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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2021

STRUCTURAL DESIGN II

[Note :- 1. Missing data may be assumed
2. Use of IS 800-2007, IS 875, IS 1905 and steel tables are permitted]

[Maximum Marks: **75**] [Time: **2.15** Hours]

PART-A

(Answer ***any three*** questions in one or two sentences. Each question carries ***2*** marks)

I. 1. List the methods of structural analysis.
2. What is gauge distance in bolted connection?
3. Define net area of a tension member.
4. Define shape factor.
5. What is slenderness ratio of masonry wall? (3 x 2 = 6)

PART-B

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

II. 1. List the advantages of welded connections over bolted connections
2. Enumerate the physical and mechanical properties of structural steel.
3. Write the codal provisions for the effective length of a compression member for different end conditions.
4. Calculate the design strength due to yielding of gross section for an angle section ISA 90 x 90 x 6mm with yield stress 300 Mpa.
5. Classify the sections based on plastic analysis in the design of beams.
6. List the component parts of a roof truss.
7. List the design considerations of a masonry wall. (4 x 6 = 24)

PART-C

(Answer ***any of the three units*** from the following. Each full question carries ***15*** marks)

UNIT – I

III. (a) List the different methods of connections of steel members. (3)

(b) Calculate the strength of a 20mm diameter bolt of grade 4.6 for the following cases. The main plates to be jointed are 12mm thick a) Lap joint and b) single cover butt joint, the cover plate being 10mm thick. (12)

OR

IV. (a) List the advantages of steel structures over RCC structures. (5)

(b) A tie member consisting of an angle section ISA 65 x 65 x 6 of Fe410 grade is welded to an 8mm gusset plate. Design a weld to transmit a load equal to the full strength of the member. Assume shop welding. (10)

UNIT – II

V. (a) Describe lacings. (5)

(b) Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 250kN. The member is subjected to the possible reversal of stress due to the action of wind. The effective length of the member is 3m. Use 20mm shop bolts of grade 4.6 for the connection. (10)

OR

VI. (a) Describe battens. (5)

(b) Design a single angle strut connected to the gusset plate to carry 175kN factored load. The length of the strut between centre to centre connection is 3m. (10)

UNIT- III

VII. (a) Differentiate laterally supported and unsupported beams. (6)

(b) An ISMB 600 @ 1226N/m is used as simple beam over an effective span of 6m. The beam carries an udl of 24kN/m including self weight. fy=250N/mm^2. Check the safety of beam in deflection. (9)

OR

VIII. (a) Explain the different parts of a plate girder and the function of each part with neat sketch. (6)

(b) An ISLB 600@ 995N/m carrying a live load of 20kN/m excluding self weight over an effective span of 5m, the yield stress is 250MPa. Check the safety of the beam in shear. (9)

UNIT - IV

IX. (a) Differentiate between effective height and effective length of masonry wall. (6)

(b) A masonry wall carrying an axial load of 9.8kN/m is of 3.5m effective length. It is not braced by cross walls. The effective height of wall is 2.4m. Design the masonry wall. Given f_b = 0.5N/mm^2, k_a = 1, k_s= 0.84 & k_p = 1.20. (9)

OR

X. (a) List the loads acting on a truss. (6)

(b) Explain the calculation of wind load on roof truss. (9)

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