



c09-c-602

3721

BOARD DIPLOMA EXAMINATION, (C-09)

OCT/NOV—2016

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. Name any six forms of rolled steel sections.

2. Write any three advantages and three disadvantages of welded joints.

3. Write three different types of failures of a tension member.

4. How does block shear affect the strength of a tension member?

5. What is the buckling class of a cross section?

6. Define lacing and mention objectives of lacing.

- * 7. Differentiate between elastic section modulus and plastic section modulus.
8. List the component parts of a plate girder and mention their functions.
9. What are the loads to be considered on a roof truss?
10. Determine the live load per square meter of plan area of the pitched roof of slope 28° .

PART—B

10×5=50

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

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

11. An angle ISA 125 mm × 95 mm × 8 mm is to be connected to a gusset plate of 10 mm thick by a lap joint using side welds only, at site. The member carries an axial design tensile force of 300 kN acting through the CG of the angle. Design the joint taking the ultimate shear stress in the fillet weld as 410 N/mm^2 .
12. Design a tension member considering a single angle section to carry a tensile force of 300 kN. Adopt length of connection as 180 mm. [Given : $f_u = 410 \text{ N/mm}^2$, $f_y = 250 \text{ N/mm}^2$]
13. Determine the compressive strength of a single I-section ISLB 450 @ 653 N/m when it is used as a column of effective length 4 m. The yield stress of steel is 250 MPa.
- * 14. A steel column of 4.5 m height carries an axial load of 1200 kN including its self-weight is restrained against translation but free to rotate at its ends. Design a column using two channel sections placed face to face. The yield stress of steel used is 250 MPa.

- * 15. Design a slab base for a column ISHB 300 @ 588 N/m. The column carries an axial load of 650 kN. Also design the welded connection. Assume Fe-410 grade steel is used if the permissible stress in concrete is 4 N/mm^2 and SBC of soil is 180 N/mm^2 . Take permissible stress in slab base as 185 MPa.
16. Determine the design bending strength of ISMB 400 @ 615 N/m, if the beam is laterally restrained.
17. A laterally restrained simple beam has to resist a maximum factored bending moment of 250 kN-m. The yield stress of steel is 250 MPa. Choose a suitable I-section for the beam.
18. A Pratt truss of span 14 m and pitch 24° is used for AC sheet roofing. The trusses are 4 m apart and the wind pressure may be assumed as 1500 N/mm^2 .

Determine (a) dead load, (b) wind load and (c) live load at

- (i) intermediate panel points
- (ii) 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

Topography : Slope less than 30°

Permeability : Medium

Height at eaves level : 10 m

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