* 4618 *

C14–C–501

4618

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2017

DCE—FIFTH SEMESTER EXAMINATION

DESIGN AND DETAILING OF RC ELEMENTS

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) **IS 456-2000** and **SP-16** codes are permitted.

1. Define 'characteristic strength of materials' and 'characteristic loads'.

2. State any three differences between working stress method and limit state method of design.

3. Define the term 'lever arm'. Write the equation for lever arm for singly reinforced rectangular beam, in limit state method.

4. Determine the development length of 16 mm dia, Fe-415 HYSD bar in tension and compression with M-25 grade concrete in limit state method.

5. State the provisions for limiting spacing of main reinforcement and distribution steel in slabs as per IS 456-2000.

6. State any three differences between one-way and two-way slabs.

7. Write the equations for calculating the effective flange width of the following :

(a) T-beam

(b) Isolated T-beam

8. If w_{ud} is factored fixed load and w_{ul} is factored load which is not fixed, write the equations to find shear force at salient points of a continuous beam.

9. Calculate the maximum bending moment at the supports for a four-span continuous beam using IS 456-2000 with the following details :

Clear distance between supports	=	3·2 m
Dead load	=	2·8 kN/m
Imposed load (not fixed)	=	12 kN/m
Overall depth of beam	=	410 mm
Effective cover	=	50 mm

10. A short circular column of size 420 mm is reinforced with 6 nos. of 20 mm diameter bars. Find the axial factored load the column can carry. The material used are M-20 grade concrete and Fe-415 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.

11. *(a)* Explain 'neutral axis factor' and 'lever arm factor' in working stress method. 4

(b) Estimate the moment of resistance of a singly reinforced rectangular section 230 mm×450 mm effective depth, reinforced with 5 bars of 12 mm dia. M-20 concrete and Fe-250 steel are used. Use working stress method. 6

12. Find the area of tensile reinforcement required for a singly reinforced rectangular concrete beam of width 300 mm and effective depth 520 mm subjected to a factored bending moment of 138 kN-m. Use M-20 grade concrete and HYSD steel of grade Fe-415.

13. Design a lintel over an opening of width 2·4 m. The height of masonry wall above the opening is 3 m. The thickness of wall is 230 mm. Use M-20 concrete and Fe-415 steel. Design of shear reinforcement need not be done.

14. A rectangular RC slab panel discontinuous and restrained at all edges has effective spans of 3·5 m and 5 m. The live load on slab is 2 kN/m^2 and floor finish is 0·8 kN/m^2. Design the slab using M-20 grade concrete and HYSD steel of grade Fe-415 by using limit state method.

15. A T-beam of flange width 1500 mm, thickness of flange 100 mm is reinforced with 4 no. of 16 mm dia. on tension side. The width of rib is 250 mm and effective depth is 500 mm. Calculate the safe uniformly distributed load including self-weight the beam can carry over a simply supported span of 5 m. M-20 concrete and Fe-415 steel are used.

16. Design a continuous one-way slab for the floor of library hall. The slab is continuous over beams of width 230 mm spaced @ 3·5 m intervals. The live load is 3 kN/m^2 and weathering course is 1 kN/m^2. Use M-20 concrete and Fe-415 steel.

17. Design a square column of size 420 mm, 3 m long subjected to a working load of 1100 kN. Use M-20 concrete and Fe-415 steel. The column is effectively held in position and restrained against rotation at both the ends.

18. Design a square footing of uniform thickness for a reinforced concrete column of size 500 mm×500 mm carrying an axial load of 800 kN. The safe-bearing capacity of soil may be taken as 150 kN/m^2. Use M-20 grade concrete and Fe-415 steel. Check for one-way and two-way shears.

★ ★ ★