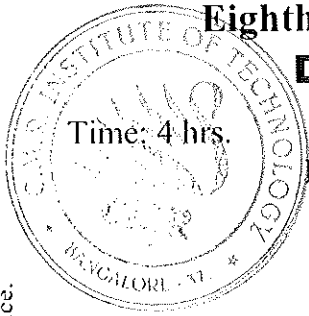


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**Eighth Semester B.E. Degree Examination, June/July 2016**  
**Design & Drawing of Steel Structures**

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:
- Frame angle – 2 ISA 150×115×10 @ 200 N/m.
  - 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.
  - 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.
  - 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:
- ISHB-300@630 N/m transmits an end reaction of 80 kN to the flange of column section ISHB-250 @ 547 N/m.
  - Seat angle ISA 100×75×8 mm at 105 N/m, 100 mm along horizontal.
  - Stiffening angle 2ISA 90×90×8 mm at 108 N/m.
  - Cleat angle at top ISA 75×75×8 mm at 89 N/m. Connect 2 – 18 mm dia in each leg.
  - 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.
  - 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:
- 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:
- Bottom column : ISHB – 300 @ 630 N/m      ii) Top column : ISHB – 200 @ 400 N/m
  - Splice plate : 8 mm thick      iv) Bearing plate : 50 mm
  - 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 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:
- Elevation for full span with discontinuous line. (10 Marks)
  - C/S at support and midspan. (10 Marks)
  - 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  $250 \text{ N/mm}^2$ . Use 16 mm dia. Bolts of grade 4.6.
- Capacity of crane : 250 kN
  - Weight of crab (Trolley) : 80 kN.
  - Weight of crane girder excluding trolley : 300 kN
  - Span of the crane girder = 18 m.
  - Minimum hook approach = 1.0 m
  - Wheel base = 3.0 m
  - Span of gantry girder = 6 m
  - Weight of rail section = 0.25 kN/m
  - Take  $f_y = 250$  MPa. (40 Marks)
- Draw to a suitable scale showing all details:
- Plan of G.G. (05 Marks)
  - Front view (10 Marks)
  - Cross section of Gantry Girder. (15 Marks)

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