C16-C–401

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BOARD DIPLOMA EXAMINATION, (C-16)

MAY/JUNE—2023

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. What are the advantages of limit state method of design over working stress method.

3. Define the terms *(a)* depth of neutral axis and *(b)* lever arm.

4. Find the depth of neutral axis of singly reinforced rectangular beam 230 mm × 300 mm effective depth, reinforced with 4 bars of 12 mm diameter. Concrete is M 20 grade and steel is Fe 415.

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 × 450 mm overall is supported on 230 mm × 300 mm masonry column at clear intervals of 3 m. Calculate the effective span.

8. What are the advantages of continuous beams/slabs?

9. What are the conditions to be satisfied to adopt the moment and shear coefficients given is IS : 456-2000 for continuous 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 criterion for valuation is the content but not the length of the answer.

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

11. A RC beam 230 mm wide and 500 mm deep effective is reinforced with 4 numbers of 16 mm diameter bars. Find the moment of resistance of the beam by using working stress method. Concrete grade M 20 and Fe 415 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 M 20 grade concrete and Fe 415 steel are used.

13. A doubly reinforced beam of width 230 mm and 550 mm total depth is reinforced with 4 bars of 12 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 4 m. Use M 20 grade concrete and Fe 415 steel.

14. Design a two-way slab for a room 4200 mm × 3500 mm clear in size if the superimposed load is 3·0 kN/m^2 and floor finish of 1 kN/m^2. The edges of the slab are simply supported and comers are not held down. Use M 20 grade concrete and Fe 415 steel. Width of support = 230 mm.

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

Width of flange	=	1000 mm
Thickness of flange	=	100 mm
Effective cover	=	40 mm
Effective depth	=	450 mm
Width of web	=	250 mm

The reinforcement consists of 4 bars of 16 mm diameter. Use M 20 grade concrete and Fe 415 steel.

16. Design a continuous one-way slab at mid-section of end panel for an office floor. The slab is continuous over beams spaced at 3 m intervals. The width of the beam is 230 mm. The superimposed load is 3.5 kN/m^2 and floor finish is 1 kN/m^2. Use M 20 grade concrete and Fe 415 steel.

17. Design a circular column of diameter 450 mm, with lateral ties subjected a working load of 1000 kN. Use M 20 grade concrete and Fe 415 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 250 kN/m^2. Design an isolated column footing with uniform thickness. Use M 20 grade concrete and Fe 415 steel.

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