* 6424 *

C–16–C–401

6424

BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—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.

(4) Assume suitable data, if necessary.

(5) IS 456 : 2000 code and SP-16 are allowed with candidates.

1. Write any three differences between nominal mix concrete and design mix concrete.

2. Define the term 'limit state'. Mention different types of limit state.

3. Calculate the minimum and maximum area of steel for a beam of 300 mm × 500 mm overall depth and effective cover 40 mm. Use Fe-415 steel.

4. What is the effective depth of singly reinforced concrete section, if the limiting moment is 90 kN-m, and the width of the beam is 230 mm and concrete grade is M-20 and type of steel is Fe-415?

5. State the IS code provisions for limiting vertical deflections for different types of beam/slab.

6. Classify slabs based on spanning directions and support conditions.

7. Draw the cross-section and stress diagrams for three cases of a T-beam.

8. Calculate the share force at outer side of support next to end support for a continuous beam as per IS 456–2000. Size of the beam is 300 mm × 500 mm overall. Effective span = 3·5 m, imposed load (not fixed) = 10 kN/m, imposed load (fixed) = 14 kN/m excluding self weight.

9. What are the conditions to be satisfied to adopt the moment and shear coefficients given in IS 456–2000 for continuous beams/slabs?

10. Determine the factored axial load of a short circular column of 300 mm diameter which can carry if the column is reinforced with 8 bars of 16 mm diameter. The grade of concrete used is M-25 and the grade of steel is Fe-415.

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, if necessary.

(5) Answer all questions in limit-state method unless mentioned as working stress method.

11. A singly reinforced rectangular concrete beam of size 300 mm × 500 mm effective depth is reinforced with 4 bars of 20 mm dia HYSD 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 3 m carrying a live load of 10 kN/m and support width is 300 mm each. Use M-20 grade concrete and Fe-250 steel. Take effective cover as 50 mm.

13. Design an RC lintel for an opening of 1·2 m width on a masonry wall of 230 mm width using M-20 grade concrete and Fe-415 steel. The height of masonry wall above the opening is 2 m/ The lintel has a bearing of 150 mm on the walls. The unit weight of masonry may be taken as 19 kN/m^3. No shear reinforcement design is required.

14. The floor slab of a classroom of 3 m × 5 m is discontinuous on all its four sides. The corners of the slab are prevented from lifting. 50 mm thick floor finish of unit weight 20 kN/m^3 is to be provided over the slab. Live load on the slab is 3 kN/m^2. Width of the support is 230 mm. Design the slab using M-20 grade concrete and Fe-415 steel. Design the torsion reinforcement also.

15. Calculate the moment of resistance of the T-beam with the following data :

Width of the flange = 700 mm
Thickness of the slab = 100 mm
Width of the rib = 250 mm
Effective depth = 600 mm
Area of tension steel = 2400 mm^2

Grade of steel is Fe-415 and M-20 grade concrete.

16. A continuous RCC rectangular beam of size 230 mm × 450 mm overall is supported by internal columns 230 mm × 230 mm placed at a clear interval of 3 m. If the beam has to carry a dead load of 18 kN/m and imposed load of 12 kN/m, design the reinforcement at the support next to end support section. Use M-20 grade concrete and Fe-415 steel. Assume effective cover 40 mm.

17. Design the short reinforced concrete rectangular column with one side as 300 mm to carry an axial load of 1800 kN. Use M-25 concrete and Fe-415 steel.

18. Design a square footing of uniform thickness for a reinforced concrete column of 350 mm × 350 mm in size carrying an axial load of 1000 kN using M-20 grade concrete and Fe 415 steel. The safe bearing capacity of the soil is 200 kN/m^2. Check for bearing pressure and development length are not required.

★ ★ ★