Roll No. ....

24287

B. Tech. 5th Semester (Civil Engg.) Examination – December, 2016

DESIGN OF STEEL STRUCTURE – I

Paper : CE-301-F

Time : Three Hours]　　　　[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. 1 is *compulsory*. Students have to attempt *five* questions in total at least *one* question from each Section. Assume any data if missing. All questions carry equal marks.

1. (a) State the main advantages of using steel as a structural material. 4

   (b) Write down *four* advantages of using welded connections over bolted connections. 4

   (c) Define effective length of column along with its slenderness ratio. 4

   (d) Explain diagonal buckling and web crippling. 4

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9. Explain the following in detail : 12 + 8

   (a) Under what circumstances are box girder preferred over plate girder ?

   (b) What are the steps involved in the design of plate girder ?

(e) What are different modes of failures of a plate girder? 4

SECTION – A

2. Explain & draw stress-strain curve of mild steel in detail & also explain design specification as per IS 800:2007. 20

3. (a) Explain different types of tension members in detail and also write down the factors affecting the strength of tension members. 10

(b) A single-riveted double cover butt joint in used to connect two plates 16 mm thick. The rivets used are power driven 20 mm in dia. at a pitch of 60 mm. Find out the safe load per pitch length & efficiency of joint. 10

SECTION – B

4. Design a column of effective length 6 mm it is subjected to an axial load of 1600 kN provide two channels back to back connected with battens by welded connection. Assuming $f_y = 250$ MPa. 20

5. Design a two tier grillage foundation to carry an axial load of 1200 kN. A base plate 700×700 mm is provided below the stanchion. The concrete is of M25 grad and bearing pressure of earth limited to 150 kN/m². 20

SECTION – C

6. Design a beam of 6.5 m effective span carrying a uniform load of 30 kN/m if the compression flange is laterally unsupported. Assuming $f_y = 250$ N/mm². 20

7. Design a simply supported gantry girder to carry an electric overhead travelling crane for the following data :

Crane Capacity	= 320 kN
Weight of crane and crab	= 300 kN
Weight of crane	= 200 kN
Minimum approach of crane hook	= 1.20 m
Distance between C/C of wheels	= 3.20 m
Distance between C/C of gantries	= 16.0 m
Span of gantry girder	= 4.0 m
Weight of rail	= 300 N/m
Height of rail	= 75 mm

SECTION – D

8. Design a plate girder, 20 m span to be provided in a hall of a restaurant. The superimposed load, exclusive of self weight is 100 kN/m. Design the web splice at one-third of span and flange angle splice at one-fourth of span. 20