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10CV72

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
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 IS – 800 – 2007, SP(6) – 1 or Steel table permitted.

PART – A

1 a. Distinguish between two major philosophy of design. **(08 Marks)**
b. What are the preliminary loads to be considered in the design of steel structures? **(08 Marks)**
c. Mention the classification of sections as per IS 800 : 2007. **(04 Marks)**

2 a. Write a note on HSFG bolts. **(06 Marks)**
b. Two plates of 10mm and 18mm thick are to be joined by double cover butt joint. Design the joint for the data. Factored design load = 750kN, blot diameter = 20mm, grade of steel = Fe410 cover plates on each side 8mm, grade of bolts 4.6. **(14 Marks)**

3 a. What are the requirements of an ideal welded joint? **(06 Marks)**
b. An I section bracket is connected to the flange of column. Determine the load if the flange weld is 16mm and the web weld is 10mm. **(14 Marks)**

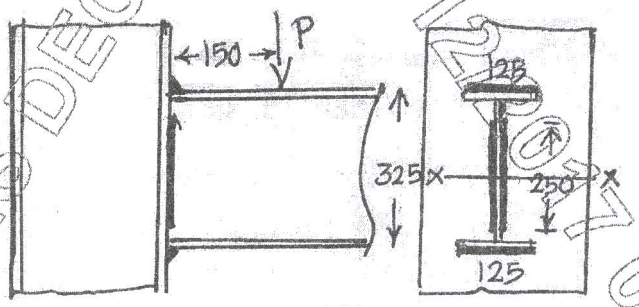

Fig.Q3(b)

4 a. Define : i) Plastic hinge ii) Mechanism and iii) Shape factor. **(06 Marks)**
b. Determine the collapse load for a fixed beam subjected to udl using upper-bond theorem. **(04 Marks)**
c. Determine the plastic moment capacity of the beam shown in Fig.Q4(c). **(10 Marks)**

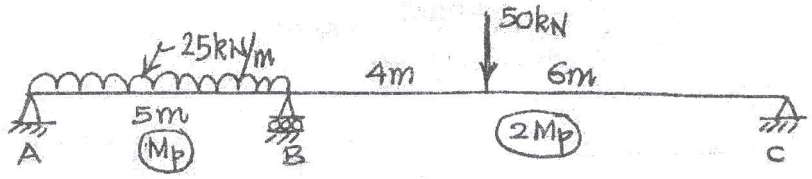

Fig.Q4(c)

PART – B

5 a. Determine the tensile capacity of the tie member $2L_S$ ISA 100 × 65× 10mm connected long legs to a gusset plate using four belts of 20mm diameter when. **(10 Marks)**

i) Angles are on both sides of the gusset plate with tack bolts
ii) Angles are on the same side of the gusset plate with tack bolts
iii) With tack bolts.

b. Design a single angle section of a tension member of a roof truss to carry a factored load of 225 kN. The member is subjected to possible reversal of stresses due to the action of wind. The length of member is 3m. Use M20 bolts of property class 4.6 in a single line. The yield and ultimate strength of steel are 250MPa and 410MPa respectively. **(10 Marks)**

6 a. Explain briefly :

i) Imperfection factor
ii) Stress reduction factor. **(06 Marks)**

b. Design a laced column with two channels back to back of 8m to carry an axial load of 1000kN. The columns are hinged at the ends. **(14 Marks)**

7 Design a gusseted base for a columns ISHB350@661N/m carrying a factored an axial load of 2500kN. The base plate rests on M20 grade concrete. M24 dia bolts of grade 4.6. **(20 Marks)**

8 A simply supported beam carries a udl of 15 kN/m including self weight and live load of 25kN/m in addition to a concentrated load of 75kN over a clear span of 9.7m, base plate 300mm. Available rolled section ISWB600@133.7ks/m. The beam is laterally supported. Design the beam. **(20 Marks)**

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