Printed Pages: 02

Paper Code: CE-701	Roll No.										

B.Tech.
SEVENTH SEMESTER EXAMINATION, 2016-17
DESIGN OF STEEL STRUCTURES

[Time: 3 Hours] [Total Marks: 100]

Note: (i) Attempt ALL questions.
(ii) Assume any data suitably, if required.
(iii) **IS 800: 2007** and Steel section tables are permitted.
(iv) Draw neat Plan and sectional elevation for all design problems.
(v) use 20mm dia Black bolts of grade 4.6 if not given in problem.

1. Attempt any *FOUR* parts of the following:- **(5x4=20)**

(a) What are the basic properties of steel that make it better suited for structural applications? Discuss the advantages of steel structures over RCC.

(b) List the different horizontal and vertical loads which may be acting on steel structures. Discuss the various loading combinations taken for the analysis of Building frames as per IS :875.

(c) Explain the various Limit states which are considered in Limit state design of steel structures. Why Partial safety factors and load factors are adopted in Limit State Design by IS: 800-2007 Code.

(d) Design a lap joint to connect two plates each 300mm wide and 12mm thick using 20mm dia bolts and grade 4.6. The applied service load is 500 KN axial tensile load.

(e) Design a double cover butt joint to connect two plates each 12mm thick and 250mm wide. The axial compressive service load to be transferred is 300 KN.

(f) Determine the strength of 6mm size fillet weld which is shop welded if a 250mm wide plate is to be joined to another 350 mm wide plate section. Determine the joint strength of the joint if the overlap of plates is 150mm and both longitudinal and end fillet weld is provided.

2. Attempt any *TWO* parts of the following:- **(10x2=20)**

(a) A diagonal member of a roof truss carries an axial load of 350KN. Design the tension member and it connection with 12mm thick gusset plate using suitable unequal angle section. Take fy= 250N/mm2 and fu= 410N/mm2

(b) A double angle tension member of size 75x50x8mm thick is connected to both side of the gusset plate with longer legs, with the help of 16mm dia black bolts. Gusset has a thickness of 12mm. it is subjected to tensile force along the axis. Find the service force carried by the tension member.

(c) Design a tension member to carry a pull of 650 KN. The member is 4.5m between the c/c of intersections. Design the member using suitable channel section.

3. Attempt any *TWO* parts of the following:- **(10x2=20)**

(a) Design a laced column 10m long to carry a factored axial load of 1400 KN. The column is restrained in position but not in direction at both ends. Assume single lacing system. Design the column with two channel back to back.

(b) Design a Slab base footing for a column made of ISMB400 section carrying a factored load of 1800 KN. Assume that column is supported on a pedestal made of concrete Grade M20.

(c) A double angle discontinuous strut consist of two ISA 75x75x6mm angles connected back to back both sides of 12mm thick gusset plate with two bolts. The length of compression member is 4.5m. Calculate the safe load carried by the section.

4. Attempt any *TWO* parts of the following:- **(10x2=20)**

(a) A proposed cantilever steel beam is built into a concrete wall. It supports a dead load of 10KN/m and live load of 12KN/m. The length of the beam is 4m. Design a suitable I- section and apply all necessary checks. Assume a bearing length of 80mm.Assume beam is laterally restrained.

(b) Calculate the safe load carrying capacity of a laterally restrained steel beam which is simply supported on a span of 6m and carrying a udl. The beam is made of I- section of ISLB 500@0.75KN/m.

(c) Discuss with neat sketches what do you mean by Laterally Restrained and Laterally unrestrained steel beams. Explain how the Web buckling and web crippling is prevented in steel beams.

5. Attempt any *TWO* parts of the following:- **(10x2=20)**

(a) Draw the neat sketch of plan and sectional elevation of a gusset base footing explaining all the structural elements. Discuss the Advantages of using Gusseted base footing over slab base footing.

(b) Discuss with neat sketches the different types of failures in bolted connections and how they are prevented while designing such connections.

(c) Explain the different types of failures in Tension members.