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10CV82

Eighth Semester B.E. Degree Examination, Aug./Sept.2020

Design and Drawing of Steel Structures

Time: 4 hrs.

Max. Marks:100

- Note:** 1. Answer ONE full question from each part.
2. Use of IS 800-2007 and steel tables permitted.
3. Missing data if any may be suitably assumed.

PART – A

- 1 a. Draw seated connection between a beam ISMB 300 and column ISHB 200@37.3 kg/m. The beam is connected to the column flange by seat angle ISA 150 × 75 × 12. The longer leg (150 mm) of the seat angle is connected to the column flange by 4 Nos – M20 of grade 4.6 bolts in two rows. The clip angle consists of ISA:60 × 60 × 6 connected to the column flange and beam flange by 4 Nos – M16 of grade 4.6 grade bolts. (2 for column flange and 2 for beam flange). Draw the side view and front view to suitable scale. (15 Marks)
- b. A secondary beam ISLB-400 is connected to the web of main beam ISMB-500 on one side of the main beam by bolted framed connection. The top flange of both beams are maintained at the same level. Two frame angles of ISA 100 × 100 × 10 of required length are used for connection. Each frame angle is connected to web of secondary beam through 4 bolts of 20 mm diameter and to the web of main beam through 4 bolts of 18 mm diameter.
Draw:
(i) Elevation of main beam through section of main beam
(ii) Elevation of secondary beam through section of secondary beam. (15 Marks)
- 2 a. A gusseted base is to be detailed for column ISHB 450 @ 872 N/m is built-up with one cover plate of section 300 × 12 mm on each side of flange of column. The size of base plate of section 600 × 800 × 20 mm, the gusset angles of ISA 150 × 150 × 10 mm are provided on each side of column flange. The gusset plates are 10 mm thick. One plate on each side is provided with 12 numbers of 18 mm diameter bolts in two vertical rows connecting column flanges, cover plate, gusset plate and gusset angles. Similarly 12 numbers of bolts of 18 mm diameter are provided in two horizontal rows connecting column flanges, cover plate, gusset plate and gusset angle. Totally there are 20 numbers of bolts on each flange of column with 4 numbers of bolts common to horizontal and vertical rows of bolts four numbers of anchor bolts of 20 mm diameter are provided to anchor the column to pedestal.
Draw to suitable scale:
(i) Plan
(ii) Elevation. (15 Marks)
- b. A built-up column made up of 2 ISMC 350 @ 42 W/m are placed back to back at a distance of 200 mm between webs. These components are connected by battons of 60 ISF 10 mm (ISF 60 mm width and 10 mm thickness) placed 300 mm c/c connected to flanges of ISMC. Length of each batton is 340 mm. 6 mm fillet weld for a length of 200 mm is used to connect the batton at each end.
Draw to suitable scale:
(i) Plan
(ii) Front elevation

(15 Marks)

PART – B

- 3 Design a welded plate girder for an effective span of 18 metres. Imposed load on girder consists of udl of 60 kN/m and two point loads of 400 kN each placed at a distance of 4 m from each support. The design must include design for bending, shear, end bearing, stiffeners, intermediate stiffener and all welded connections.

Draw to suitable scale:

- (i) Elevation of plate girder greater than half span
- (ii) Cross-section at midspan and at support

(70 Marks)

- 4 Design a girder to an industrial shed to support an electric overhead travelling crane using the following data:

Crane capacity = 200 kN

Weight of crab (trolley) = 40 kN

Weight of crane girder (excluding trolley) = 200 kN

Span of crane girder = 15 m

Min. approach for crane hook = 1.2 m

Wheel base = 3.5 m

Span of gantry girder = 7.5 m

Weight of rail section = 0.3 kN/m

Draw to suitable scale:

- (i) C/Section of gantry girder
- (ii) Front view of gantry girder (elevation)
- (iii) Plan view

(70 Marks)
