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10CV82

Eighth Semester B.E. Degree Examination, Jan./Feb. 2021
Design and Drawing of Steel Structures

Time: 4 hrs. Max. Marks:100

Note:1. ***Answer any ONE question each from PART – A and PART - B.***
2. ***Use of IS 800-2007, steel tables and SP6(1) are permitted.***

PART – A

1 a. A cross beam ISLB 350 @ 485.6 N/m is connected to a main beam ISMB 500 @ 852.5 N/m, top of the flanges are at the same level. The framed connection has the following details :
i) Connecting cleat angles 2 ISA 150 × 115 × 10 @ 200 N/m.
ii) The connection between the cleat angle of length 115mm and web of the cross – section is connected by 5mm fillet weld. Depth of weld is 180mm.
iii) The connection between the cleat angle of length 150mm and web of the main beam is connected by 8mm fillet weld. Depth of weld is 250 mm.
iv) Clearance between cross beam and web of the main beam is 06mm.
Draw to a suitable scale i) Front view and ii) Side view. **(14 Marks)**

b. Draw to a suitable scale beam to column stiffened seat connections.
i) Front view showing C/s of beam.
ii) Side view showing elevation of beam for the following details :
Column - ISHB 400 @ 806.4 N/m.
Beam - ISMB 400 @ 604.3 N/m
Seat angle – ISA 100 × 100 × 10mm
Cleat angle – ISA 90 × 90 × 8mm.
Pair of stiffeners – 2, ISA 90 × 90 × 8 , 6 – 20mm bolts for stiffeners to column in two rows, two – 20mm bolts for remaining connection. **(16 Marks)**

2 a. A column splice is provided between upper storey column ISHB 200 @ 366 N/m and lower storey column ISHB 250 @ 500 N/m. The columns are co – axial. At the junction between face of columns, a base plate of 40mm thickness is provided. Four numbers of web cleat angles ISA 100 × 100 × 8mm are used to connect web of column with base plate using 2 bolts along each leg of angles. Flange splice plate of 10mm thick is provided with suitable filler plate. 6 bolts are provided in 2 vertical rows at each flange of column for connection. Two extra bolts are provided at each face up upper column due to filler plate. All bolts are 20mm black bolts. Adopt pitch of 50mm and 35mm edge distance for bolts.
Draw to a suitable scale : i) Elevation of column splice ii) Side view. **(15 Marks)**

b. Two channels ISMC 400 @ 494 N/m placed back to back with a spacing 250mm. The channels are supported on a slab base having 700 × 700 × 70mm size. The side angles are 100 × 100 × 8mm of 450mm length and are connected by suitable bolts of size 20mm. Base plate is connected to concrete pedestal 2.2 × 2.2 × 1.0m size using 4 anchor bolts of diameter 20mm having 300mm length.
Use web cleat angles to the channels – 75 × 75 × 8 mm with 5mm weld all around.
Draw to a suitable scale the following :
i) Sectional Elevation.
ii) Plan of slab base with all details. **(15 Marks)**

PART – B

3 The fink roof truss for an industrial building has the following details (Fig. Q3).
Span = 10m , Rise = 2.5m , Bearing = 300mm , Slope $\theta = 26.6^0$.
Panel width AD = DE = EF = FC = 1.4m.

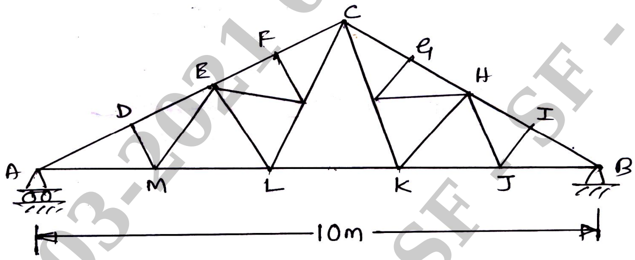

Fig. Q3

Design the members of the joint C and A completely. Also, design the sliding base at A consisting of shoe angles, base plate and bearing plate. The forces under service condition are
Reaction at A = 20 KN
Force in CF = CG = 36 KN. Compression and 22 KN tension.
Force in CN = CO = 20 KN. Compression and 15 KN tension.
Force in AD = 67 KN (Compression).
Force in AM = 60 KN (Tension).
Use suitable diameter bolts for all connections. Also, design the anchor bolts for a pull of 20KN.
Draw to a suitable scale. **(40 Marks)**

a. The Elevation of roof truss greater than half span.
b. Elevation of joint C to a larger scale.
c. Elevation and plan details of sliding joint at A. **(30 Marks)**

4 A simply supported welded plate girder for an effective span of 30m and a udℓ of 30 KN/m and two concentrated load of 150KN each acting at 10m from both ends. It is fully restrained against lateral buckling throughout the span. Design the central section using thin web with K = 100 and end bearing stiffener.
Also design the welded connection between flange and web. Take $f_y = 250$ MPa , $f_u = 415$ MPa and ultimate stress of weld = 410 MPa. Also design curtailment of plate. **(40 Marks)**

Draw to a suitable scale :

a. Elevation for full span with discontinuous line. **(10 Marks)**
b. C/s at support and mid span. **(10 Marks)**
c. Plan for full span with discontinuous line. **(10 Marks)**

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