transfer tension. Determine the design tensile strength of the angle if the gusset plate is connected to 90mm leg. **(15 Marks)**

   b. What is a lug angle? Explain in brief with a diagram. **(05 Marks)**

6 Design a built up column with two channels back to back to length 8m to carry an axial factored load of 1000 kN. The column is hinged at both ends. Design the column with lacings with bolted connections. **(20 Marks)**

7 a. Explain the types of column bases. **(06 Marks)**

   b. Design a gusseted base for a column ISHB 350@ 710N/m with two plates 450mm×20mm carrying a factored load of 3600kN. The column is to be supported on concrete pedestal to be built with M20 concrete. **(14 Marks)**

8 Design a steel beam section for supporting roof of a hall for the following data and apply usual checks. Assume Fe415 grade steel clear span = 6.5m, End bearings = 150mm C/C spacing of beams = 3m. Imposed load on beam = 10kN/m^2 Beam depth is restricted to 375mm. The compression flange of the beam is laterally supported throughout. **(20 Marks)**

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