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C14–C–601

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2018

DCE—SIXTH SEMESTER EXAMINATION

DESIGN OF 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) Use of IS-800 : 2007 is allowed.

1. State any three merits and three demerits of steel structures.

2. List out different types of joint and different types of welded connection.

3. Sketch any six different forms of tension member.

4. Calculate the design strength of a tension member due to yielding of cross-section for ISA 100 mm × 75 mm × 10 mm. Use f_y 410 N/mm^2.

5. Define *(a)* column, *(b)* strut and *(c)* boom.

6. Define *(a)* lacing and *(b)* battening.

7. State different classifications of beam.

8. List out the component parts of a plate girder.

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

10. The angle of slope of roof is 25°. Calculate the live load on truss to be considered in the design.

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. A double-angle tension member of two ISA 110 mm × 110 mm × 12 mm carrying an axial tension of 400 kN is to be connected to a gusset plate by fillet welds along the ends and sides of the leg. Design the welded joint. The ultimate shear stress of the weld is 330 MPa. Assume that the connections are made in workshop.

12. Determine the design tensile strength of a single ISA 150 mm × 75 mm × 10 mm, connected to the gusset plate by 6 mm size fillet welds. The length of the weld is 300 mm. Assume f_y 250 N/mm^2 and f_u 410 MPa.

13. Determine the design axial load carrying capacity of a column ISHB300 @ 577 N/m if the length of column is 3 m, whose both ends are pinned. Assume f_y 250 N/mm^2 and f_u 410 MPa.

14. Design a suitable section for a compression member of effective length of 5 m to carry an axial load of 2500 kN, using a single-rolled heavy I-section and 16 mm thick plates. Take yield stress of steel as 340 MPa.

15. Design a slab base with rectangular base plate having equal projections for a column section consisting of ISHB350 @ 661 kN/m carrying an axial load of 1200 kN including self-weight. Use M-20 grade concrete and E-250 grade of steel. Also design the concrete pedestral if SBC of soil is 180 kN/m^2.

16. A simply supported beam ISMB300 @ 442 N/m has an effective span of 6 m. Find the design bending and shear strength of the beam, if the beam is laterally restrained. Use E-410 as grade of steel.

17. Design a rolled steel I-section to act as a simply supported beam with span 5 m carrying a UDL of 32 kN/m including self-weight. Check the beam for shear and deflection, if the beam is laterally restrained. Use Fe-410 grade steel.

18. A roof truss of span 16 m and pitch 25° is used for AC sheet roofing. The trusses are 4 m apart. Determine the *(a)* dead load and *(b)* live loads at intermediate panel points, end panel points of truss assuming the following data :

Unit weight of AC sheet roofing = 200 N/m^2 of plan area
Unit weight of purlin = 100 N/m^2 of plan area
Unit weight of bracing = 20 N/m^2 of plan area
Height of eaves level = 8 m

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