

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

END SEMESTER EXAMINATION-2015

M.Tech (Structural Engineering)

II Semester

COURSE CODE: 12M1WCE212

MAX. MARKS: 45

COURSE NAME: DESIGN OF STEEL STRUCTURES

COURSE CREDITS: 03

MAX. TIME: 3 HRS

Note: Carrying of mobile phone during examinations will be treated as case of unfair means.

(i) All questions are compulsory.

(ii) For numerical problems write in detail all the steps needed for the solution.

(iii) Use of IS 800:2007 and steel table/ SP6(1) is allowed in the exam.

(iv) Missing data if any may be assumed suitably.

Section A

(1 x 9 = 9Marks)

1. For cold formed square hollow section with size 150mm and thickness 6mm, Determine the following :
 - a. Classify the section.
 - b. Imperfection factor.
 - c. If the section is used as a column, what would be its effective length factor if one is restrained in both translation and rotation while other end is restrained only in translation?
 - d. If the section is used as a beam, determine the web buckling strength at support point. Take bearing support width as 150mm.
 - e. Determine its tensile strength, considering connection as welded and ignoring block shear strength.
2. Under what condition can lateral buckling can occur in beam?
3. Find the shape factor for square of side 100mm, with its diagonal parallel to z-z axis.
4. Why are drilled holes preferred over punched holes?
5. What is lug angle? How its use can be avoided?

Section B

(6 X 6 = 36Marks)

1. Design bolted connection for a tie section comprising of ISA100X100X10mm for its design tensile strength. The longer leg of the angle has to be connected to the gusset plate 8mm thick.
2. A tension member of a truss consisting of a single channel is subjected to a factored tension of 350kN. Design the channel section and connection of the member to a gusset plate using lug angle. Provide welded connection.
3. A simply supported beam of span 5m supports a reinforced concrete slab. The compression flange of the beam is restrained due to its connection with the slab. The beam is subjected to a dead load of 25kN/m and an imposed load of 20kN/m and 40kN at the mid span. Design the beam. Assume the beam stiff bearing length 100mm.
4. Design a built-up column to carry an axial load of 1500kN with the length of column being 8m. The column is effectively held in position at both ends, but not restrained against rotation at both ends. The C/S of the column is Four angles – equal arranged as square section
5. For Q4. (Section B) Design Double lacing and batten system.
6. An ISA 150x110 angle, bolted on one side of a gusset plate by two rows of 20 mm bolts through the 150 mm leg, is required carry a tensile load of 320 kN. The gauges on this leg are 50 mm from the back of the angle to the first row and 60 mm between rows. The pitch is 80 mm in each row, the stagger being 40 mm. Select a thickness for the angle.