

c09-c-402

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BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2021

DCE - FOURTH SEMESTER EXAMINATION

R.C. STRUCTURES

Time : 3 hours ]

[ Total Marks : 80

**PART—A**

4×5=20

- Instructions :** (1) Answer *any five* questions.  
(2) Each question carries **four** marks.  
(3) Assume suitable data if necessary.  
(4) IS 456:2000 and SP-16 Codes are allowed.

1. Define the term limit state as per IS : 456-2000.
2. State the loads to be considered in the design of beams as per IS : 875
3. Calculate the maximum area of tension reinforcement for the beam of size 300 mm × 500 mm overall as per code.
4. Write the anchorage value of a standard U-type hook as per IS : 456-2000
5. State the IS code provisions for limiting vertical deflections for different types of beams/slabs for spans up to 10 m.
6. What is the maximum distance between main bars to be provided in tension for slabs as per IS : 456.
7. What are the advantages of T-beams?

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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. Sketch three span continuous slabs and mark the points, where the tension reinforcement is to be provided.
10. Write the equation to calculate ultimate load on short axially loaded column with lateral ties.

**PART—B**

15×4=60

- Instructions :** (1) Answer *any four* questions.  
 (2) Each question carries **fifteen** marks.  
 (3) Assume M20 grade concrete and Fe415 grade for steel unless specified.  
 (4) Answer all questions using Limit State Method unless specified.

11. A reinforced concrete beam 250 mm wide and 425 mm effective depth is reinforced with an area of tension steel 600 mm<sup>2</sup>. Find the depth of neutral axis. Take  $\sigma_{cbc} = 7 \text{ N/mm}^2$  and  $\sigma_{st} = 230 \text{ N/mm}^2$  (Working Stress Method).
12. State the assumptions made in the design of flexural members (Beams) in limit state method as per IS : 456-2000.
13. A singly reinforced rectangular beam 300 mm × 450 mm effective depth is reinforced with 5 bars of 16 mm diameter. Find whether it is under-reinforced or over-reinforced if M20 grade concrete and Fe 415 grade steel are used.
14. Draw the cross-section of a cantilever slab (sunshade) and show the reinforcement.
15. A T-beam of effective flange width 1500mm, thickness of slab 100 mm, width of web 300 mm, and effective depth of 560 mm is reinforced with 4 nos. of 25 mm dia bars. Find whether the N-A lies in the flange or web. Take  $f_{ck} = 20 \text{ N/mm}^2$  and  $f_y = 415 \text{ N/mm}^2$ .

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- 16.** Calculate the maximum factored moment at middle of interior span of a 3 span continuous floor slab with the following data using IS : 456 :
- Effective span ( $l$ ) = 4 m; Factored dead load ( $w_{ud}$ ) = 8.4 kN/m; Factored live load ( $w_{ul}$ ) = 3.75 kN/m.
- 17.** Write any five codal provisions to be followed regarding longitudinal reinforcement used in columns.
- 18.** Draw neat sketches of any three types of footings.

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