T.E. (Civil) (Part - I) (Semester - V) (Revised) Examination, December - 2015

DESIGN OF STEEL STRUCTURES

Sub. Code : 66236

Day and Date : Thursday, 10 - 12 - 2015

Total Marks : 100

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) All questions are compulsory.

2) Use of IS 800:2007, IS 875, Steel table, Non programmable calculator permitted.

3) Figure to the right indicate full marks.

4) Draw sketches wherever necessary.

5) Assume suitable data if required.

SECTION - I

Q1) a) State advantages of limit state method over working stress method.[4]

b) What is meant by strength of bolted connections? How is the strength of bolted connections calculated? [6]

c) A tension member consist of a plate 75×8mm in size is connected to 10mm gusset plate and subjected to a force of 200 kN The grade of steel is Fe 410. Design fillet weld if (i) weld is provided on two sides of plate in the direction of force & (ii) Weld is provided on three sides of plate. [6]

Q2) a) Explain the terms [6]

i) Block shear failure &

ii) Shear lag effect.

P.T.O.

b) Find out the design tensile strength of angle ISA 100×100×10 connected to gusset plate 10mm using M20 bolts of class 4.6 in a single line. The yield and ultimate strength of steel are 250Mpa and 410 Mpa respectively. Provide edge distance as 35mm and c/c spacing between bolts 55mm. **[12]**

OR

b) Design a tension member to carry factored load of 500 Kn, consisting of pair of equal angles back to back connected to opposite side of gusset plate by weld. Design connections & draw neat sketch. **[12]**

Q3) a) Write step by step procedure for designing of compression member. **[6]**

b) Calculate safe compressive load carrying capacity of double angle discontinuous strut composed of 2ISA 70 × 70 × 6 with long leg connected back to back on either side of gusset plate 12mm thick. The length of strut between c/c of intersection is 3 m & tacking done. **[10]**

SECTION - II

Q4) a) Explain with sketch the Gusseted base. **[4]**

b) Design a column to carry axial compression of 1400kN & having a length of 6m. It is effectively held in position but restrained against rotation at both ends,. Design built-up section by using two channel sections. Also design suitable lacing system. **[12]**

Q5) a) Write a note on curtailment of flanges. **[6]**

b) Design laterally restrained beam having effective span of 5m subjected to UDL of 20 kN/m including self weight & point load 20kN at mid point vertically downwards. Take check for deflection & shear. **[12]**

OR

b) Design a laterally supported beam of effective span 6m for the following data and find the shear strength and design bending strength of beam.

Factored bending moment = 150 kNm **[12]**

Factored shear force = 210 kNm

Grade of steel Fe 410.

Q6) a) Draw the neat sketch of crane system with all components. [4]

b) The Crane system has the following data. Determine the design forces acting on it. [12]

 i) Crane capacity - 200kN

 ii) Weight of crane - 200kN

 iii) Weight of crab - 60kN

 iv) Minimum hook Approach - 1 .2m

 v) Wheel base - 3m

 vi) Span of gantry girder - 6m

 vii) Weight of rail section - 0.3kN/m

 viii) Crane is electrically operated.

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