

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2022**

STRUCTURAL DESIGN – II

(Note: Use of IS 800-2007, IS-875, IS1905 and Steel Table are permitted)

[Maximum Marks: **100**]

[Time: **3 Hours**]

PART-A

[Maximum Marks: **10**]

I. (Answer **all** questions in one or two sentences. Each question carries **2** marks)

1. Define Effective length of weld.
2. Define Tie members.
3. Write two types of plate girders.
4. Define Roof Truss.
5. What is Slenderness ratio of masonry wall? (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

II. (Answer **any five** of the following questions. Each question carries **6** marks)

1. What are the advantages and disadvantages of steel structures?
2. State different types of welds and welded joints?
3. What are the factors effecting strength of tension member?
4. Write any four codal provision of lacing system?
5. What are the component parts of Plate girder?
6. Explain how wind load on a roof truss is determined?
7. Write the codal provision of effective thickness of wall used for calculating the slenderness ratio. (5 x 6 = 30)

PART-C

[Maximum Marks: **60**]

(Answer **one** full question from each Unit. Each full question carries **15** marks)

UNIT – I

- III. (a) Distinguish between bolted joints and welded joints? (7)
- (b) An angle ISA 150 x 115 x 10mm carrying an axial tension of 500kN is to be connected to a gusset plate of 10mm thick. Design the joint with ultimate shear stress of 410N/mm^2 . (8)

OR

- IV. (a) Write the physical and mechanical properties of steel structures? (7)
- (b) A tie member consists of an ISA100x75x10mm thick by using field weld on both side of angle, design the fillet weld joint with permissible stresses and ultimate shear stress are 150Mpa and 410Mpa? (8)

UNIT – II

- V. (a) What are the modes of failure in tension members? (6)
- (b) A single un equal angle ISA 90x60x6 mm is connected to a gusset plate of 10mm thick With 5 number of bolts of 18mm diameter, determine the design strength $e = 30\text{mm}$, $p=50\text{mm}$, $g=50\text{mm}$ and $f_y = 250 \text{ Mpa}$? (9)

OR

- VI. (a) Write the behaviour of compression members? (6)
- (b) Design a steel column using a single rolled I section to carry an axial load of 1000 KN. The column has an effective length of 6m with respect to z axis, 4m with respect to y axis, use f_e 410 grade steel, assume design compressive stress as $0.6 f_y$. (9)

UNIT- III

- VII. (a) An ISLB600@ 995N/m carrying an live load of 20kN/m excluding self weight over an effective span of 4.5m, the yield stress is 250N/m^2 . Check the safety of the beam in deflection? (5)
- (b) Design a rolled steel beam using I section for simply supported beam of span 6m carries a UDL of 18kN/m excluding self weight. The compression flange of beam is laterally restrained Take $f_y = 250\text{Mpa}$? (10)

OR

- VIII. (a) Define Girder and Spandrels. (5)
- (b) The Rolled steel beams are provided in a hall at 3.0m centre to centre on an effective span of 5m, over the beam a RCC slab of 100mm thick, the live load on the slab is 2kN/m^2 and floor finish is 1kN/m^2 . If the compression flange of the beam is laterally Restrained Take f_y 250N/mm². (10)

UNIT - IV

- IX. (a) What are the loads on roof truss? (5)
- (b) Determine the design loads on roof truss for a factory building for a span 20m, and pitch of 1/5 the height of truss at eaves level is 10m, the spacing of truss is 4.5m, the factory building is 36m long is located at Madhya Pradesh, provide AC Sheeting? (10)

OR

- X. (a) A masonry wall 230mm thick carries an axial load of 50kN and an eccentric load of 30kN at an eccentricity of 30mm from the centre of the wall Determine the stress in the masonry at the plane of loading? (5)
- (b) Explain the terms:
- | | |
|------------------------------|--------------------------------|
| 1. Effective length of wall | 2. Effective height of wall |
| 3. Slenderness ratio of wall | 4. Effective thickness of wall |
- (10)
