

[01 - 3117]

III/IV B.E. DEGREE EXAMINATION.

First Semester

Civil Engineering

STEEL STRUCTURES — I

(Common with Civil Environmental Engineering and  
Dual Degree Programme in Civil Engineering)

(Effective from the Admitted Batch of 2008–2009)

Time : Three hours

Maximum : 70 marks

First question is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

Use of IS 800-2007 and Steel Tables may be permitted.

1. Answer the following :

- (a) Explain the design philosophy of limit state method.
- (b) What are the salient features of stress-strain curve of mild steel?
- (c) What are the advantages and disadvantages of welded connections?

- (d) What are the various modes of failure of tension members?
  - (e) What are the various parameters influencing the compressive strength of a member?
  - (f) Distinguish between the behavior of laterally supported and laterally unsupported beams.
  - (g) What are the disadvantages of pre-engineered structures?
2. A bracket plate of thickness 12 mm is connected to the flange of an ISMB 300 column and is subjected to a factored force of 250 kN acting in the plane of the bolts at an eccentricity of 300 mm. Design the connection using M16 bolts of grade 4.6.
3. A tension member of a roof truss consists of two ISA  $100 \times 75 \times 10$  subjected to a force of 325 kN. The angles are to be welded on the either side of 12 mm gusset plate. Design the welded connection.
4. Design an angle tension member subjected to an axial load of 425 kN and also its connection to the gusset plate using lug angle. Use bolts of grade 4.6.

5. Design a battened column of length 9 m, consisting of two channels facing each other, subjected to an axial load of 1350 kN. The column is to be restrained against rotation and translation at one end and restrained against translation only at the other end.
6. A column of section ISHB 300 is subjected to a factored axial load of 700 kN, a factored moment of 30 kNm and a factored shear force of 65 kN. Design the column splice.
7. A simply supported beam of span 8 m is subjected to factored imposed load of 30 kN/m. Design the beam section assuming the beam is laterally supported.
8. A column ISHB 450 of height 6 m is subjected to an axial factored load of 3200 kN. Design a gusseted base for the column. The column is supported on M25 grade concrete pedestal.