



c14-c-601

4716

BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—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 875:1987 and Steel-tables are permitted.

(5) Assume suitable data if necessary

1. State any six forms of rolled steel sections.

2. What are different types of welds and welded joints?

3. Calculate gross sectional area of connected leg of tie member ISA 90 × 60 × 8 mm, if its longer leg is connected to gusset plate.

4. Explain the terms :

(a) Gross area

(b) Net effective area

- * 5. What is buckling class of cross-sections?
6. State any three possible modes of failures of compression members.
7. Differentiate between laterally supported and un supported beams.
8. Sketch the figures showing (a) web crippling and (b) web buckling
9. Sketch any three types of roof trusses.
10. Determine the live load on a roof if the angle of slope of roof is 24° .

PART—B

5×10=50

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

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

(3) The answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. The longer leg of an unequal angle $100 \times 75 \times 8$ mm is to be connected to a gusset plate by a lap joint using side welds only. The member carries a design tensile force of 280 kN acting through the C.G. of the angle. Design the joint taking the ultimate shear stress in the fillet weld as 410 N/mm^2 . Assume connections are made in the workshop.
12. Design a single angle tension member to carry a tensile force of 200kN. The angle is to be connected to a gusset plate through one of its leg by fillet welding. $f_y = 250 \text{ N/mm}^2, f_u = 410 \text{ N/mm}^2$. Assume length of connection as 130 mm.
13. (a) Explain the various codal provisions to be followed in the design of battening system as per IS:800-2007.
(b) Differentiate between lacing and battens.

- * 14. Two channels ISMC 300@ 358N/m are to be placed back to back and used as a column on an effective length of 6m. The yield stress in steel used may be taken as 400MPa. Determine the minimum clear distance to be maintained between the backs of the channels to get the maximum strength. Determine also the design strength of the column.
15. Design a slab base for a column ISHB 350@674 N/m carrying a design compressive load of 1350kN. M_{20} grade concrete is used for foundation. Calculate the size of concrete pedestal if SBC of size is 200kN/m^2 . Take $f_y = 250\text{N/mm}^2$.
16. A rolled steel beam has an effective span of 5m and carries a udl of 20kN/m including self wt. If the compression flange is restrained laterally, design an I-section simple beam. Take $f_y=250\text{ MPa}$ and $E=200\text{ kN/mm}^2$. Check for shear and deflection.
17. A proposed cantilever beam is built into a concrete wall. It supports a dead load of 15kN/m and imposed load of 10kN/m . The length of the beam is 3m. Select a suitable section with necessary checks. (Section is stiff against bearing) Take $f_y = 250\text{N/mm}^2$.
18. (a) What are the loads to be considered in the design of steel roof trusses?
- (b) A power plant structure having maximum dimensions more than 60 m is proposed to be built on down hill side near Dehradun. The height of the hill is 400 m with a slope of 1 in 3. If the location is 250 m from the crest of the hill on downward slope and its eaves board is at a height of 9m, determine the design wind pressure.
