C16-**C-501**

6620

BOARD DIPLOMA EXAMINATIONS

SEPTEMBER/OCTOBER-2020

DCE – FIFTH SEMESTER

STEEL STRUCTURES

Time: 3 hours Max. Marks: 80

PART – A **3 X 10 = 30**

Instructions: *1. Answer **all** questions.*
*2. Each question carries **Three** Marks.*
3. Answer should be brief and straight to the point and should not exceed Five simple sentences.

1. List the advantages and disadvantages of steel structures.
2. Name different types of welds and sketch any one of them.
3. Calculate the design strength of welded joint if the size of weld is 5mm and length is 250mm. The ultimate shear stress in the weld is 410 N/mm^2. Assume connection are made in the work shop.
4. Calculate the design strength of a tension member due to yielding of gross section for a plate of 150 X 80 mm. Take f_y= 250 N/mm^2.
5. State the different forms of compression members.
6. Sketch the sectional elevation of slab base and label the components.
7. State the situations where the plate girders are necessary.
8. Define shape factor and mention the shape factors to a rectangular and circular secrtion.
9. State the various loads on roof truss.
10. Determine the live load on a truss if the angle of slope of roof truss is .

PART – B **5 X 10 = 50**

Instructions: *1. Answer any **Five** questions*
*2. Each question carries **TEN** Marks.*
3. Answer should be comprehensive and Criteria for Valuation is the content but not the length of the answer.

11. A tie in a truss consists on an ISA 100 X 75 X 8 mm connected to a 10 mm thick gusset plate through the longer leg by shop fillet weld. Design side fillet welded joint if the permissible stress in the angle and ultimate stress in the fillet weld are 150 Mpa and 410 Mpa respectively.

12. Determine the design tensile strength of single angle ISA 150 X 75 X 10 mm connected to the gusset plate by 6mm size fillet welds with its longer leg. The length of weld is 250 mm. f_y= 250 N/mm^2, f_u= 410 N/mm^2.

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

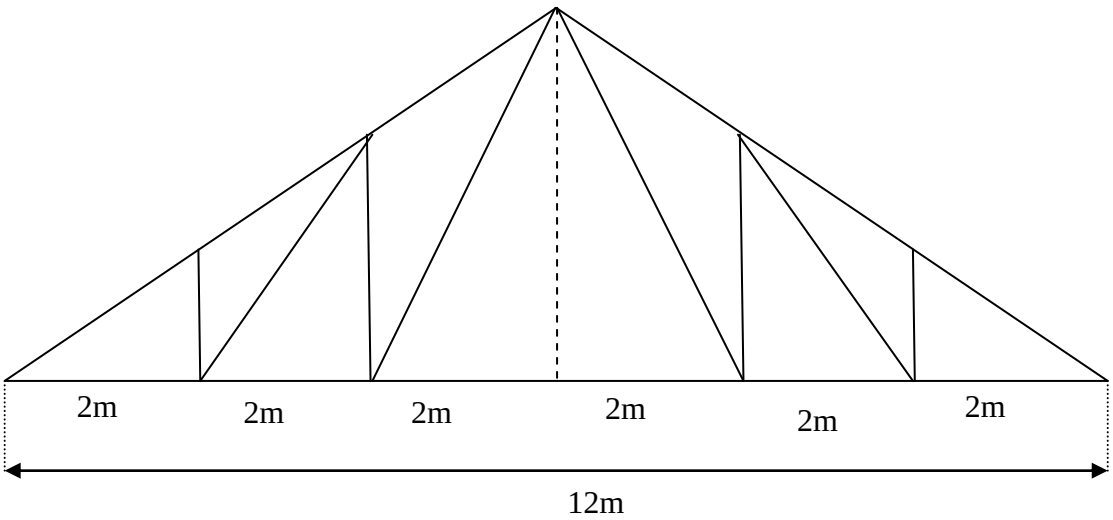
14. Design a single angle section to carry a compressive load of 125 KN. The c/c distance between the End Connection is 2m. Provide fillet welded joints. Yield stress of steel is 250 Mpa.

15. State the various design specifications for lacing as per IS 8000-21007.

16. An ISLB 500@750 N/m is used as simply supported beam of span 5 m carries an UDL of 25 KN/m including self weight. The compression flange of beam is adequately restrained check the section for shear and deflection if f_y= 250 N/mm^2, E = 2x 10^5 N/mm^2.

17. Design a simply supported beam of span 5 m carrying RCC floor slab capable of providing lateral restraint to the top compression flange. Imposed load is 15 KN/m and dead load is 20 KN/m. Yield strength of steel is 250 Mpa.

18. A Pratt truss of span 12m and pitch is 30^0, carries AC sheet roofing. The trusses are 3m apart. The design wind pressure may be assumed as 1200 N/m^2. Determine the a) Dead Load
b) Live Load
c) Wind load at various panel points of truss.



* 6620 *

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.

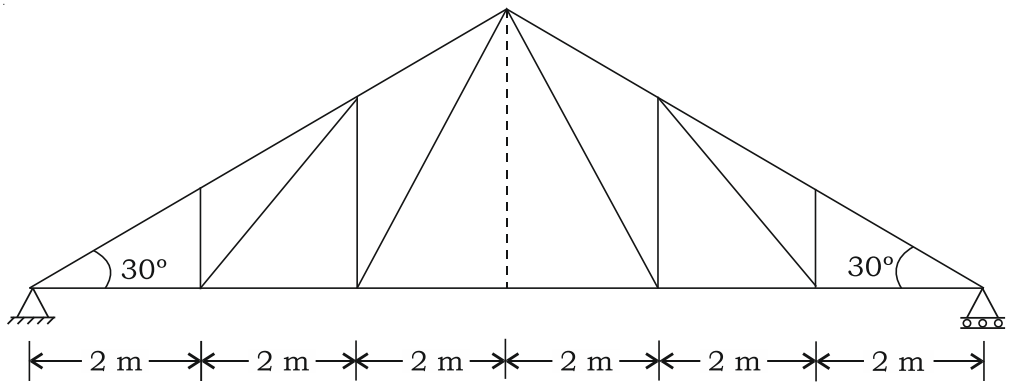
16. Write short notes on the following :

(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.



★ ★ ★