C14-C-**601**

4710

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH / APRIL - 2019

DCE - VI 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) Answer should be brief and straight to the point and shall not exceed five simple sentences.

(4) Use of IS 800-2007, IS 875 and steel tables are permitted.

(5) Assume suitable data wherever required.

1 State any three advantages of steel structures.

2 State the different types of welded joints.

3 State different modes of failure of a tension member.

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

5 Define :

(a) Effective length of column (b) Slenderness ratio

6 Mention effective length to be used for different end condition.

7 Distinguish between laterally restrained and unrestrained beams.

8 Define shape factor and mention the shape factors for rectangular and circular sections.

9 Draw a neat sketch of a roof truss and name the component parts.

10 Calculate the live load on (a) roof (b) roof truss if the slope of the roof is 24°.

PART - B **10×5=50**

Instructions : *(1) Answer any **FIVE** questions.*
*(2) Each question carries **TEN** marks.*
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11 An angle ISA 125 ×95 ×10 mm is carrying an axial design tensile force of 275 KN. Its longer leg is connected to a 12 mm thick gusset plate by lap joint using side welds only at site. Design the joint taking ultimate shear stress in the fillet weld as 330 N/mm^2.

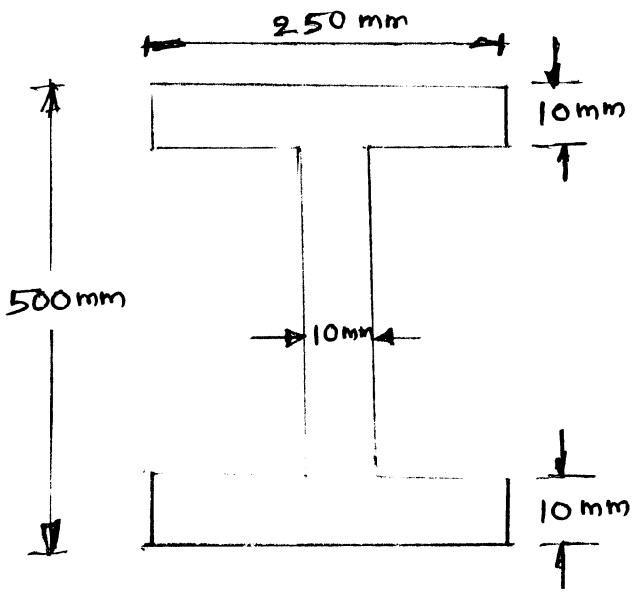
12 Design a double angle tension member to carry an axial tension of 480 KN. The angles are to be connected on either side of 12 mm gusset plate by fillet welds. Take steel of yield stress 250 N/mm^2 and ultimate stress 410 N/mm^2. The effective length of the member is 6m. Check for block shear is not necessary, but check for slenderness ratio is needed.

13 Design a single angle strut connected to the gusset plate to carry 180 KN factored load. The length of the strut between c/c intersection is 3m. Yield stress of steel is 250 mpa. Assume the end connection is done by fillet welds.

14 Determine the design axially loaded capacity of the column 15 HB 300 at 577 N/M, if the length of the column is 3.0 m and its both ends hinged. Take f_y = 250 N/mm^2, f_u = 410 N/mm^2, E = 2 $\times 10^5$ N/mm^2.

15 Design a slab base with rectangular base plate having equal projections for a column section consisting of 15 HB 350 at 661 N/m carrying an axial load of 1200 KN including self weight. Use M20 grade concrete E-250 grade steel. Also design of welded connection of base plate and column. Design of concrete pedestral is not required.

16 Find the shape factor for the I-section shown in figure.



17 Design a rolled steel I-section to act as a simply supported beam with effective span of 4m carrying a UDL of 15 KN/M excluding the self weight. Check the beam for shear and deflection if the beam is laterally restrained. Take f_y = 250 N/mm^2. E = 2 $\times 10^5$ N/mm^2.

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 of eve board = 8m
Topography : slope less than 30^o
Permeability : medium
Span of truss = 15 m
Pitch = 1/5
Sheeting with A.C. sheets
Spacing of purlins = 1.35 m
Spacing of trusses = 4m