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(REVISION — 2015)

Reg. No. .....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2019

STRUCTURAL DESIGN - II

[*Time* : 3 hours

(Maximum marks : 100)

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

PART — A

(Maximum marks : 10)

Marks

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

1. List any two methods of connection of steel members.
2. Define the term 'tension member'
3. Define 'slenderness ratio' of compression members.
4. Define 'Laterally supported Beam'.
5. Define 'effective height of masonry wall'. (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Classify the properties of Structural steel.
2. Calculate the 'design shear strength' of a 16 mm diameter bolt of grade 4.6 used for a Lap joint for 12 mm thick steel plates of Fe 410 grade.
3. Defne the following terms : (a) Gross area (b) Net area (c) Net effective area.
4. Write the usual steps in the design of compression members.
5. Explain the classification of Cross sections as per IS 800-2007, based on plastic analysis.
6. List the loads acting on a roof truss.
7. Write short notes on the following :

   (a) Stress reduction factor (b) Area reduction factor (5×6 = 30)

Marks

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) List any six advantages of steel structures. 6

(b) Design a suitable longitudinal fillet weld to connect Fe 410 grade plates of size 120 × 8mm to 150 × 10mm to transmit a pull equal to full strength of small plate. Assume welding is to be done in work shop. 9

OR

IV (a) Explain the design philosophy of steel structures. 6

(b) Two steel plates (Fe410) of size 180 × 20 mm are lap jointed by use of 6 numbers of 20 mm diameter bolt of 4.6 grade. Determine the strength of joint if the pitch of the bolt is 60mm and edge distance is 30 mm. 9

UNIT — II

V (a) With neat figure, explain the use of Lug angles. 6

(b) Determine the design axial load capacity of the column ISHB 300 @ 577 N/m, if the length of column is 3 m and its both ends pinned. 9

OR

VI (a) With neat figure write short notes on Lacing and Battens. 6

(b) A single unequal angle ISA 90 × 60 × 6 mm is connected to a gusset plate of 10mm thick with 5 numbers of bolts of 16mm diameter, determine the design strength.
Take e = 30mm, p = 50mm, g = 50mm and fy = 250Mpa. 9

UNIT — III

VII (a) An ISWB 350 @ 569N/m carries maximum shear force 100 KN, check the safety of the beam in shear. Take fy = 250 Mpa. 6

(b) With a neat figure explain the different parts of a plate girder. 9

OR

VIII (a) Write short notes on steel beam and its design procedure. 6

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

UNIT — IV

IX (a) List the types of roof trusses. 6

(b) A masonry wall of 29 cm effective thickness is subjected to an eccentric load of 100KN at an eccentricity of 30 mm. The length of wall is 2.50 m and the mortar is of grade M1 (cement mortar 1:5) while the bricks used are of compressive strength 5.0N/mm^2. Check the design of the wall. Assume slenderness ratio of wall as 12. 9

OR

X (a) Explain the "Design considerations of a masonry wall". 6

(b) A roof truss shed is to be built in Lucknow for an industry. The size of shed is 24 × 40m. The height of building is 12m at the eves. Determine the basic wind pressure. 9