



c16-c-401

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BOARD DIPLOMA EXAMINATION, (C-16)
OCT/NOV—2018
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.

1. Define:

- (a) Characteristic strength of materials
- (b) Characteristic loads

2. Explain:

- (a) Limit state of collapse
- (b) Limit state of serviceability

3. Determine the spacing of 8 mm diameter 2 legged vertical stirrups for an RCC beam of 230 mm wide and 450 mm effective depth to resist a factored shear force of 90kN. Use M20 concrete and Fe250 steel.

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4. A lintel of effective depth 120 mm is provided over a door opening of 2.4m. The height of brickwork above the opening is 3m. Masonry weighs 16 kN/m^2 . The brick walls are 230 mm thick. Bearing of lintel on either side is 150 mm. Find the masonry load on the lintel. Assume 60° load dispersion.

5. State IS code stipulations of minimum percentages and maximum spacing of distribution reinforcement.

6. A restrained two-way slab is provided 210 mm^2 as midspan reinforcement. Find the areas of torsion reinforcement in the slab—
(a) at the corner where both edges are discontinuous;
(b) at the corner where one edge is discontinuous and one edge is continuous.

7. Find the effective flange width of the following simply supported isolated Tee-beam:

(a) Effective span = 5 m

(b) Breadth of the web = 230 mm

(c) Thickness of slab = 110 mm

(d) Width of the support = 230 m

(e) Actual width of the flange = 750 mm

8. State the conditions for using design coefficients to find the design moments and shear force as given in IS 456-2000 in case of continuous beams/slabs.

9. A continuous RCC slab of 120 mm thick is supported on 300 mm \times 300 mm beams at clear intervals of 4m.

10. A square column of size 450 mm \times 450 mm is reinforced with 8 bars of 20 mm diameter of grade Fe 415 and grade of concrete is M20. Calculate the load carrying capacity as per IS 456-2000.

PART—B

10×5=50

- Instructions :** (1) Answer *any five* questions.
(2) Each question carries **ten** marks.
(3) The answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 11.** Design a reinforced concrete beam simply supported over an effective span of 6 m to support an imposed load of 20 kN/m inclusive of its self weight. Use M20 grade concrete and Fe 415 grade steel. Provide width of the beam equal to half of the depth. Use working stress method.
- 12.** Design a rectangular simply supported reinforced concrete beam over a clear span of 5m. The superimposed load is 25kN/m and support width is 230 mm each. Use M20 concrete and Fe 415 steel. Check the design for deflection. Shear reinforcement design is not necessary.
- 13.** A cantilever beam of uniform depth is to support a span of 2.5 m. If the superimposed load is 20 kN/m and it is monolithic with RC column of 300 mm width and 400 mm deep, design the beam including shear reinforcement. Check for deflection is not necessary. Use M20 concrete and Fe 415 steel.
- 14.** Design a reinforced concrete slab to carry a live load of 3 kN/m² on an effective span of 3.7 m. Use M20 concrete and Fe 415 steel. Sketch the reinforcement details.
- 15.** A Tee-beam of effective flange width of 1200 mm, thickness of slab 110 mm, width of the rib 300 mm and effective depth 470 mm is reinforced with 4 numbers of 16 mm diameter bars. Calculate the moment of resistance of the section. Use M20 concrete and Fe 415 steel.

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- 16.** A continuous RCC rectangular beam of size 250 mm × 500 mm overall depth is supported by 300 mm × 300 mm size masonry pillars at clear intervals of 4m. The beam carries a dead load of 20 kN/m including its self weight and an imposed load of 10 kN/m. Design the reinforcement at
- (a) middle of the end span and
 - (b) middle of interior span. Use M20 concrete and Fe 415 steel.
- 17.** Design a circular column to an axial load of 1100 kN using lateral ties. Use M20 concrete and Fe 415 steel.
- 18.** A square isolated uniform reinforced concrete footing 2.5 m × 2.5 m is 560 mm thick, supports an RC column of size 300 mm × 300 mm. Net upward soil pressure on footing is 280 kN/m². The footing is provided with 16 mm diameter bars at 220 mm c/c in both the directions as reinforcement. Check the footing for (a) One way shear, (b) Punching shear, (c) Development length and (d) Bearing pressure. The safe bearing capacity of soil is 200 kN/m². Use M20 concrete and Fe 415 steel. Take the effective cover for bars in footing is 50 mm.

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