C16-C-**501**

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BOARD DIPLOMA EXAMINATION, (C-16)
MARCH/APRIL—2021
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) Answers should be brief and straight to the point and shall not exceed five simple sentences.

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

(5) Assume any suitable data, if necessary.

1. Define limit state, state different types of limit states to be considered in the limit state design.

2. Explain the terms :

(a) Size of fillet weld

(b) Effective throat thickness

3. Calculate the safe load transmitted by field welded joint, if size of weld is 5 mm and length 200 mm. Take f_u = 410 N/mm^2.

4. Write three different types of failure of tension members.

5. Define :

(a) Least radius of gyration

(b) Slenderness ratio

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6. What are the equation of longitudinal shear and moment in batten?

7. Write a short note on laterally supported beams.

8. Define :

   (a) Elastic moment of resistance

   (b) Plastic moment of resistance

9. Draw a neat figure of joint at bottom chord members of a truss.

10. Determine the live load on a truss if the angle of slope of roof is 30°.

PART—B 10×5=50

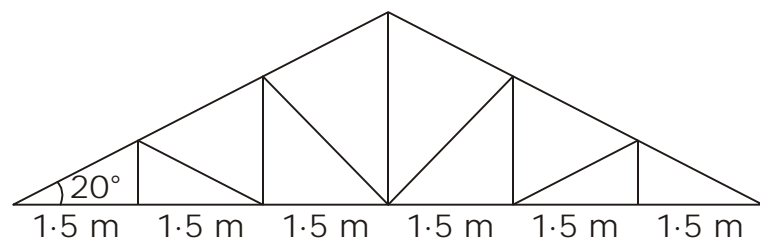**Instructions :** (1) Answer *any* **five** questions.

(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 110 mm × 110 mm × 10 mm is carrying an axial design force of 300 kN acting through the C.G. of the angle and is connected to gusset plate 10 mm thick by a lap joint using both side and end fillet welds at site. Design the joint taking the design shear stress in the fillet weld as 150 N/mm^2.

12. Design a single angle section to carry a factored tensile force of 300 kN. The end connections are made using fillet welds. Assume the angle is connected to gusset plate with longer leg. f_y = 250 N/mm^2, f_u = 410 N/mm^2. Assume gusset plate thickness as 12 mm.

13. Determine the design compressive strength of single ISHB 400 @ 774 N/m when it is used as column of 5·5 m height with both ends fixed condition. f_y = 250 N/mm^2.

14. Design a single angle section to carry a compression of 100 kN. The c/c distance between the end connection is 2 m. Assume that the end connections are made with fillet welds, f_y = 250 MPa. Select an unequal angle section.

15. Design a slab base for a column ISHB 350 @ 724 N/m carrying an axial load of 850 kN. Use M20 grade concrete for foundation. f_y = 250 N/mm². Also design the concrete pedestal if SBC of soil is 180 kN/m³. Design of welded joint may be ignored.

16. A simply supported beam ISMB 350(5)524 N/m has an effective span of 5 m. Find :

    (a) Design bending strength of beam

    (b) Design shear strength of beam

    f_y = 250 Mpa. Assume that the beam is laterally supported.

17. Design a simply supported beam of an effective span 5·5 m and carries a udl of 22 kN/m including self weight. The compression flange of beam is laterally restrained. Check the beam for shear and deflection. Grade of steel is Fe 250.

18. Calculate dead load, live load and wind load at various panel points of truss of span 9 m shown in figure, spacing of truss is 3 m and carry Ac Sheet roofing. The basic wind pressure may be assumed as 1000 N/m².

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