



c16-c-501

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BOARD DIPLOMA EXAMINATION, (C-16)

JANUARY/FEBRUARY—2022

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.
 - (4) Use of IS : 800-2007 and steel tables are permitted.
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1. Sketch any six types of rolled steel sections.
 2. Distinguish between welded joint and riveted joint.
 3. What shall be the maximum size of the fillet weld applied to the
(a) Square edge of the plate and (b) Round edge of the flat ?
 4. Describe different modes of failure of tension members.
 5. Distinguish between actual length and effective length of columns.
 6. Write any three codal provisions to be followed in the design of batten system as per IS : 800-2007.
 7. Define the terms (a) Elastic moment of resistance and (b) Plastic moment of resistance.

8. Explain the terms : (a) Web crippling and (b) Web buckling.
9. Distinguish between plane trusses and space trusses.
10. Determine the live load per sq. m on a sloping roof having a slope of 38° .

PART—B

10×5=50

- Instructions :**
- (1) Answer *any five* questions.
 - (2) Each question carries **ten** marks.
 - (3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.
 - (4) IS : 800-2007, IS : 875-1987 and steel tables may be allowed.
11. A tie in a truss consists of pair of angles 2 ISA 90mm × 60mm × 10mm welded on either side of gusset plate of 12mm thick through the longer legs. Design the welded connection with side and end welds if the stress in angle and fillet welds is 150 MPa and 410 MPa respectively. Assume the connections are made in workshop.
 12. Determine the design strength of a tensile member ISA 125mm×75mm×8mm with its shorter leg connected to 10mm thick gusset plate by 7mm size fillet welds. The effective length of weld is 180mm. Take $f_y = 250\text{N/mm}^2$ and $f_u = 410\text{N/mm}^2$.
 13. Determine the design compressive strength of single ISLB 450 @ 653 N/m, when it is used as column of effective length 4m. The yield stress of steel is 300N/mm^2 .
 14. Design a single angle strut connected to the gusset plate to carry 180 kN factored load. The length of the strut between c/c intersections is 3m. Yield stress of steel is 250 MPa. Use fillet welds. Assume $f_{cd} = 90\text{N/mm}^2$.
 15. Design a slab base for a column ISMB 400 @ 616 N/m carrying an axial working compressive load of 800kN. M20 concrete is used for the foundation. Yield stress of steel is 250 MPa. Also design the concrete pedestal if the safe bearing capacity of soil is 190 kN/m^2 and design the welded connections if the ultimate stress in the welds is 410 MPa. Assume that connections are made in shop.

- 16.** Find the shape factor of an I- section with top and bottom flange 200mm×10mm and web 380mm×10mm.
- 17.** A roof of a hall measuring 8m × 12m consists of 100mm thick RCC slab supported on steel I beams spaced at 3m apart. The finishes load may be taken as 1.5 kW/m², live load as 1.5 kN/m² and self-weight of beam as 0.5kN/m. Design the steel beam. Assume $E = 2 \times 10^5 \text{ N/mm}^2$ and $f_y = 250 \text{ N/mm}^2$.
- 18.** Determine the design loads at 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 = 40m

Width of the building = 15m

Hight of eaves level = 8m

Topography : slope less than 30°

Permeability : medium

Span of truss = 15m (assume 6 panels each 2.5m)

Pitch = 1/5

Sheeting = AC sheets

Spacing of purlins = 1.35m

Spacing of trusses = 4m

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