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C09–C–602

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2017

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) Use of IS 800 : 2007, IS 875 : 1987 for wind load calculations, steel tables are permitted.

(4) Assume data suitably, if necessary.

1. What are the mechanical properties of steel?

2. With the help of sketch, show different features of a fillet welded joint.

3. Differentiate failure due to yielding and failure due to rupture of tension member.

4. What are the factors that influence the strength of tension members?

5. Define battening and mention the objectives of battening.

6. What are different types of column base?

7. Define elastic moment of resistance and plastic moment of resistance.

8. State different types of stiffener provided in plate girders.

9. How do you estimate the weight of a truss when span is given?

10. Determine the live load per square meter of plan area of the pitched roof of slope 30°.

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 100 mm 75 mm 10 mm is connected to gusset plate of thickness 12 mm by welding. It carries a factored tensile load of 400 kN. Design the joint assuming size of weld as 6 mm and the fabrication is to be done in the field. The welds are to be provided only at sides. [Given, f_u 410 N/mm^2]

12. Determine the tensile strength of a single-angle tension member. ISA 90 mm 60 mm 8 mm connected to the gusset plate by 6 mm size weld and longer leg is connected to gusset plate. The length of weld is 360 mm. [Given, f_y 250 N/mm^2 and f_u 410 N/mm^2]

13. Determine the compressive strength of a single I-section ISHB 350 @ 674 N/m, when it is used as a column of effective length 4 m. The yield stress of steel is 320 MPa.

14. Design a steel column using a single rolled I-section to carry an axial load of 900 kN. Both the ends of the column are restrained against rotation and translation. The actual length of the column between intersections is 6 m. The yield stress of steel is 260 MPa.

15. Design a slab base with rectangular base plate having equal projections for a column section consisting of ISHB 350 @ 674 N/m carrying an axial load of 1000 kN including self-weight. Use M-20 grade concrete and Fe-250 grade steel. Also design the concrete pedestal if safe bearing capacity of soil is 180 kN/m^2.

16. Determine the design bending strength of a laterally restrained beam ISMB 350 @ 524 N/m. The yield stress of steel is 250 MPa.

17. Design a rolled steel I-section to act as a simply supported beam with span 4 m carrying a.u.d.l. of 40 kN/m including the self-weight. Check the beam for shear and deflection if the beam is laterally restrained. [Use Fe-410 grade steel]

18. Determine the design loads on the nodal points of the truss of an industrial building near Visakhapatnam. The building is first class building with general life of 50 years with the following data :

Terrain—category 2

Maximum dimension—40 m

Width of building—15 m

Height at eyes level—8 m

Topography—slope less than 30°

Permeability—medium

Span of truss—15 m

Pitch—1/5

Sheeting—AC sheets

Spacing of purlins—1·35 m

Spacing of trusses—4 m

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