DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

STRUCTURAL DESIGN - II

[*Time* : 3 hours

(Maximum marks : 100)

[*Note* :- Use of IS-800-2007, IS-1905, IS-875 and Steel table are permitted.]

PART — A

(Maximum marks : 10)

Marks

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

1. List any two physical properties of steel.

2. List any two advantages of welded joints.

3. Define 'compression member'.

4. Define 'laterally supported beam'.

5. Define 'Slenderness ratio' of a masonry wall.   (5 × 2 = 10)

PART — B

(Maximum marks : 30)

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

1. Write any six advantages of steel structures.

2. Calculate the safe load transmitted by a shop welded joint, if the size of weld is 5 mm and its length is 250 mm, the ultimate shear stress of the weld is 410 MPa.

3. Determine the strength due to yielding of gross section of ISA $100 \times 65 \times 10$mm and fy = 250 Mpa.

4. With neat figure write short notes for the use of lacing and battening.

5. Write short notes on classification of sections based on plastic analysis.

6. Calculate the live load on the roof truss if the angle of pitch is 18 degree.

7. Write short notes on :

   (a) Cavity wall   (b) Faced wall   (c) Veneered wall   (5 × 6 = 30)

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PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Two plates of 16 mm thickness are to be 'lap joined' using M20 bolts of grade 4.6, determine the bolt value if Fe 415 steel plates are used.   9

(b) Write any six advantages of welded connections.   6

OR

IV (a) A tie member of a roof truss consists of 2 ISA $150 \times 75 \times 8$mm. The angles are connected to either sides of a 10 mm gusset plates and the member is subjected to a working load of 350 KN. Design the welded connection. Assume connections are made in the work shop.   9

(b) Define the terms :

(i) Pitch   (ii) Gauge distance   (iii) Edge distance.   6

UNIT — II

V (a) Determine the design axial load capacity of a column ISHB 300@577 N/m, if the length of column is 3 m and pinned at both ends, $f_y = 250$ MPa, $E = 2 \times 10^5$ N/mm².   9

(b) Define the terms :

(i) Gross area   (ii) Net area   (iii) Net effective Area   6

OR

VI (a) A T-section ISHT 75 @ 153N/m is used as a tie member, the flange is to be connected to a gusset plate by side and end fillet welds, keeping length of connection equal to the width of flange of section, determine the design strength due to yielding and rupture of given tension member, take '$f_y = 300$MPa' and '$f_u = 440$ MPa'.   9

(b) In a truss a strut 3m long consists of two angles ISA $100 \times 100 \times 6$mm. Find the factored strength of the member, if the angles are connected on both sides of 12 mm gusset by welding.   6

UNIT — III

VII (a) An ISWB 350@569 N/m carries maximum shear force 90 KN, check the safety of the beam in shear, with $f_y = 250$MPa.   9

(b) List the components parts of a plate girder.   6

OR

Marks

VIII (a) Determine the design bending strength of a laterally supported beam of ISMB 300 @442 N/m, the yield stress of steel is 250 Mpa. 9

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

UNIT — IV

IX (a) Determine the dead load and live load on roof truss for a factory building for a span 20m and pitch of '1/5'. The height of truss at eve's level is 10 m, the spacing of truss is 4.50m, the factory building is 36m long is located at Delhi, Provide A.C. sheeting. 9

(b) Write short notes on :

(i) Stress reduction factor　　(ii) Area reduction factor 6

OR

X (a) Write short notes on :

(i) Dead load　　(ii) Live load　　(iii) Wind load acting on a roof truss 9

(b) A masonry wall 200 mm thick carries an axial load of 50KN and an eccentric load of 30 KN at an eccentricity of 30 mm from the centre of wall. Determine stress in masonry at the plane of loading. 6

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