Weight of each crane including crab = 260 kN

Minimum distance of crane hook = 1.1 m

Span of crane between rails = 20 m

Span of gantry girder = 7m

Wheel base = 3.4m

Bay width = 16m

Yield stress of steel = 250 N/mm^2 20

Section–D

8. Give reason for the following : 4×5=20

(a) What are the reasons behind splicing in plate girder ?

(b) Under what circumstances bearing stiffeners are used in plate girder ?

(c) How the flange area of a plate girder is designed ?

(d) What are the types of splices ?

9. Design a bearing stiffener for a welded plate girder with the following specifications.

Web = 1000 mm × 6mm thick.

Flanges = 2 Nos. of 350 × 20 mm plate on each side.

Support reaction = 350 kN.

Width of the support = 300 mm. 20

B.Tech. 5th Semester (Civil Engg.) Examination, December–2015

DESIGN OF STEEL STRUCTURE–I

Paper–CE–301–F

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

Note :

- ***Q. No. 1 is compulsory.*** *Each question carries equal mark (20 marks).*
- *Students have to attempt **five** questions in total at least **one** question from each section.*
- *Use of IS 800–1984 or 2007, IS 875–1987 is allowed.*
- *Use of Steel Table is allowed.*
- *Assume suitable data.*

1. Explain the following : 4×5=20

i. Define Lap joint and Butt Joint.

ii. What are the advantages of HSFG bolts ?

iii. What is a Lug angle ?

iv. What is the purpose for providing anchors bolt in base plate ?

v. How do you improve the shear resistance in plate girder ?

Section–A

2. (a) Two plates 12 mm and 10 mm thick are joined by a triple riveted lap joint, in which the pitch of the central row of rivets is 0.6 times the pitch of rivets in the outer rows. Design the joint and find its efficiency. Take σ_{at} = 150 N/mm^2 & σ_{pl} = 250 N/mm^2. 10

   (b) What are the methods employed for the design of the steel framework ? What are the assumptions made in simple design ? 10

3. (a) Define weld. Write about the advantages of welding. List the various types of welded joints. 10

   (b) Design a double angle tension member carrying axial tensile force of 300 kN in addition to this, it is also subjected to a uniformly distributed load of 0.4 kN/m throughout its length, including self weight. The centre to centre distance between the end connection is 2.7 m. 10

Section–B

4. (a) Design completely a built-up column composed of channel section placed back to back and carrying an axial load of 1500 kN. Its length is 6m and it is effectively held in position at both ends and restrained against rotation at one end. Take f_y = 250 N/mm^2. 15

   (b) Write about batten plates in compression member. 5

5. (a) Design a grillage foundation for a compound column consisting of ISHB 400@ 82.0 kg/m with flange plates 350 mm × 20 mm one on each flange, and carrying an load of 3000 kN. The base plate has size 800 mm × 900 mm. The grillage is supported on soil having bearing capacity of 200 kN/m^2. 15

   (b) What are the functions of providing column bases ? 5

Section–C

6. A beam of effective span of 12m carries a uniformly distributed load of 80 kN/m, inclusive of its own weight. Design the section if only 12 mm thick plates are available.

   Assume that the beam is laterally restrained at mid span, but each end is restrained against torsion. Use 20 mm dia. Power driven rivets. 20

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

   Crane capacity = 250 kN