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BOARD DIPLOMA EXAMINATION, (C-16)

JUNE/JULY—2022

DCE - FIFTH SEMESTER EXAMINATION

STEEL STRUCTURES

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

PART—A

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

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

                (2) Answers should be brief and straight to the point and shall not exceed five simple sentences.

                (3) Use of IS : 800-2007, IS : 875-1987 and steel tables are permitted.

1. State any six merits of steel structures.   ½×6

2. Define *(a)* size and *(b)* throat thickness of fillet weld.   1½+1½

3. Write the IS : 800-2007 codal provision for overlap of welded joint.   3

4. List the types of failures of tension member.   3

5. Write any three IS : 800-2007 codal provisions to be followed in the design of lacing system.   1×3

6. State any six forms of compression members in steel structures. ½×6

7. Define shape factor. Give its values for *(a)* rectangular and *(b)* circular cross-sections.   2+½+½

8. Write any four component parts of a plate girder.   ¾×4

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9. Draw the sketches of any three types of pitched roof trusses.   1×3

10. Determine the live load per square meter of plan area of the pitched roof of slope 25°.   3

PART—B

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.

(4) Use of IS : 800-2007, IS : 875-1987 and steel tables are permitted.

11. An angle ISA 100 mm × 75 mm × 8 mm carrying an axial tension of 250 kN is to be connected to a gusset plate through its longer leg using side fillet welds only. Design the joint if the ultimate shear stress in the weld is 410 MPa. Assume connections are made at site.   10

12. Determine the design strength of a tensile member ISA 150 mm × 75 mm × 10 mm when its longer leg is connected to 10 mm gusset plate by 7 mm fillet welds. The effective length of the weld is 170 mm.
Take f_y = 250 MPa and f_u = 410 MPa.   10

* 13. Determine the design strength of axially loaded column ISHB 300 @ 588 N/m, if the length of column is 4 m and its both ends are hinged. Take f_y = 250 MPa, f_u = 410 MPa and E = 2 × 10^5 N/mm². 10

14. Design a slab base for a column ISHB 350 @ 674 N/m carrying an axial load of 1000 kN. M20 grade of concrete is used for foundation. Calculate the size of concrete pedestal if SBC of soil is 200 kN/m². Take f_y = 250 MPa. Design of welded joint is not required.   6+4

15. State any six design specifications for battening as per IS : 800-2007.
6×10/6

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16. Write short notes on the following : 5+5

(a) Effect of holes in the tension zone of a laterally supported beam

(b) Shear Lag effect

17. Design a rolled steel beam using I-section for simply supported span 6 m carrying an UDL of 40 kN/m including self-weight of beam. The beam is adequately supported laterally. Check the beam for deflection and shear. Take f_y = 250 MPa and E = 2 × 10^5 N/mm². 6+2+2

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 m. The basic wind pressure for that location is 1500 N/m². Assuming medium openings, calculate the Dead load, Live load and Wind loads on panel points. AC sheets are used as roof material. Assume medium permeability. 10

Take : *(a)* Weight of AC sheet roofing = 160 N/m²

(b) Weight of purlins = 90 N/m²

(c) Weight of bracings = 20 N/m²

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