C16-C–501

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BOARD DIPLOMA EXAMINATION, (C-16)

MAY/JUNE—2023

DCE - FIFTH SEMESTER EXAMINATION

STEEL STRUCTURES

Time : 3 Hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Use of IS : 800-2007 and steel tables are permitted.

(4) Assume any suitable data, if necessary.

1. What are the advantages of steel structures?

2. What are the different types of welded joints?

3. Sketch the cross section of fillet weld and butt weld.

4. State the different modes of failures of tension members.

5. Define the terms *(a)* radius of gyration and *(b)* slenderness ratio.

6. Define battening and mention any two specifications of battening.

7. Differentiate between laterally restrained beam and unrestrained beam.

8. Define the terms *(a)* web buckling and *(b)* web crippling.

9. What are the different types of loads to be considered in the design of roof truss?

10. Distinguish between plane truss and space truss.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. An angle ISA 200 mm × 150 mm × 10 mm is carrying an axial tension of 500 kN is to be connected to a gusset plate through its longer leg using side and end fillet welds. Design the joint if the ultimate shear stress in the weld is 330 MPa. Assume connections are made in the workshop.

12. Determine the design strength of a tensile member ISA : 100 × 65 × 10 mm is connected to gusset plate of 12 mm thick with its longer leg by 6 mm size fillet weld. The effective length of the weld is 250 mm. Take f_y = 250 MPa and f_u = 410 MPa.

13. Determine the design compressive strength of single ISHB 400 at 806 N/m, when it is used as a column of 5 m height with both of its ends restrained against triangulation and rotation. The field stress of steel used is 340 MPa.

14. Design a single angle strut connected to the gusset plate to carry 180 kN factored load. The length of the strut between centre to centre of intersection is 3 m. Take yield stress of steel is 250 MPa. Use fillet welds.

15. Design a slab base for a column ISHB 350 @ 724 N/m carrying an Axial load of 1200 kN. Use M20 grade concrete for foundation. f_y = 250 N/mm^2, also, design the concrete pedestal if SBC of soil is 180 kN/m^2. Design of welded joint may be ignored.

16. Design a simply supported beam of span 5 m carrying RCC floor capable of providing lateral restrained to the top compression flange. The UDL is made up of 20 kN/m imposed load and 15 kN/m dead load, assume Fe 410 grade steel.

17. Define shape factor and determine the shape factor of a symmetrical I-section with flange dimensions 250 mm × 15 mm and web dimensions 12 mm × 275 mm.

18. The span and rise of a steel roof truss are 16 m and 4 m respectively. The sloping length of one truss is divided into 4 equal parts on each side. The spacing of trusses is 3.5 m. AC sheets are used as roof material. The basic wind pressure for that location is 1500 N/m^2. Assuming large openings on one side of the building and wind blowing normal to ridge from the closed side. Calculate the dead load, live load and wind loads on panel points of windward and leeward sides with the following data :

Unit weight of AC sheet roofing	200 N/m^2 of plan area
Unit weight of purlin	100 N/m^2 of plan area
Unit weight of bracing	20 N/m^2 of plan area

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