



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Eighth Semester, B.E. - Civil Engineering

Semester End Examination; June/July - 2015

Design and Drawing of Steel Structures

Time: 4 hrs

Max. Marks: 100

Note: Answer ONE full question from PART - A, ONE full question from PART - B.

PART - A

1. a. A secondary beam ISLB 400 @ 0.569 kN/m is connected to the web of main beam ISMB 500 @ 0.869 kN/m by bolted framed connection. The top flange of both beams are kept at same level. Two framing angles of ISA 100 x 100 x 10 mm of required length are used for connection. 4 Nos. M20, 4.6 grade bolts are used for connecting web of secondary beam to framing angle, 3 Nos. M20, 4.6 grade bolts are used for connecting web of main beam to the leg of each framing angles. Provide minimum edge distance and min. pitch. Draw to a suitable scale. 14
 - i) Front view
 - ii) Side view
- b. A secondary beam ISMB 500 @ 0.869 kN/m is connected to flange a column ISHB 250 @ 0.51 kN/m by unstiffened seated connection. Provide 9mm fillet weld to connect seat angle ISA 150 x 115 x 12 mm to the column and beam. Top clip angle ISA 100 x 100 x 6 mm is used at the top & 6mm fillet weld is applied to the toes. Draw to a suitable scale. 16
 - i) Elevation
 - ii) side view
- 2 a. A column splice connection is made for a column ISHB 300 @ 0.577 kN/m. The size of splice plate is 420 x 250 x 10 mm. 3 Nos. M20, 4.6 grade bolts are provided at a pitch of 70mm and edge distance of 35 mm on each side of the joint to connect flanges and splice plate. Draw to a suitable scale. 12
 - i) sectional Elevation
 - ii) side view
- b. A column ISHB 250 @ 54.7 kg/m with 25 mm thick cover plates is supported by gusseted base. Dimension of base plate is 1050 x 600 x 28 mm thick with 1050 mm edge placed parallel to the column flange. Gusset plate is 16 mm thick and its width tapers from 1050 mm at bottom to flange width and its width tapers from 1050 mm at bottom to flange width of column at top. Gusset angle consists of 2 Nos. ISA 150 x 115 x 15 mm with 150 mm leg connected to gusset plate. Connection between each face of column flange and gusset plate consists of 16 Nos. M20 black bolts in two vertical rows @ pitch of 60 mm and edge distance of 50 mm. Same number of bolts shall be provided to connect the gusset angle to the gusset plate in two plates in two horizontal rows at a pitch of 110 mm and edge distance of 70 mm. 18

Provide two web cleat angles of ISA 100 x 100 x 8 mm connected by 2 Nos. M 20 black bolts for each leg. Nominal bolts shall be provided in the sides for connecting gusset plate and gusset angle 4 Nos. anchor bolts are also provided at each corner. Draw to a suitable scale.

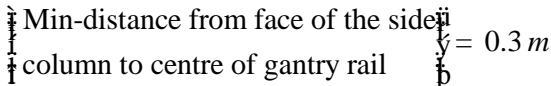
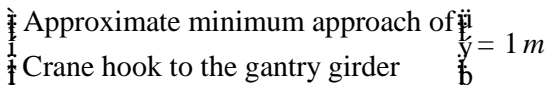
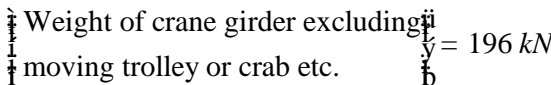
- i) Elevation ii) plan iii) side view.

PART – B

3. Design a welded plate girder for an effective span of 30m carrying a UDL of 28 kN/m and two concentrated loads of 150 kN each acting at 10 m from both ends. The girder is simply supported at ends. It is fully restrained at both ends against lateral buckling throughout the span. Also design end bearing stiffeners, load bearing stiffeners, intermediate stiffeners splice plate and their connections. Draw to a suitable scale. 35

- i) half elevation 15
- ii) C/S at support and midspan 10
- iii) half sectional plan. 10

4. Design a suitable section for a simply supported bolted gantry girder to be used in a mill building to carry an electric travelling crane with the following data.

- i) Span of the gantry girder = 8 m
- ii) Span of the crane girder = 15 m
- iii) Crane capacity = 157 kN 35
- iv)  ȳ = 0.3 m
- v)  ȳ = 1 m
- vi) Wheel base distance = 3 m
- vii)  ȳ = 196 kN
- viii) Weight of trolley, electric motor, hooks, crab etc. = 59 kN

Draw to a suitable scale.

- i) Cross section 15
- ii) Cross section showing connection details. 10
- iii) C/S with half crane girder and column section. 10

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