Code: CE6T2

III B.Tech - II Semester – Regular/Supplementary Examinations AUGUST 2021

DESIGN AND DRAWING OF STEEL STRUCTURES
(CIVIL ENGINEERING)

Use of IS 800-2007 & IS: 875 and Steel Tables are allowed

Duration: 3 hours   Max. Marks: 70

PART – A

Answer any **ONE** question.   1 x 28 = 28 M

1. Design a column having an effective length of 6 m and subjected to a factored axial load of 2400 kN. Provide the channels back to back connected by welded battens. Assume Fe410 grade steel. Also draw the detailing of the sections.
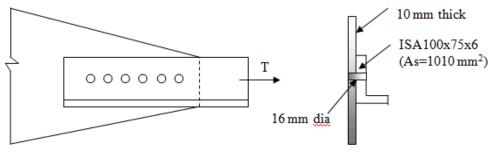
OR

2. Design a simply supported beam of 7 m span carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The total UDL is made up of 30 kN/m dead load including self weight plus 15 kN/m imposed load. In addition, the beam carries a point load at mid span made up of 50 kN dead load and 50 kN imposed load (assuming a stiff bearing length of 75 mm). Also check for deflection, web buckling at support, web bearing. Also draw the detailing of sections.

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 14 = 42 M

3. Design a connection to joint two plates of size 250 x 12 mm of grade Fe410, to mobilize full plate tensile strength using shop fillet welds, if (i) a lap joint is used, and (ii) a double cover butt joint is used.

4. A single unequal angle 100 x 75 x 6 mm is connected to a 10 mm thick gusset plate at the ends with six 16 mm diameter bolts to transfer tension as shown in figure. Determine the design tensile strength of the angle assuming that the yield and the ultimate stress of steel used are 250 MPa and 410 MPa: (i) if the gusset plate is connected to the 100 mm leg, and (ii) if the gusset plate is connected to the 75 mm leg. Take edge distance and pitch as 40 mm.

5. Design a simply supported beam of span 3 m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The uniformly distributed load is made up of 15 kN/m imposed load and 10 kN/m dead load (section is stiff against bearing). Assume Fe410 grade steel.

6. Design a slab base for a column of 300 @ 577 N/m carrying an axial load of 2000 kN. M40 grade of concrete is used for the foundation. Provide welded connection between column and base plate.

7. A deck bridge simply supported of an effective span of 16 m is subjected to an udl of 18 kN/m and two concentrated loads of 180 kN each spaced at 2 m apart. The top flange can be assumed to be laterally supported. Design and connect flange angles and end bearing stiffener and also curtailment of flanges.