JAYPEE UNIVERSITY OF INFORMATRION TECHNOLOGY, WAKNAGHAT
END SEMESTER EXAMINATION-2015
B.Tech (Civil Engineering)
VI Semester

COURSE CODE: 10B11CE611   MAX. MARKS: 45

COURSE NAME: DESIGN OF STEEL STRUCTURES

COURSE CREDITS: 04   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. Check whether an ISMB400 in FE410 steel would be affected by local buckling effects when used as a column.

2. Give basic difference in behavior is between tie and strut members while resisting the loads?

3. How deflection limitation is specified in IS800:2007?

4. Will the shape factor of rectangular and circular cross section be higher than that of I-sections? If yes, state the reason.

5. What is the maximum slenderness ratio permissible in steel strut?

6. What is the condition of High shear case in beam, what will be the design bending strength of beam for this case?

7. What are the different modes of failures of a tension member?

What is the limiting width to thickness ratios for flange of welded I section of compression member based on:

8. Slender members

9. Compact members

Section B

(3 X 4.5 = 13.5Marks)

1. A tie member consists of 2 ISMC 200. The channels are connected on either side of a 10mm thick gusset plate. Design the welded joint to develop the full strength of the tie. The overlap is to be limited to 350 mm.

2. **(a)** A column height 4.5m is hinged at the ends. It is square in cross section (plan) of side 350mm and consists of 4 angles of ISA 80x80x10mm at each corner suitably laced by single lacing. Find the safe load that can be applied on the column.
   (b) Determine the force on double lacing for which the lacing has to be designed.

3. **(a)** Differentiate between the bending and buckling of a beam.

   (b) How the local buckling of steel structural shapes affects the member strength? How is it avoided?
   (c) Why is the plastic method of design more useful for redundant structures than the determinate structures?

Section C

(3 X 7.5 = 22.5 Marks)

1. **(a)** Design a built-up column to carry an axial load of 1200kN with the length of column being 7.5m. The column is effectively held in position at both ends, but not restrained against rotation at both ends. The C/S of the column should be made of two I- sections
   (b) Design double lacing system.

2. A tension member of a truss consisting of a single channel is subjected to a factored tension of 450kN. Design the channel section and connection of the member to a gusset plate using lug angle. Provide bolted connection.

3. Design a simply supported beam of 5m span carrying a reinforced concrete floor capable of providing a lateral restraint to the top compression flange. The total udl is made up of 90kN dead load including self-weight plus 120kN imposed load. In addition the beam carries a point load at mid span made up of 50kN dead load and 50kN imposed load (assuming a stiff bearing length of 65mm).