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

Q1. **Answer briefly :**

a) Define the term 'Strain Hardening'.

b) What do you mean by structural steel?

c) What do you mean by the tensile strength of the steel?

d) What is the relation between throat thickness and size of the wold?

e) What are '*structural tubings*'?

f) Differentiate between laterally supported and laterally unsupported beams.

g) What is the role of Purlins in roof truss?

h) What do you mean by shear failure of the rivet?

i) Draw a neat sketch for a gusset base.

j) What is the basic principle for the design of a compression member?

## SECTION-B

Q2. A double riveted lap joint is used to connect 10 mm thick plates, by providing 22mm diameter rivets at 40 mm pitch. Determine the strength of the joint and joint efficiency.

Q3. Draw a neat sketch for the steel roof truss showing its various components. Also explain any ten of its components.

Q4. A tie bar 100mm X 20mm is welded to another plate. It is subjected to factored pull of 400 KN. Find the minimum overlap required if 8mm site fillet welds are used. Assume any missing data.

Q5. Design a double angle tension member connected on each side of a 10 mm thick gusset plate, to carry a axial factored load of 400 KN. Use 20 mm bolts Take yield stress of material as 250 N/mm$^2$

## SECTION-C

Q6. A column with the effective length of 5.0 m has to carry the design load of 5000 KN. Design the column with I-section and plates.

Q7. Design a laced column with two channel sections placed toe to toe of length 12 meter to carry axial load of 800 KN. The column is restrained in position but not in direction at both the ends.

Q8. A simply supported beam of span 8 meter 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 22 KN/m. Design the beam.

Q9. What are the various modes of failure for a bolted connection? Explain in detail with the help of neat sketches. How will you calculate the bolt value?