Hall Ticket No | | | | | | | | | | |

Question Paper Code: ACEC23

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal-500043, Hyderabad

B.Tech VI SEMESTER END EXAMINATIONS (REGULAR) - JULY 2023
Regulation: UG-20
STEEL STRUCTURES DESIGN AND DRAWING

Time: 3 Hours **(CIVIL ENGINEERING)** **Max Marks: 70**

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Discuss the sectional classification and properties of structural steel. Draw the stress-strain curve for structural steel and explain the salient features. [BL: Understand| CO: 1|Marks: 7]

   (b) Design a lap joint between the two plates each of width 120mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 160kN. The plates are of Fe 410 grade. Use bearing type of bolts. [BL: Apply| CO: 1|Marks: 7]

MODULE – II

2. (a) Discuss about slenderness ratio and list out the maximum values of effective slenderness ratio for various members as per IS recommendations. [BL: Understand| CO: 2|Marks: 7]

   (b) A column 4 m long has to support a factored load of 6000 kN. The column is effectively held at both ends and restrained in direction at one of the ends. Design the column using beam sections and plates. [BL: Apply| CO: 2|Marks: 7]

MODULE – III

3. (a) Write short notes on the design of laterally supported beam. Distinguish between web buckling and web crippling. [BL: Understand| CO: 3|Marks: 7]

   (b) Design a simple supported beam of effective span 1.5 m carrying a factored concentrated load of 360 kN at mid span. [BL: Apply| CO: 3|Marks: 7]

4. (a) Classify the types of cross section as per IS 800. Mention the difference between slab base and gusseted base for steel columns. [BL: Understand| CO: 4|Marks: 7]

   (b) Design an angle purlin for the following data.
   Spacing of truss = 3.5 m
   Spacing of purlins = 1.6 m
   Weight of AC sheets including laps and fixtures = $0.205 kN/m^2$
   Live load = $0.6 kN/m^2$
   Wind load = $1 kN/m^2$, suction
   Inclination of main rafter of truss = $21°$ [BL: Apply| CO: 4|Marks: 7]

MODULE – IV

5. (a) Illustrate various components of roof truss with neat sketch. Mention the various loads acting on roof truss. [BL: Understand| CO: 5|Marks: 7]

   (b) A bracket is bolted to the flange of the column as shown in Figure 1 using 8 mm thick bracket plate. Use M20 bolt of grade 4.6. Design the connection. [BL: Apply| CO: 5|Marks: 7]

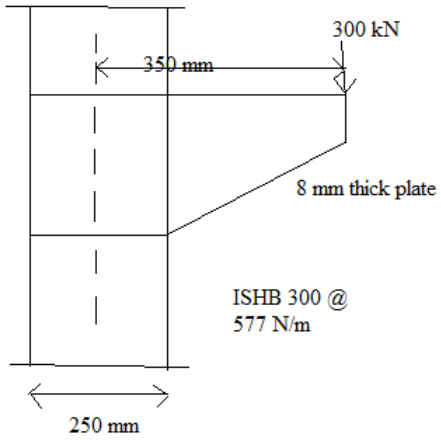

Figure 1

6. (a) Construct the typical sketch to show the following beam column connection: i) stiffened seated connection ii) unstiffened seated connection. [BL: Understand| CO: 5|Marks: 7]

   (b) Design a stiffened seat connection for an ISMB 300@ 514 N/m transmitting an end reaction of 300kN (due to factored loads) to a column section ISHB 250 @ 576.8N/m. The steel is of grade Fe 410 and bolts of grade 4.6. [BL: Apply| CO: 5|Marks: 7]

MODULE – V

7. (a) Explain the step by step procedure for design of stiffeners in a plate girder. Why are intermediate stiffeners required for plate girders? [BL: Understand| CO: 6|Marks: 7]

   (b) Design the plate girder of span 20 m to carry a super imposed load of 30 kN/m. Avoid use of bearing stiffeners. [BL: Apply| CO: 6|Marks: 7]

8. (a) Obtain expression for the optimum depth of a plate girder. Draw plate girder and mention its components. [BL: Understand| CO: 6|Marks: 7]

   (b) Design the plate girder of span 24 m to carry a super imposed load of 35 kN/m using thin web and end stiffener and avoid intermediate stiffener. [BL: Apply| CO: 6|Marks: 7]