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10CV82

Eighth Semester B.E. Degree Examination, June/July 2016
Design & Drawing of Steel Structures

Time: 4 hrs. Max. Marks:100

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

PART – A

1 a. A cross beam ISLB-350 @ 495 N/m is connected to a main beam ISMB-500 @ 869 N/m. The top of the flanges are at same level. The framed connection has the following details:
i) Frame angle – 2 ISA 150×115×10 @ 200 N/m.
ii) The connection between the cleat angle leg of 115 mm and web of the cross beam is 5 mm fillet weld of length 250 mm.
iii) The connection between the cleat angle leg of 150 mm and web of the main beam is 8 mm fillet weld of length 250 mm.
iv) The clearance between cross beam and web of main beam is 10 mm.
Draw to a suitable scale:
- Front view and
- Side view with all details. **(15 Marks)**

b. The design stiffened seated connection has the following details:
i) ISHB-300@630 N/m transmits an end reaction of 80 kN to the flange of column section ISHB-250 @ 547 N/m.
ii) Seat angle ISA 100×75×8 mm at 105 N/m, 100 mm along horizontal.
iii) Stiffening angle 2ISA 90×90×8 mm at 108 N/m.
iv) Cleat angle at top ISA 75×75×8 mm at 89 N/m. Connect 2 – 18 mm dia in each leg.
v) Bolts connecting the stiffening angle with the column flange are 8 – 20 mm dia. HSFG bolts at a pitch of 60 mm C/C, 4 bolts in each row.
vi) Stiffening angle are tack bolted.
Use 2 – 18 mm dia bolts.
Draw to a suitable scale:
- Front elevation
- Side view. **(15 Marks)**

2 a. A built up column is composed of 2ISLC-350@388 N/m placed back to back at clear distance of 220 mm. The column is provided with single lacing system consisting of 60 ISF12 mm at 45° and is connected by a 20 mm dia bolt at each end. The channels are supported over a slab base 600×450×50 mm. The angles connecting column and base plate is ISA 100×100×10 mm and are connected by 2-20 mm dia on each leg. Draw to a suitable scale:
i) Sectional elevation. ii) Plan of slab base assembly with all details. **(15 Marks)**

b. Draw to a suitable scale the elevation and plan of the column splice having the following details:
i) Bottom column : ISHB – 300 @ 630 N/m ii) Top column : ISHB – 200 @ 400 N/m
iii) Splice plate : 8 mm thick iv) Bearing plate : 50 mm
v) Use 8 – 20 mm dia on each side of the joint in two rows of 4 bolts each for connecting flanges of the columns to flange splice plate.
Draw to a suitable scale :
- Sectional elevation
- Side view with details. **(15 Marks)**

PART – B

3 A simply supported welded plate girder for an effective span of 30 m and a udl of 30 kN/m and two concentrated load of 150 kN each acting at 10 m 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 stiffner. Also design the welded connection between flange and web. Take fy = 250 MPa, fu = 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 midspan. **(10 Marks)**

c. Plan for full span with discontinuous line. **(10 Marks)**

4 Design a simply supported crane girder for the following data. The girder is electrically operated. Take yield stress of steel is 250 N/mm^2. Use 16 mm dia. Bolts of grade 4.6.

i) Capacity of crane : 250 kN
ii) Weight of crab (Trolley) : 80 kN.
iii) Weight of crane girder excluding trolley : 300 kN
iv) Span of the crane girder = 18 m.
v) Minimum hook approach = 1.0 m
vi) Wheel base = 3.0 m
vii) Span of gantry girder = 6 m
viii) Weight of rail section = 0.25 kN/m
ix) Take f_y = 250 MPa. **(40 Marks)**

Draw to a suitable scale showing all details:

a. Plan of G.G. **(05 Marks)**

b. Front view **(10 Marks)**

c. Cross section of Gantry Girder. **(15 Marks)**

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