

TED (10) 4005
(Revision-2010)

N20 – R00198

Reg.No.....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE - NOVEMBER 2020

STRUCTURAL DESIGN

[Maximum marks: 100]

(Time: 3 Hours)

[Note:- Use of IS 456-2000, IS 800-2007, SP-16 and steel tables are permitted]

PART – A

[Maximum marks: 10]

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

- (1). What is the basic concept of RCC design.
- (2). What is bond strength?
- (3). List the various forms shear reinforcement.
- (4). Write the mechanical properties of structural steel.
- (5). What is the function of a stiffener in a plate girder?

(5 x 2 = 10)

PART – B

[Maximum marks: 30]

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

1. Explain i) Limit state of collapse ii) Limit state of serviceability
2. Explain the difference between under reinforced and over reinforced section?
3. What is a continuous slab. Explain the precautions to be taken while designing and constructing a continuous slab.
4. Draw and mark the parts of a flanged beam. Enumerate advantages of flanged beam.
5. What are the advantages and disadvantages of welded connections?
6. Explain the different modes of failure of a tension member with equations
7. Explain the different types of loads acting on a roof truss.

(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 is the need of development length? How is it provided? (6)
- (b) A single reinforced simply supported beam of effective span 6.2 m is carrying a UDL of 17 kN/m including the self weight. Taking breadth as 240 mm, find the depth and tensile steel. Check for shear and design for shear using M20 and Fe 415 steel. (9)

OR

- IV. (a). What are the conditions for using doubly reinforced section. (6)
(b). A singly reinforced cantilever beam of effective span 1.5m and carry a UDL of 12kN/m excluding the self weight. Design for flexure with M20 and Fe 415 steel. (9)

UNIT-II

- V. (a) Explain various end conditions for finding the effective length of a column? (7)
(b) Design the transverse reinforcement for an RCC column of size 250x600mm with 8 numbers of 20mm diameter longitudinal rods. (8)

OR

- VI. (a) Differentiate between uniaxial and biaxial bending of a column. What causes the bending stresses in a column. (6)
(b) Determine the positive and negative reinforcement at critical positions for the continuous slab detailed below: Number of spans = 5Nos, Eff. Span - 3.6m, Dead load – 3.5kN/m², Live load – 2kN/m², Concrete – M20 steel Fe 415 (9)

UNIT-III

- VII. (a) Explain the steps in the design of a tension member. (6)
(b) Design a single tension member to carry a tensile force of 225kN due to dead load live load. The angle is connected to gusset plate by fillet weld, $f_y = 25\text{MPa}$, $f_u = 410\text{MPa}$ (9)

OR

- VIII. (a) Write down the advantages and disadvantages of steel structures over RCC structures. (6)
(b) Design a double angle tension member of Fe 250 connected on each side of 10 mm thick gusset plate to carry an axial factored load of 375kN use 20mm black bolts shop connected. Check only for yield strength. (9)

UNIT-IV

- IX. (a) Draw the cross section of a plate girder, mark the elements and explain the functions of each element. (8)
(b) What is stiffness. Explain the different types of stiffness. (7)

OR

- X. (a) Explain web crippling. (7)
(b) Calculate the basic wind pressure for a shed of 45 x 20 x 14 m size if basic wind speed is 45m/sec, $K_1 = 1.0$, $K_2 = 0.934$, $K_3 = 1.06$ (8)

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