

9. Design gantry girder in an industrial building for two moving cranes for the following data : 15

Span of gantry girder : 6m

Crane capacity : 200 kN

Distance b/w centers of gantry girder : 10m

Weight of crane girder : 120 kN

Weight of crab : 50 kN

Minimum approach of crane hook : 1.02m

Distance between centers of wheels : 3.8m

Height of rail sections : 80mm

Mass of rail section : 30 kg/m

3205-1550-(P-4)(Q-9)(22)

(4)

Roll No. _____

3205

B. Tech. (Civil Engg.) 5th Semester
Examination – February, 2022

DESIGN OF STEEL STRUCTURE

Paper : FCC-CE-309-G

Time : Three hours]

(Maximum Marks : 75

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 : Attempt five questions in all, selecting at least one question from each unit. Question no. 1 is compulsory. All questions carry equal marks. Use of IS 800-1984 or 2007 is allowed. Use of Steel Table is allowed. Assume suitable data.

1. Explain the following :

2.5 × 6 = 15

- Sketch different types of bolted connections.
- What is shear lag? Describe its effects.
- What do you mean by eccentrically loaded column?
- What is meant by slab base?
- How the laterally supported beam fails?
- Differentiate between web buckling & web crippling.

3205-1550-(P-4)(Q-9)(22)

P. T. O.

UNIT - I

2. (a) What are the composition and properties of structural steel? 7.5
- (b) What are the methods employed for the design of the steel framework? What are the assumptions made in simple design? 7.5
3. (a) Determine the safe load and the efficiency of a double cover butt joint. The main plates are 12 mm thick connected by 18 mm diameter rivets at a pitch of 100 mm. Design the cover plates also. What is the percentage reduction in the efficiency of the joint if the plates are lap jointed? 10
- (b) Explain the failures of bolted joints. 5

UNIT - II

4. Design a tension member to carry an axial factored load of 500 kN. Use a double angle rolled steel section connected (at site) to each side of a gusset plate of 10 mm thick using 20 mm diameter bolts of grade 4.6. 15
5. Design a built-up column consisting of two channels placed back to back to carry an axial factored load of 1900 kN. Design bolted single lacing system also. Length of the column is 10m and both the ends of the column are effectively restrained in direction and position. 15

3205-1550-(P-4)/(Q-9)/(22)

(2)

UNIT - III

6. An ISLB600/76.1N/m has been used as a simply supported beam over a span of 7.2m. Determine the safe uniform load that the beam can carry if because of the compression flange of the beam is overzoned against lateral buckling. 15
7. Design a gusseted base for a column ISIB 550 672.4 kg/m with flange plates 450 x 20 mm carrying a factored axial force of 3000 kN. The column rests on M20 grade concrete pedestal. Design the bolted connection also. Assume Fe 410 grade steel and 4.6 grade bolts. 15

UNIT - IV

8. A portal frame is shown in figure. Find the value of W at collapse. 15



3205-1550-(P-4)/(Q-9)/(22)

(3)

P. T. O.