C16–C–501

6620

BOARD DIPLOMA EXAMINATION, (C–16)

NOVEMBER—2020

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) IS 800-2007 is permitted. Steel tables an allowed.

1. State any six merits of steel structures.

2. State different types of joint.

3. Draw the detailed sketch of fillet welded joint showing the component parts.

4. Sketch any six forms of tension members.

5. Define the following :

(a) Column

(b) Strut

6. Write any three codal provisions to be followed in the design of lacing system as per IS : 800-2007.

7. Determine the shape factor for rectangular beam.

8. State different types of stiffeners provided in plate girders and write their functions.

9. List any six types of roof trusses commonly used for different spans.

10. How much live load on the truss is considered in the design if the angle of splope of roof is 25°.

PART—B

10×5=50

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

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

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

(4) IS 800-2007, IS 875-1987 and steel table may be allowed.

11. An angle ISA 130×130×10 mm carrying an axial load of 220 kN is connected to a gusset plate 12 mm thick. Design the welded connection with side and end welds if ultimate shear stress in weld is 410 MPa, connections are made in shop.

12. Design a single angle tension member of a roof truss to carry factored tensile force of 225 kN. The angle is to be connected to a gusset plate by one of its legs by fillet welds. f_y = 250 MPa, f_u = 410 MPa. Assume length of weld as 100 mm.

13. Determine the design axial load on a column section IS MB 400 @ 615 N/m, given that the height of column is 5 m and that is pin ended. Also assume the following : f_y = 250 N/mm^2, f_u = 410 N/mm^2, E = 2 × 105 N/mm^2.

14. Determine the design compressive strength of single angle discontinuous strut ISA 80 × 50 × 8 mm of 1·5 m long when connected to the gusset plate through longer leg by fillet welds at each end-yield stress of steel used 340 MPa. Modulus of elasticity of steel is 2×10^5 MPa. The gusset fixity may be taken as hinged.

15. Design a slab base for a column ISHB 300 @ 577 N/m carrying an axial working load of 1000 kN. M-20 concrete is used for the foundation, yield stress of steel is 250 MPa. Also design the concrete pedestal if the safe bearing capacity of soil is 190 kN/m^2. Also design the welded connections if the ultimate stress in the welds is 410 MPa. Assume connections are made in shop.

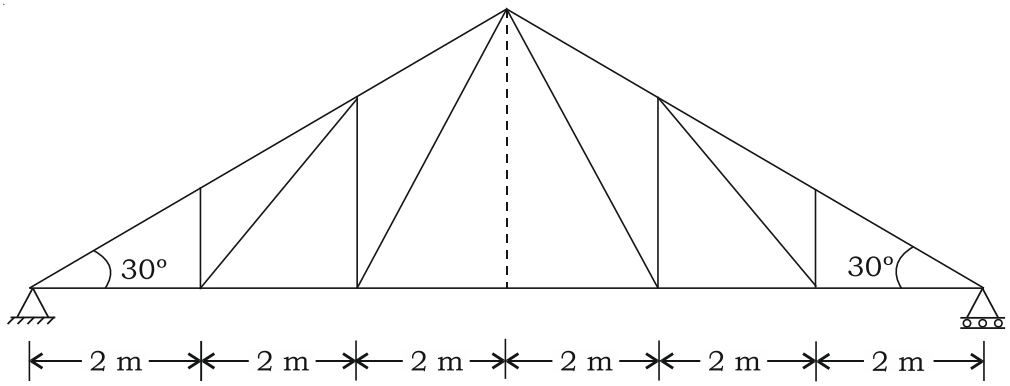
16. Write short notes on the following :

(a) Shear lag effects in beams

(b) Lateral torsional buckling of beams

17. Design a rolled steel beam using I-section of effective span 6 m if the beam carries a udl of 40 kN/m excluding self weight of beam. Self weight of beam is 0·5 kN/m. The beam is adequately supported laterally. Check the beam for shear and deflection. If $E = 2 \times 10^5$ N/mm^2 and $f_y = 250$ N/mm^2.

18. A Pratt roof truss of span 12 m and pitch 30° is shown in the figure below. The trusses are placed at 4 m apart and carry corrugated AC sheet roofing. The spacing of trusses is 4 m. Corrugated AC sheets and angle purlins are used in the roof. The basic wind pressure may be taken as 1500 N/m^2. There will be no snow fall in the region. If the building is of normal permeability, determine dead load, live load and wind load at various panel points of the truss. Assume weight of AC sheeting = 160 N/m^2, weight of purlins = 100 N/m^2 and height of eaves as 7 m.



★ ★ ★