TED (15/19) 6013
(Revision-2015/19)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER - 2024

STRUCTURAL DESIGN - II

[Maximum marks: 100] [Time: 3 Hours]

[Note: Use of IS 800-2007, IS 1905, IS 875 – part 3 and steel table are permitted]

PART – A
Maximum marks: 10

I. (Answer ***all*** the questions in one or two sentences. Each question carries **2** marks)

1. Define the term tension member.
2. List any four types of rolled steel section used in steel structures.
3. Define Compression member.
4. Define load bearing wall.
5. Define laterally supported beam. **(5 x 2 = 10)**

PART – B
Maximum marks: 30

II. (Answer any ***five*** of the following questions. Each question carries **6** marks)

1. What are the advantages and disadvantages of steel structures?
2. Calculate the design strength of welded joint if the size of weld is 6mm and its length is 240mm, the ultimate shear stress in the weld is 410 MPa. Assume the conditions are made in workshop.
3. Write down the procedure of design of a single angle strut.
4. Sketch the cross section of a plate girder and mark the components.
5. Write short notes on classification of section based on plastic analysis.
6. Calculate the live load on roof truss of slope 24^0.
7. Write short notes on (i) Cavity wall (ii) Faced wall **(5 x 6= 30)**

PART – C
Maximum marks: 60

(Answer ***one full*** question from each unit**.** Each full question carries **15** marks)

UNIT – I

III. (a) What are the physical and mechanical properties of steel structures? (5)

(b) A tie member in a truss consists of 2 ISA 125 x 95 x 10 mm connected to a gusset plate of 12 mm thick by a shop fillet weld, design the welded joint with yield and ultimate stresses are 250 and 410 MPa. (10)

OR

IV. (a) Explain types of failures in bolted joint. (5)

(b) Calculate the strength of a 20 mm diameter bolt of grade 4.6 for the following cases, the main plates to be joined are 12 mm thick.

(i) Lap joint

(ii) Single cover butt joint, the cover plate being 10 mm thick (10)

UNIT – II

V. (a) Define the terms (i) Gross area (ii) Net area (iii) Net effective area (6)

(b) A single angle ISA 200 x 100 x 15 mm is connected to a gusset plate of 12 mm thick by fillet weld of 4 mm size. Determine the design strength with $f_y = 300$ N/mm^2, $f_u = 440$ N/mm^2 and length of weld is 240 mm. (9)

OR

VI. (a) What are the different shapes of compression member commonly used? (6)

(b) Determine the design axial load carrying capacity of a column ISLB 300@377 N/m, if the length of member is 5m, and fixed at both ends. (9)

UNIT - III

VII. (a) Find the shape factor of a rectangular section of size b x d. (6)

(b) An ISLB 600 @ 995 N/m carrying an imposed load of 20 KN/m excluding self weight over an effective span of 6 m, the yield stress of steel is 250 MPa, check the safety of beam in shear. (9)

OR

VIII. (a) Write the design procedure of a laterally supported beam. (6)

(b) A simply supported beam ISMB 400 @ 616 N/m is subjected to a BM of 100 KNm and shear force of 80 KN. Check the safety of the beam in shear and deflection. (9)

UNIT – IV

IX. (a) Explain the types of loads acting on truss. (5)

(b) Determine the design loads on roof truss for a factory building for a span 20 m and pitch of 1/5, the height of truss at eave's level is 10 m, the spacing of trusses is 4.5 m, the factory building is 36 m long is located at Delhi, provide AC sheeting. (10)

OR

X. (a) Write short notes on effective height and effective length of masonry wall. (5)

(b) A masonry wall 200 mm thick carries an axial load of 50 KN and an eccentric load of 30 KN at an eccentricity of 30 mm from the centre of the wall. Determine the stress in the masonry at the plane of loading. (10)
