



C16-C-401

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**BOARD DIPLOMA EXAMINATION, (C-16)
OCTOBER/NOVEMBER—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.

1. Define the following terms used in working stress method :
(a) Modular ratio
(b) Lever arm
2. Define the term 'limit state'. Mention different types of limit states.
3. Define the terms (a) depth of neutral axis and (b) lever arm.
4. What are different forms of shear reinforcement in beams?
5. What is the maximum spacing of main reinforcement and distribution steel in slabs as per IS 456-2000?
6. Differentiate between one-way and two-way slabs.
7. Find the effective flange width of the following simply supported isolated tee-beam :
Effective span = 5 m
Breadth of the web = 230 mm
Thickness of slab = 110 mm
Width of the support = 230 mm
Actual width of the flange = 750 mm

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8. Sketch a three span continuous beam and mark the location where the tension reinforcement is provided.
9. Calculate the factored moment at middle of interior span of a 3 span continuous floor slab with the following data :
- Factored dead load $W_{ud} = 8.4 \text{ kN/M}$
- Factored live load $W_{UL} = 3.75 \text{ kN/M}$
- Effective span $l = 3.39 \text{ m}$
10. What are the specifications for lateral ties in a column?

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.

11. A singly reinforced rectangular concrete beam of size 300 mm × 500 mm effective depth is reinforced with 4 bars of 20 mm dia bars. Find the moment of resistance of the beam section using working stress method. Use M-25 grade concrete and Fe-415 steel.
12. Design a rectangular simply supported reinforced concrete beam over a clear span of 4 m carrying a live load of 20 kN/m and support width is 300 mm each. Use M-20 grade concrete and Fe-250 steel. Take effective cover as 50 mm. Check the design for deflection.
13. An RCC beam 230 mm wide and 450 mm deep is reinforced with 4 bars of 16 mm diameter on tension side. If the design shear force is 60 kN, design the shear reinforcement consisting only of vertical stirrups. 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 3.5 kN/m² and floor finish of 1 kN/m². The edges of the slab are simply supported and corners are not held down. Use M-20 grade concrete and Fe-415 steel. Support width = 250 mm all round.

- 15.** Calculate the moment of resistance of the T-beam with the following data :
- Width of the flange—750 mm,
 - Thickness of slab—110 mm,
 - Width of the rib—250 mm,
 - Effective depth—600 mm,
 - Area of tension steel—2400 mm²,
 - Grade of steel Fe-415 and grade of concrete M-20.
- 16.** Design a continuous one-way slab at mid-section of interior panel 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 M-20 grade concrete and Fe-415 steel.
- 17.** Design a circular column to carry an axial load of 1000 kN using lateral ties. Use M-20 concrete and Fe-415 steel.
- 18.** Design a square footing of uniform thickness for a reinforced concrete column of size 300 mm × 300 mm carries an axial load of 1200 kN. The safe bearing capacity of soil is 220 kN/m². Use M-20 concrete and Fe-415 steel.

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