[Total No. of Questions - 9] [Total No. of Printed Pages - 3] (2125)

15322

B. Tech 7th Semester Examination

Design of Steel Structures (NS)

CE-412

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Attempt one question from each section A, B, C & D.

(ii) Section E is compulsory and all questions carry equal marks.

(iii) Relevant codes are allowed.

SECTION - A

1. Distinguish between:
   (i) Factor of safety and Partial safety factor.
   (ii) Characteristic loads and Design loads.
   (iii) Working stress method, ultimate strength design and limit state design. (20)

2. A tie member of a roof truss consists of 2 ISA 100 x 75 x 8 mm. The angles are connected to either side of a 10 mm gusset plates and the member is subjected to a working pull of 300 kN. Design the welded connection. Assume connections are made in the workshop. (20)

SECTION - B

3. A beam fixed at both the ends is subjected to two concentrated loads, each at one-third point of the span. Determine the collapse load for the beam. (20)

[P.T.O.]

4. A column consisting of ISHB 400 @ 0.774 kN/m has an unsupported length of 3.8 m. It is effectively held in position at both ends, restrained against rotation at one end. Calculate the axial load this column can carry. (20)

SECTION - C

5. Design a simply supported beam, having an effective span of 8 m and carrying a u.d.l. of 45 kN/m. The beam is laterally supported. Check the beam against web crippling and web buckling at the ends, if the length of bearing plate at the support is 140 mm. Also, design the bearing plate, taking the safe bearing capacity of masonary as 7.5 N/mm^2. (20)

6. Design a stiffened seat connection to connect the ISMB 500 transferring a load of 260 kN to an ISHB 300 @577 N/m. (20)

SECTION - D

7. An angle section 8 mm thick carrying 120 kN factored load is to be connected to a gusset plate as lap joint using M20 bolts of grade 4.6. Find the number of bolts required and sketch the connection details. (20)

8. A tie member in a truss consists of a pair of angles ISA 90 x 60 x 8 mm welded on either side of a gusset plate 8 mm thick through the longer legs. Design the welded joint if the member is subjected to a working pull of 250 kN. Assume connections are made in the workshop. (20)

SECTION - E

9. (a) Distinguish between factor of safety and partial factor of safety.

   (b) Explain Lug Angle with sketch and its importance.

   (c) Write short notes on shape factor and load factor in plastic analysis.

(d) Explain slenderness ratio and its significance in design of the compression members.

(e) Explain shortly the design of laterally supported beams and laterally unsupported beams.

(f) List and explain the different failure of bolted joints in short.

(g) Important advantages and disadvantages of using welded connection over bolting connection.

(h) Under what circumstances slot and plug welds are used?

(i) Write short notes on splices to tension members.

(j) Write different types of compression members and its uses. (2×10=20)