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C09–C–**602**

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BOARD DIPLOMA EXAMINATION, (C–09)
OCT/NOV—2018
DCE—SIXTH 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) Reference books are allowed.

(i) Steel code IS 800–2007

(ii) Tables from IS 875-1987 for wind load calculations.

1. What are the physical properties of steel? State with values.

2. List out different types of welded joint.

3. The strength of tension member connected by welding is more than the member connected by bolting. Why?

4. What is meant by shear lag?

5. Sketch different forms of compression members.

6. Define radius of gyration.

7. Distinguish between laterally restrained beam and unrestrained beam.

8. Name any four types of web stiffener in plate girder.

9. Draw a neat sketch of a roof truss and name the component parts.

10. Determine the live load per square metre of plan area of the pitched roof of slope 24°.

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PART—B   10×5=50

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

12. Determine the design strength of a tensile member ISA 125 mm × 75 mm × 8 mm with its shorter leg connected with 6 mm fillet welds to the 10 mm thick gusset plate. The length of weld is 180 mm. [Take f_y 250 MPa and f_u 410 MPa]

13. Determine the design compressive strength of single ISLB 450 at 653 N/m when it is used as column of effective length 4 m. The yield stress of steel is 300 N/mm^2.

14. Determine the design compressive strength of single angle discontinues strut ISA 80 mm × 50 mm × 8 mm of length 1.5 m when connected to 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 rigid.

15. *(a)* What are the types of column bases? Explain any one of them.

(b) Find the thickness of a base plate of size 400 mm × 500 mm which is provided below a steel column carrying a total load of 800 kN. The projection of the base plate from column in both the directions is 100 mm and the permissible bending stress in base plate is 180 N / mm^2.

16. A simply supported beam ISMB 300 at 442 N/m has an effective span of 6 m. Find—

(i) Design bending strength of beam;

(ii) Design shear strength of beam.

Assume Fe$_{410}$ grade steel and assume that the beam is laterally supported.

17. A roof of a hall measuring 8 m × 12 m consists of 100 mm thick RCC slab supported on steel I-beams spaced at 3 m apart. The finished load may be taken as 1.5 kN / m^2 and live load as 1.5 kN / m^2 Design the steel beam. Assume f_y 250 MPa]

18. A power plant structure having maximum dimension more than 60 m is proposed to be built on down hill side near Dehradun. The height of the hill is 400 m with a slope of 1 in 3. if the location is 250 m from the crest of the hill on downward slope and its eve board is at a height of 9 m, determine the design wind pressure.

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