Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.–5)
DESIGN OF STEEL STRUCTURES–I
Subject Code : BTCE-501
Paper ID : [A2078]

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION A

1. **Write briefly :**

   1. What is ductility? Why is it important?

   2. What is the difference between black bolts and HSFG bolts?

   3. What is groove welding? List its various types.

   4. List the different modes of failure of a tension member.

   5. What is shear lag effect?

   6. Can bolt holes be ignored in the design of compression members? If yes, why?

   7. What is the difference in the behavior of long column and short column?

   8. What is meant by shape factor of a section?

   9. What is the purpose of anchor bolts in a base plate?

   10. What are the load combinations that are usually considered for truss analysis?

SECTION-B

2. Two plates 10 mm and 18 mm thick are to be joined by double cover butt joint. Design the joint for the following data :

    Factored design load = 750 kN

    Bolt = M 20, 4.6 grade

    Cover plates = 8 mm thick each

3. A tie member consisting of an ISA 80 mm × 50 mm × 8 mm is welded to a 12 mm thick gusset plate at site. Design welds to transmit load equal to the design strength of the member. Let size of weld is 6 mm.

4. Determine the design tensile strength of a plate (160 × 6 mm) connected to an 8 mm thick gusset using 16 mm diameter bolts as shown in Fig. 1 if the yield and the ultimate stress of the steel used are 250 MPa and 410 MPa respectively.

5. Design a suitable base for the coloumn section ISHB 350 subjected to an axial load of 3000 KN. The base rests on M 15 concrete pedestal. Assume bearing strength of concrete as 4 MPa.

6. Determine the design axial load of a column section ISHB 300. The column is having a height of 9 m and is effectively restrained by bracings in the y-y direction at 3 m and 6 m. Also, it is effectively restrained by bracings in the z-z direction at mid height. Assume pinned conditions at both ends of the column

SECTION-C

7. Design a built up column 10 m long to carry an axial load of 1750 KN. The column is restrained in position but not in direction at both the ends. Provide single lacing system with riveted connections. Design columns with channels placed back to back.

8. Design the purlins of a truss. It is given that the length of the purlin is 5 m. The dead load, live load and wind load are 301.7 N/m, 620 N/m and −18373 N/m respectively.

9. Design a simple supported beam of effective span 1.5 m carrying factored concentrated load of 360 KN at mid span and U.D.L of 100 KN/m.