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10CV82

Eighth Semester B.E. Degree Examination, June/July 2018
Design and Drawing of Steel Structures

Time: 4 hrs. Max. Marks:100

Note: ***1. Answer any ONE full question from each part.***
2. Use of IS-800-2007 and Steel table are permitted.

PART – A

1 a. A secondary beam ISMB 300@44.2 kg/m is to be connected to the main beam ISMB 400@61.6 kg/m, two angles ISA 100 × 100 × 6 mm are used to connect the webs of beams. Three bolts of 20 mm diameter are used to connect angles to web of secondary beam. Six bolts of 20 mm diameter are used to connect to angles to the web of main beam. The top flanges of both beams are at the same level.
Draw to a suitable scale
(i) Sectional elevation
(ii) Side view showing all details. **(15 Marks)**

b. An un-stiffened seated connection for beam ISLB 500@75 kg/m to the flange of a column ISHB 400@82.2 kg/m is done using 2 rows of 2-16mm diameter bolts with an angle ISA 110×110×10 mm. Top cleat angle is ISA 100×100×8 mm with 2-16 mm diameter bolts on each leg. Draw to suitable scale
(i) Front view
(ii) Side view. **(15 Marks)**

2 a. An upper storey column ISHB 300@ 577 N/m is to be spliced with a lower storey column ISHB 400@ 758.5 N/m. The two columns are coaxial. Provide 50 mm thick bearing plate and 6 mm thick flange splice plate. Use 10 bolts of 20 mm diameter on each side of the joint in two lines of 5 bolts each for connecting flanges of the columns to flange splice plate.
Draw to a suitable case
(i) Sectional elevation
(ii) Side view with details. **(15 Marks)**

b. Draw to a suitable scale sectional plan, front elevation and side view of a column with slab base using following data :
Column → ISHB 350 @ 710.2 N/m
Base plate → 650mm × 500mm × 35mm
Cleat angle → ISA 130 × 130 × 8 mm of length 500 mm
Concrete pedestal → 1.20m × 1.00m × 0.70m
Anchor bolts → 4 – 16 mm diameter
4 – 20 mm diameter bolts on each side of flange to connect cleat angles to the column and same number of counter sunk bolts to connect angles to the base plate.
Web cleat angle → ISA 75 × 75 × 8 mm with 4mm weld all around. **(15 Marks)**

PART – B

3 Design a simply supported gantry girder to support an electrically operated crane, for the following data:

i) Span of crane girder = 25 m
ii) Span of gantry girder = 8 m
iii) Capacity of crane = 200 kN
iv) Self weight of crane = 150 kN [Excluding crab]
v) Weight of crab = 75 kN
vi) Wheel base distance = 3.5 m
vii) Minimum hook approach = 1.00 m
viii) Self weight of rail = 0.30 kN/m
ix) Height of rail = 75 mm **(40 Marks)**

Draw to suitable scale

a. The c/s of gantry girder and its attachment to supporting column of the bracket
b. Plan details
c. Side elevation **(30 Marks)**

4 The centre line of a roof truss is as shown in the Fig.Q4. The magnitude and nature of forces under service conditions are

Top chord members → 120 kN compression
Bottom tie members → 100 kN Tension
Interior members → 60 kN Tension and 50 kN compression.

For all the interior members use similar single angle section. Design the members using 16 mm diameter of grade 4.6. Also design a bearing plate and anchor bolts, four in numbers for pull of 60 kN to connect the truss to an RCC column 300 × 300mm of M20 grade concrete. **(40 Marks)**

Draw to a suitable scale:
(i) Elevation of truss greater than half space (ii) Elevation of joint 'C' (iii) Elevation of support 'A'. **(30 Marks)**

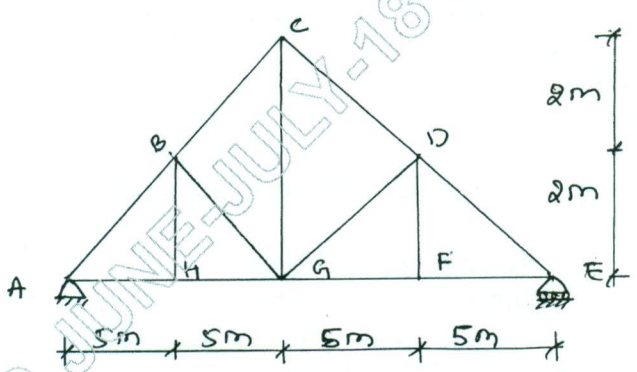

Fig.Q4

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