TED (15) – 5015

(REVISION — 2015)

Reg. No. .....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

STRUCTURAL DESIGN - I

[*Time* : 3 hours

(Maximum marks : 100)

[*Note:*— Use of IS 456-2000 and SP-16 are permitted.]

PART — A

(Maximum marks : 10)

Marks

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

1. List two main limit states of RCC design.
2. Write the functions of distributors in one way slab.
3. Differentiate between nominal shear stress and permissible shear stress.
4. How we can find the spacing of main reinforcement in one way slab.
5. State the minimum eccentricity taken in column design. $(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

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

1. Explain partial safety factors for material strength and loads.
2. Calculate the limiting moment of resistance of a singly reinforced beam having size 300 mm × 500 mm is reinforced with 4 numbers of 20 mm diameter bars. Use M 20 grade concrete and Fe 415 grade steel. Provide an effective cover of 50 mm.
3. Identify different types of shear reinforcements.
4. Explain : (i) Isolated footing (ii) Combined footing.
5. Calculate the development length of 20 mm diameter tension and compression reinforcement. Take grade of steel in Fe 415 and concrete M 20 grade.
6. Draw the sketch of torsion mesh provided at the corners of restrained slab when (i) One edge discontinuous (ii) Two adjacent edges discontinuous.
7. Explain : (i) Stairs spanning horizontally (ii) Stairs spanning longitudinally.

$(5 \times 6 = 30)$

Marks

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Explain the following section :

(i) Balanced section (ii) Under reinforced section

(iii) Over reinforced section 6

(b) A simply supported beam having span 5 m is subjected to a uniformly distributed load of 20kN/m including self weight. Design the beam for flexure using M20 grade concrete and Fe 500 grade steel. 9

OR

IV (a) State the circumstances under which doubly reinforced beams are needed. 6

(b) A cantilever beam having an effective span of 1.5 m is acted upon by a udl of 8kN/m including self weight. Design the beam for flexure using M20 grade concrete and Fe 415 grade steel. 9

UNIT — II

V (a) Sketch the cross section of a T-beam and mark the parts. How the effective width of flange will calculate as per code provisions. 6

(b) An R.C.C. beam 200 mm wide and 450 mm effective depth is simply supported over a span of 6m. It is subjected to a shear force of 90 kN at support. The beam is provided with 1% of tension reinforcement. Design the shear reinforcement using M 20 grade concrete and Fe 250 grade steel. 9

OR

VI (a) A doubly reinforced simply supported rectangular beam has a span of 5m, 300 × 420mm (effective) is provided with 4 numbers of 16 mm diameter bars as tension reinforcement and 3 numbers of 16mm diameter bars as compression reinforcement. Grade of concrete is M20 and steel Fe415. Check the beam for stiffness. 6

(b) Find the ultimate moment of resistance of a T - beam section having width of flange 1400mm, depth of flange 130mm, width of rib 250mm, effective depth of beam is 400mm and area of tension steel 2000mm^2. Use M20 concrete and Fe 415 steel. 9

UNIT — III

VII (a) Distinguish between one way slab and two way slab. 6

(b) Design a slab for a room having inside dimension 3 × 8m. The slab is simply supported on masonry walls having thickness 240mm. The slab carries a live load of 2kN/m^2 and a floor finish of 1.8 KN/m^2. Use M20 concrete and Fe415 grade steel. 9

OR

Marks

VIII (a) Draw a neat sketch showing the arrangements of reinforcements in one way continuous slab. 6

(b) Calculate the area of reinforcement required for a two way simply supported roof slab for a room 4m × 6m. The slab is supported on walls 300mm wide. Live load is 2kN/m^2 and weight of weathering course is 1.8 KN/m^2. Corners are not held down. Use M20 concrete and Fe 415 grade steel. 9

UNIT — IV

IX (a) Write the code provision for selecting the diameter and spacing of laterals and pitch of helical reinforcement in columns. 6

(b) Design a dog logged stair case in a stair hall of 2.5 × 5.2m for a building in which the height of floor is 3.3m. Provide arise of 150mm and tread 250mm The super imposed load on stair is 3kN/M^2. Use M20 Concrete of Fe415 steel. 9

OR

X (a) Explain the procedure of checking one way shear and two way shear in column footing. 6

(b) Design a short R. C. C. square column to carry an axial load of 1400kN. Use M25 grade concrete and Fe500 grade steel. 9