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Paper Code: ECE701	Roll No.									

B.Tech.
DESIGN OF STEEL STRUCTURES
(SEMESTER- VII) EXAMINATION, 2015-16

Time: 3 Hours **Total Marks: 100**

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

1. Attempt any **FOUR** parts of the following **10x2=20**

(a) Discuss 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.

(b) Design a lap joint to connect two plates each 400mm wide and 20mm thick using 20mm dia bolts and grade 4.6. The applied service load is 600 KN axial tensile load.

(c) Determine the strength of 6mm size fillet weld which is shop welded, if a 300mm wide plate is to be joined to another 400 mm wide plate section. Determine the strength of the joint if the overlap of plates is 200mm and both longitudinal and end fillet weld is provided.

2. Attempt any **TWO** parts of the following **10x2=20**

(a) A member of a roof truss carries an axial load of 600KN. Design the tension member and it connection with 12mm thick gusset plate using suitable angle section. Take fy= 250N/mm2 and fu= 410N/mm2

(b) A double angle tension member of size 75x50x8mm is connected to both side of the gusset plate with longer legs, with the help of 20mm 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 1000 KN. The member is 4.5m between the c/c of intersections. Design the member using channel section.

3. Attempt any **TWO** parts of the following **10x2=20**

(a) Design a laced column 8 m long to carry a axial load of 1000 KN. The column is fixed 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 axial load of 1600 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 5.5m. Calculate the safe load carried by the section.

4. Attempt any **TWO** parts of the following **10x2=20**

(a) A Simply supported steel beam resting on a concrete wall with its flange restrained against lateral buckling.It supports a dead load of 10KN/m and live load of 15KN/m. The length of the beam is 8m.Design an eye section for the beam and apply all necessary checks. Assume a bearing length of 80mm.

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

(c) Explain with neat sketches what do you mean by Laterally Restrained and Laterally unrestrained 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) What is Purlin? Explain the step wise Design procedure for an angle iron purlin as recommended in IS800-2007.