



c09-c-602

**3721**

**BOARD DIPLOMA EXAMINATION, (C-09)**  
**OCT/NOV—2015**  
**DCE—SIXTH SEMESTER EXAMINATION**  
**STEEL STRUCTURES**

*Time* : 3 hours ]

[ *Total Marks* : 80

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**PART—A**

3×10=30

**Instructions** : (1) Answer **all** questions.

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

**Reference books to be allowed** :

(1) Steel code IS 800-2007

(2) Steel tables

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

1. Name any six forms of rolled steel sections.
2. Write any three advantages of welded joints over riveted joints.
3. Define a tie and mention different shapes of sections used as ties.
4. Write three different types of failures of a tension member.
5. Differentiate between lacing and battens.
6. What is meant by slenderness ratio?
7. Draw the cross section of plate girder and label the component parts.

- \* 8. Explain the terms :
- (a) Web crippling  
(b) Web buckling
9. What is a purlin? List various loads used in the design of a purlin.
10. Determine the live load per square metre of plan area of the pitched roof slope  $26^\circ$ .

**PART—B**

10×5=50

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

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

11. A tie member of a roof truss consists of 2-ISA 100 mm 75 mm 8 mm. The angles are connected to either side of a 10 mm gusset plate and the member is subjected to a working load of 300 kN. Design the side fillet weld only. Assume connections are made in the workshop.

Take  $f_u = 410 \text{ N/mm}^2$

12. Design a single-angle tension member to carry a factored load 340 kN. The angle is to be connected to a gusset plate with longer leg by fillet welds. Take  $f_y = 250 \text{ N/mm}^2$ ,  $f_u = 410 \text{ N/mm}^2$

13. Determine the design compressive strength of single ISHB 400 at 822 N/m when it is used as a column of 5 m height with both of its ends, restrained against translation and rotation. The yield stress of steel used is 340 MPa.

- \* 14. Design a slab base for a column ISHB 300 at 588 N/m carrying a factored load of 1500 kN. M 20 concrete is used for the foundation yield stress of the steel is 250 Mpa. Also design the concrete pedestal if the safe bearing capacity of soil is  $190 \text{ kN/m}^3$ .

- \* **15** (a) Explain any five codal provisions to be followed in the design of lacing system as per IS : 800-2007. 5  
(b) Draw a neat sketch (sectional elevation) of Gusseted base showing its components. 5

**16.** Determine the design bending strength of a laterally restrained beam ISLB 400 at 569 N/m. The yield stress of steel is 300 MPa.

**17.** Design a simply supported beam of an effective span 6 m carries a udl of 20 kN/m including self weight. If the compression flange of the beam is laterally restrained, check the beam for shear only. The grade of steel is Fe 410.

**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 eave 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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