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C09–C–602

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BOARD DIPLOMA EXAMINATION, (C–09)

SEPTEMBER/OCTOBER - 2020

DCE—SIXTH SEMESTER EXAMINATION

STEEL STRUCTURES

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

Reference books allowed :

1. Design of Steel Structures (IS : 800–2007)
2. Steel tables
3. Extracts from IS : 875–1987 (For wind load calculation)

PART—A 3×10=30

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

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

(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. What are different loads to be considered in the design of steel structures?

2. Define the terms *(a)* effective throat thickness, *(b)* end return and *(c)* overlap.

3. Write three different types of failures of tension members.

4. Sketch the cross section of angles connected to the same side of gusset plate and both sides of gusset plate.

5. Sketch different sections used for compression members.

6. Sketch the sectional elevation of slab base and label the components.

7. Explain the *(a)* web buckling and *(b)* web crippling in beams.

8. Explain the term shear centre and its significance.

9. Draw a neat sketch of a North light roof truss.

10. How much live load on truss is considered in design, if the angle of slope 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 criterion for valuation is the content but not the length of the answer.

11. An angle ISA 125 mm 75 mm 8 mm is carrying an axial tensile load of 250 kN, is to be connected to a gusset plate of 12 mm thick through its longer leg using side fillet welds only. Design the welded joint. The ultimate shear stress in the weld is 410 N/mm^2. Assume the connections are made at site.

12. Determine the design strength of a single-angle tension member ISA 150 mm 115 mm 10 mm connected to 12 mm thick gusset plate by its longer leg using fillet weld. Take the length of connection equal to 200 mm. Assume f_y 250 N/mm^2 and f_u 410 N/mm^2. [Tensile strength due to block shear is not necessary.]

13. Determine the design compressive strength of a single ISLB 450 at 653 N/m, when it is used as a column of effective length 4·2 m. The yield stress of steel is 250 N/mm^2.

14. Design a single angle discontinuous strut to carry an axial compression of 150 kN. Assume gusset fixity is rigid and longer leg is connected to the gusset plate by using fillet weld. Take f_y 250 MPa.

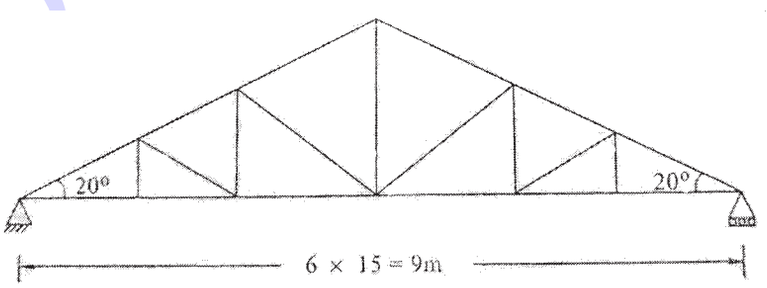
15. Design a slab base for a column ISHB 300 at 577 N/m carrying an axial load of 1000 kN. M20 grade concrete is used for the foundation. The yield stress of steel is 250 MPa. Also design the concrete pedestal, if the safe bearing capacity of soil is 180 kN/m^2.

16. A simply supported beam ISLB 300 @ 370 N/m has an effective span of 5 m. Find the design bending and shear strength of the beam. Take f_y 250 N/mm^2 and the beam is laterally supported.

17. *(a)* What is meant by shear lag effect?

(b) Draw a neat sketch of a plate girder and name its component parts.

18. The line sketch of a howe truss of 9 m with slope of the roof 20° is shown below. The c/c spacing of trusses is 4 m. Corrugate AC sheets and angle purlins are used in the roof. The design wind pressure for the place is 2000 N/m^2. Determine the various loads at the panel points for which the truss is to be designed. Assume normal permeability for the structure.



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