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C16–C–501

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BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—2018

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.

1. List the mechanical properties of structural steel.

2. Define the following terms :

(a) Size of fillet weld

(b) Throat thickness of fillet weld

3. What shall be the maximum size of the fillet weld applied to the

(a) square edge of a plate, and *(b)* round edge of a flange?

4. Write any three applications of tension members.

5. Define the following terms :

   (a) Least radius of gyration and

   (b) Slenderness ratio

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

7. Define elastic moment and plastic moment of resistance.

8. Draw the cross section of plate girder and label the component parts.

9. What loads are to be considered in the design of steel roof truss?

10. Determine the live load per square metre of plan area of the pitched roof of slope 26°.

PART—B 10×5=50

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

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

(3) The answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. An angle ISA 100 mm × 100 mm × 12 mm is carrying an axial design tensile force of 220 kN acting through the CG of the angle is to be connected to a gusset plate 12 mm thick by a lap joint using side welds and end welds, at site. Design the joint taking the ultimate design stress in the filet weld as 410 N/mm^2.

12. Determine the design strength of a tensile member ISA 100 mm × 75 mm × 10 mm when its longer leg is connected to 10 mm gusset plate by 7 mm size fillet welds. The effective length of the weld is 170 mm. [Take f_y 250 MPa and f_u 410 MPa.]

13. Design a steel column using a single rolled I-section to carry an axial load of 800 kN. One end of the column is restrained against translation and rotation and the other end is restrained against translation and free against rotation. The actual length of the column between intersections is 6 m and the yield stress of steel is 250 MPa.

14. Determine the design compressive strength of single angle discontinuous strut ISA 80 mm × 80 mm × 10 mm of length 2 m when connected to gusset plate through one leg by fillet welds at each end. Yield stress of steel used is 340 MPa and modulus of elasticity of steel is 2 10^5 PMa. The gusset fixity may be taken as hinged.

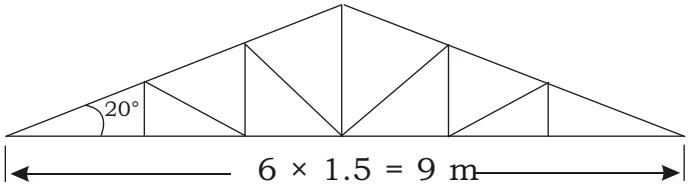
15. Design a slab base with rectangular base plate having equal projections for a column ISHB 300 @ 577 N/m carrying an axial factored load of 1000 kN. Use M_{20} grade concrete and Fe 250 grade steel. Also design the concrete pedestal if the safe bearing capacity of soil is 190 kN/m^2.

16. *(a)* Write a note on the effect of holes in the tension zone of a laterally supported beam.

(b) Determine the shape factor for a rectangular section of width *b* and depth *d*.

17. A hall of clear dimensions 12 m × 8 m is to be covered by RCC slab flooring 10 cm thick resting over RS joists spaced at an interval of 3 m centre to centre. Terrazo finishing of 1.5 kN/m^2 is to be provided over the RCC slab. The live load on the slab is 2 kN/m^2 and the joists are resting over 30 cm thick walls. Design the floor joists. The unit weight of RCC is 25 kN/m^3. Check the safety of the beam in shear and deflection only. Take yield stress of steel as 250 N/mm^1 and *E* as 200 kN/mm^2.

18. The line sketch of Howe truss of 9 m span is shown in the figure :



The trusses are placed at 4 m apart and carry a corrugated AC sheets roofing on angle purlins. The slope of the roof is 20°. The basic wind pressure for the place is 2000 N/m^2. There will be no snowfall in the region. If the building is of normal permeability, determine— (a) dead load; (b) wind load; (c) live load. at various panel points of the truss.
Consider the following :

(a) Weight of AC sheet as 160 N/m^2

(b) Weight of purlins as 100 N/m^2

(c) Height of eves as 7 m

(d) External pressure coefficient C_{pe} :

Slope	For wind angle 0°		For wind angle 90° on both slopes	
20°	Wind ward	Lee ward	Near gable end	Internal bays
	– 0.7	– 0.5	– 0.8	– 0.6

(e) Internal pressure coefficient C_{pi} as 0.2

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