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BOARD DIPLOMA EXAMINATION, (C-16)
SEPTEMBER/OCTOBER - 2020
DCE—FOURTH SEMESTER EXAMINATION
REINFORCED CONCRETE STRUCTURES

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.
(4) Use of code book IS-456-2000 is permitted.
1. List out the advantages and disadvantages of concrete when compared with other building materials.
 2. Define the term 'limit state'. Mention the different types of limit state.
 3. Define (a) depth of neutral axis and (b) lever arm.
 4. Find the depth of NA of singly reinforced rectangular beam 300 mm×450 mm effective depth, reinforced with 4 bars of 16 mm diameter. Concrete is M20 grade and steel is Fe415.
 5. State the IS code provisions for limiting vertical deflection for different types of beams/slabs.

- * 6. What is the maximum spacing of main reinforcement and distribution steel in slabs?
7. A continuous RCC rectangular beam of size 300 mm×550 mm overall is supported on 230 mm×230 mm masonry column at clear intervals of 4 m. Calculate the effective span.
8. What are the advantages of continuous beams/slabs?
9. Give the equations for calculating the effective flange width of T-beams.
10. List any three code provisions for longitudinal reinforcement in design of columns.

PART-B

10×5=50

Instructions : (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

(4) Assume missing data, if any, suitably.

* 11. An RC beam 250 mm wide and 550 mm deep effective is reinforced with 4 numbers of 12 mm diameter bars. Find the moment of resistance of the beam by using working stress method. Concrete grade M20 and Fe415 steel are used.

12. A singly reinforced concrete beam section 250 mm×600 mm overall is reinforced with 3 bars of 20 mm diameter with an effective cover of 50 mm. The beam is cantilever over a span of 3 meters. Find the uniformly distributed load the beam can carry, when M20 grade concrete and Fe415 steel are used.

* **13.** A doubly reinforced beam of width 230 mm and 550 mm total depth is reinforced with 4 bars of 16 mm diameter as compression reinforcement and 6 bars 20 mm diameter as tension steel at an effective cover of 50 mm on both the sides. Find the safe uniformly distributed load the beam can carry if it is simply supported over an effective span of 5 m. Use M20 grade concrete and Fe415 steel.

14. Design a two-way slab for a room 4200 mm×3500 mm clear in size, if the superimposed load is 3.5 kN/m² and floor finish of 1 kN/m². The edges of the slab are simply supported and corners are not held down. Use M20 grade concrete and Fe415 steel.

15. Calculate the maximum moment of resistance of T-beam which has simply supported span of 5 m.

Width of flange : 1500 mm

Thickness of flange : 100 mm

Effective cover : 40 mm

The reinforcement consists of 4 bars of 20 mm diameter. Use M20 grade concrete and Fe415 steel.

16. Design a continuous one-way slab for an office floor. The slab is continuous over beams spaced at 3.5 m intervals. The width of the beam is 230 mm. The superimposed load is 4 kN/m² and floor finish is 1 kN/m². Use M20 grade concrete and Fe415 steel.

17. Design a circular column of diameter 400 mm, with lateral ties subjected a working load of 1200 kN. Use M20 grade concrete and Fe415 steel. The column is 3 m long, effectively held in position and direction at both ends.

* **18.** A reinforced concrete column of size 300 mm×300 mm carries a load of 750 kN. The safe bearing capacity of soil is 200 kN/m². Design an isolated column footing with uniform thickness. Use M20 grade concrete and Fe415 steel.
