

Total No. of Questions: 09

B.Tech. (CE) (2011 Onwards) (Sem. – 5)

DESIGN OF STEEL STRUCTURES–I

M Code: 70512

Subject Code: BTCE-501

Paper ID: [A2078]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS 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 have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION A

1. a) What role does sulphur and phosphorus play in steel?
b) Tensile strength is of secondary importance in most of steel structures. State true or false. Support your answer.
c) Define 'Rivet value'.
d) Differentiate between fillet weld and butt weld. Under which conditions fillet weld is preferred?
e) What do you mean by 'formation of plastic hinge' in beams?
f) Draw a neat diagram for 'horizontal' welded joint.
g) Why lacing is provided in the columns?
h) What is the role of sag tie in steel truss?
i) What is the significance of slab bases?
j) Write any four examples of tension members.

SECTION B

2. A tie bar 100mm X 16mm is welded to another plate. It is subjected to factored pull of 300 KN. Find the minimum overlap required if 8mm size fillet welds are used. Assume any missing data.
3. Design a double angle tension member connected on each side of a 10 mm thick gusset plate, to carry an axial factored load of 375 KN. Use 20 mm bolts. Take, yield stress of material as 250 N/mm^2 .
4. Draw a neat sketch for the steel roof truss showing its various components. Also explain any ten of its components.
5. Write down the steps for the design of axially loaded columns.
6. Design a slab base for a column ISHB 300@577 N/m carrying an axial load of 1200 KN. M20 concrete is to be used for the foundation. Provide welded connection between the column and base plate.

SECTION C

7. A simply supported beam of span 6m 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 25 KN/m and an imposed load of 20 KN/m. Design the beam.
8. Design a laced column with two channel sections placed toe to toe of length 10 m to carry axial load of 750 KN. The column is restrained in position but not in direction at both the ends.
9. Design a grillage foundation with I-sections, for a column having a load of 5000 KN. Column is provided with a base plate of size 700mm X 800mm. Take bearing capacity of the soil as 200 KN/m^2 . Assume any missing data.