

III B. Tech II Semester Supplementary Examinations, February-2022
DESIGN AND DRAWING OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: i) Answer any **ONE Question** from **Part – A** and any **THREE Questions** from **Part – B**
 ii) Use of IS 800: 2007, IS: 875 (Part III)- 1987, structural steel tables is to be permitted in the examination hall.

PART –A

(28 Marks)

1. Design a welded plate girder of 20 m span to support a uniformly distributed live load of 75 kN/m over the span using the following data: [28M]
 - Effective span of the girder = 20 m.
 - Distributed live load = 50 kN/m
 - Yield stress of steel = 250 MPa
 - Top flange restrained laterally
 Design the cross sectional details of the plate girder to conform to the specifications of IS: 800: 2007. Sketch the details of the plate girder.

(OR)

2. Design a tubular steel truss to suit the following data: [28M]
 - Span of truss = 16 m.
 - Type of truss = fink truss
 - Roof cover = GC sheeting
 - Spacing of roof trusses = 4.5 m
 - Wind pressure = 1.0 kN/m².
 Draw the elevation of the roof truss.

PART –B

(42 Marks)

3. a) A tie member of a truss consists of double angle section of dimensions 80 mm × 80 mm × 8 mm welded on the opposite side of a 12 mm thick gusset plate. Design a fillet weld to make the joint. Axial tension in the member is 200 kN. [8 M]
- b) Explain about the design concept of riveted joint in shells. [6 M]
4. Design a laterally unsupported I beam with simply supported ends of effective span 6 m subjected to the working load of 40 kN/m. Assume that full torsional and warping restraints are provided at the supports and the load acts on the upper flange which will have destabilizing effect. [14M]
5. a) Design a single angle to carry a tension of 100 kN. The end connection is to be done using fillet welds. The yield and ultimate strengths of the steel are 250 MPa and 410 MPa, respectively. [8 M]
- b) Design a suitable slab base for a column section ISHB 200 @ 365.9 N/m supporting an axial load of 400 kN. The base plate is to rest on a concrete pedestal of M15 grade concrete. [6 M]



6. A column ISHB 300 @ 576.8 N/m is to support a load of 600 kN. The column section is to be spliced at a height of 2.5 m. Design the splice plate. Assume $f_y = 250$ MPa. [14M]
7. Design a simply supported gantry girder of effective span 6 m to carry a crane capacity of 100 kN. The weight of the crane excluding the crab is 150 kN and the weight of the crab is 20 kN. The weight of the rail is 300 N/m. The minimum approach of the crane hook is 1.0 m. The wheel base is 3 m. The centre to centre distance between the gantry girders is 18 m. The height of the rail is 75 mm. Assume that the gantry girder is laterally unsupported. [14M]

