

Roll No.

Total No. of Questions : 09]

Paper ID [CE303]

[Total No. of Pages : 02

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Semester - 5th)

STEEL STRUCTURE - I (CE - 303)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

Q1)

(10 × 2 = 20)

- a) Define allowable/permmissible stresses used in design. What is the relation between allowable stresses and factor of safety?
- b) Define and differentiate pitch and gauge for a riveted joint.
- c) Give disadvantages of welded joints.
- d) Find rivet value for 20 mm dia power driven rivets which are connecting two plates of thickness 14 and 16 mm by lap joint.
- e) What is slenderness ratio? How does it affect the load carrying capacity of a column?
- f) (i) Give maximum and minimum value of angle of inclination for laced column.
(ii) Give the factor by which effective length of battened column is altered.
- g) What are laterally supported and unsupported beams?
- h) Draw bending stress diagram under a column base which is subjected to a point load P at an eccentricity e.
- i) Why is curtailment of flanges carried out in the design of a plate girder?
- j) Draw a roof truss and label following members on it: (i) upper chord member (ii) lower chord member (iii) principal rafter (iv) purlin.

Section - B

(4 × 5 = 20)

- Q2) What are various modes of failure of a riveted joint?
- Q3) A 8 mm thick angle section is joined to a 10 mm thick gusset plate. Angle is supporting a load of 70 kN. Find out number of 18 mm diameter rivets required for the connection.
- Q4) A tie member 100×8 mm is to transmit a load of 115 kN. Design the fillet weld and calculate necessary overlap if (i) welding is done on three sides (ii) welding is done on four sides.
- Q5) Design a tension member to transmit a pull of 150 kN. Effective length of member is 4.5 meters. Member should consist of a pair of angles connected to both sides of gusset plate.
- Q6) Give, in detail, various loads considered for the design of Roof Trusses.

Section - C

(2 × 10 = 20)

- Q7) Design a laterally unsupported beam with 6 m simply supported effective span, subjected to UDL of 20 kN/m over entire span and a point load of 40 kN at mid span. Depth of beam is restricted to 350 mm.
- Q8) Design a column with effective length 7m. It is subjected to an axial load of 1500 kN. Provide two channel sections placed back to back with lacing. Design suitable lacing system also.
- Q9) (a) What are stiffeners and why are they used? How many types of stiffeners are being used in the design of plate girder? Give the conditions (as per IS 800) when stiffeners are required.
- (b) Design a suitable Base for a column section ISHB 350 @ 724 N/m subjected to an axial load of 4000 kN. Base is resting on M15 concrete pedestal. Safe bearing pressure of concrete is 4000 kN/m².