



c09-c-402

**3423**

**BOARD DIPLOMA EXAMINATION, (C-09)**  
**OCT/NOV—2014**  
**DCE—FOURTH SEMESTER EXAMINATION**  
**RC STRUCTURES**

*Time* : 3 hours ]

[ *Total Marks* : 80

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**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) Candidates are allowed to use IS : 456-2000 Code Book.

1. What is the role of partial safety factor in limit state design?
2. Define characteristic strength of material and characteristic load.
3. Calculate the development length in compression for Fe-250 bar of 12 mm diameter and M-20 concrete.
4. Calculate the development length in tension for Fe-415 bar of 16 mm diameter and M-20 concrete.
5. Why is the reinforcement of short span placed below the reinforcement of long span in slabs?
6. Explain where and how you will provide torsion reinforcement in slabs.

- \* 7. Find the effective flange width of the following simply supported T-beam :
- Effective span = 5.4 m  
 c/c distance of adjacent panels = 3.0 m  
 Breadth of web = 230 mm  
 Thickness of slab = 120 mm
8. How do you calculate effective span in case of a continuous beam?
9. Calculate the maximum bending moment at support next to end supports for a continuous beam with the following data as per IS : 456-2000  
 Size of the beam 300 mm 500 mm overall  
 Effective span = 4 m  
 Imposed load (not fixed) = 10 kN/m  
 Imposed load (fixed) = 15 kN/m excluding self-weight  
 Effective cover = 40 mm
10. Calculate the load carrying capacity of an axially loaded short column of diameter 230 mm reinforced with 6 bars of 12 mm diameter. [Use M-20 grade concrete and Fe-415 grade steel.]

**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 suitable data wherever necessary.

11. (a) State the assumptions made in working stress method of design for flexure. 4  
 (b) Define the terms (i) modular ratio, and (ii) lever arm in working stress method 4  
 (c) Determine the modular ratio for M-25 grade concrete. 2
- \* 12. A singly reinforced concrete beam section of 300 mm 550 mm overall is reinforced with 5 bars of 12 mm diameter with an effective cover of 50 mm. The beam is simply supported over a span of 5.5 m. Find the uniformly distributed load the beam can carry. Use M-25 grade concrete and Fe-415 steel. Use limit state method.

- \* 13. Design a simply supported singly reinforced rectangular RC beam for flexure over a clear span of 5 m. The superimposed load is 20 kN/m and the width of supports is 300 mm each. Use M-20 grade concrete and Fe-415 steel. Check the design for deflection.
14. Design a simply supported RC slab for a room of clear size 4 m × 3.5 m superimposed load being 3 kN/sq.m and weight of finishes being 1.0 kN/sq.m. The corners of the slab are not held down. Width of supports is 230 mm. [Use M-25 grade concrete and Fe-415 steel]
15. A T-beam of effective flange width 1200 mm, thickness of slab 100 mm, width of rib 300 mm and effective depth 460 mm is reinforced with 4 numbers of 16 mm diameter bars. Calculate the moment of resistance of the section. [M-20 grade concrete and Fe-415 bars are used.]
16. A continuous RCC rectangular beam of size 300 mm × 500 mm effective is supported on 300 mm × 300 mm brick pillars at 3 m intervals. The beam carries a dead load of 15 kN/m including its self-weight and imposed load of 10 kN/m. Design the reinforcement for the beam at the support next to end support. [Use M-20 concrete and Fe-415 steel.]
17. Design a circular column of diameter 400 mm with lateral ties. Unsupported length of column is 3 m and is subjected to a working load of 1200 kN. The column is effectively held in position at both ends but not restrained against rotation at both ends. [Use M-25 concrete and Fe-415 steel.]
- \* 18. A square isolated uniform RC footing, 2500 mm × 2500 mm, being 550 mm thick supports an RC column 300 mm × 300 mm. Net upward soil pressure on the footing is 288 kN/m<sup>2</sup>. 16 mm diameter bars at 220 mm c/c is provided in the footing in both the directions. Effective cover for bars in the footing is 50 mm. Using M-20 concrete and Fe-415 steel, check the footing for one-way shear, punching shear, development length and bearing pressure.  $2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}$

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