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T.E. (Civil) (Part - III) (Semester - V) Examination, April - 2016

DESIGN OF STEEL STRUCTURES (Old)

Sub. Code : 45536

Day and Date : Friday, 29 - 04 - 2016 **Total Marks : 100**

Time : 10.30 a.m. to 01.30 p.m.

Instructions :
1) **Solve any three questions from section I and any three from section II.**
2) **Use of IS:800-1984, IS:800-2007, IS:875-1987 (Parts 1 to 5), Steel Table is permitted.**
3) **Assume suitable data If required.**
4) **Draw sketches wherever necessary, Figures to the right indicate full marks.**

SECTION - I

Q1) a) Compare bolted connection with welded connection and state the advantages & disadvantages of each. **[8]**

b) Design a welded connection for an angle 50×50×6 mm carrying an axial tensile load 74kN connected to 8 mm thick gusset plate. **[8]**

Q2) a) Determine strength of member in axial tension for a cross section made of ISA 90×60×6mm connected longer leg with welding. **[6]**

b) Design a tension member for a pull of 500 kN. Use double unequal angle, longer leg connected on same side of gusset plate with welded connection. Length of member is 2.1m. Tack welding is provided. Check also for slenderness ratio limit. **[12]**

Q3) a) Determine strength of member in axial compression for of ISA 60×60×6mm connected with single bolt. Length of member is 1.4m. **[8]**

b) Design a strut for 400 kN. Use double unequal angle connected on same side of gusset plate with shorter leg connection. Length of member is 1.5m. **[8]**

P.T.O.

Q4) Design a simply supported beam supporting a UDL 70 kN/m inclusive of self weight. The overall depth of beam is restricted to 500 mm. Compression flange of the beam is supported laterally throughout span. Beam span is 8m. Check beam for shear and deflection. **[16]**

SECTION - II

Q5) Determine the design forces (maximum BM and max SF) due to vertical loads and lateral forces for the gantry girder with following data: **[16]**

Span of crane bridge = 16 m

Span of gantry girder = 5 m

Wheel base = 2.4 m

Wt. of crane bridge = 180 kN

Wt. of trolley and hook = 80 kN

Load lifting capacity of gantry girder = 200 kN

Minimum approach of hook = 1.0m

Weight of rail = 0.3 kN/m

Height of rail = 75 mm

Q6) a) A built up column section consists of four equal angles ISA 100,100,10mm arranged at the corners of a square 240mm×240mm. The length of the column is 5.5 m with one end fixed and other hinged. Determine the safe compressive load carrying capacity of the column. **[8]**

b) Design a slab base for a built up column consisting of ISHB 300@ 58.8 kg/m with one cover plate of 350mm×20mm on each flange and having an effective length of 5 m. The column carries an axial load of 1200kN. The column is supported on a concrete pedestal of M20 grade concrete. **[8]**

Q7) a) Explain lacing and battening in case of built up columns. **[4]**

b) What are the limitations and shortcomings of the working stress method? **[3]**

c) Write a brief note about the various serviceability limit states. **[3]**

d) Write on load combination. **[3]**

e) What is block shear failure in tension member **[3]**

Q8) a) A tie member of 1.6 m length in a roof truss consists of 2 ISA 70,70,8 bolted to a 10 mm gusset, one on each side using a single row of 5 bolts of 20 mm diameter. Determine the tensile capacity of the member by limit state method. **[9]**

b) A principal rafter of a roof truss consists of a double angle back to back on either side of 10 mm thick gusset connected by welding. The length of the rafter between center to center of intersections is 1.5m. Design the principal rafter to carry a factored load of 200 kN. **[9]**

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