B.Tech. 5th Semester (F) Scheme

Examination, December–2018

DESIGN OF STEEL STRUCTURE-I

Paper– CE-301-F

Time allowed : 3 hours]   *[Maximum marks : 100*

Note : *Students have to attempt **five** questions in total at least **one** question from each section. All questions carry equal marks.*

Indian Standard Code (IS: 800: 1984/2007) and IS Handbook No. 1 (Steel Table) are allowed.

Section- A

1. Design a double cover butt joint to connect two plates each 12 mm thick. The load to be transferred by the joint is 400 KN. Also find the efficiency of the joint. Assume steel of yield stress 240 MPa.   20

2. A diagonal member of a roof carries a maximum axial pull of 350 KN. Design the section and the connection with a 14 mm gusset plate. The length on the gusset plate available for making the connection is 320 mm. Design the lug angle also if required. The steel is of yield stress of 250 N/mm².   20

Section- B

3. A discontinuous strut of 3 m length between the intersections consists of two angles 110 × 110 × 8 mm. The angles are placed back to back on the opposite side of the gusset plate and are tack riveted. Calculate the percentage change in the load carrying capacity if the two angles are placed on the same side of the gusset plate.   20

4. (a) Distinguish between the slab base and gusseted base and draw a neat sketch of sectional elevation of gusseted base indicating the salient features. 6

(b) A built up column of ISHB @ 674 N/m with 400 × 20 mm flange plates carries an axial load of 1800 KN. Design a suitable gusseted plate. Bearing strength of concrete is 0.45 fck. Assume M_{25} grade concrete and M_{20} bolts of grade 5.6. SBC of soil = 180 KN/m². 14

Section- C

5. (a) Distinguish between laterally restrained and unrestrained beam with the help of sketch. 5

(b) A roof of a hall measuring 5×12 m consists of 120 mm thick RCC slab supported on steel I-section spaced at 3.0 m c/c. Take live load 4.5 KN/m² and finishes 2.0 KN/m². Bearing of wall 400 mm. The beam is laterally restrained. Design one of the interior beam supporting the roof. Check for shear, moment capacity and deflection. 15

6. Design a simply supported gantry girder to be used in an industrial building for the following data: 20

Crane Capacity : 100 KN

Weight of crab : 35 KN

Weight of crane (excluding crab) : 160 KN

Minimum clearance between

Crane hook and gantry girder : 1.00 m

Wheel base : 3.00 m

Distance between c/c gantry column : 6.0 m

Distance between c/c of gantries : 20.0 m

Yield stress of steel : 250 MPa

Crane type : M.O.T.

Section- D

7. A plate girder has the following elements: 20

Top and Bottom plates: 480 × 28 mm each

Web Plate = 1600 × 8 mm

Design the horizontal stiffener.

8. Explain the following in detail: 20

(a) What is meant by curtailment of plates and how this is done in plate girder?

(b) What are longitudinal web stiffeners and how are they provided?

(c) When do we need shear buckling of the web?

(d) How the behavior of a plate girder affected by holes in the web?