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C09–C–402

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—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) Use of IS 456–2000 and SP–16 codes are permitted.

1. State any three advantages of limit state method of design over working stress method.

2. Define the term limit state. List the different types of limit states.

3. Draw the bending stress distribution diagram of the cross-section of a balanced section related to a singly reinforced beam, is limit state method.

4. A singly reinforced concrete beam of width of 230 mm has to resist an ultimate moment of 100 kN-m. If M20 grade concrete and Fe 415 grade steel are used, determine the minimum effective depth required to resist that moment.

5. Mention the minimum spacing requirements of main reinforcement and distribution reinforcement in slabs as per IS 456-2000?

6. Classify the staircases based on the design of slab type.

7. Write the equations used to find out the effective flange width of isolated Tee bean.

8. What are the three advantages of continuous beam when compared to simply supported beam?

9. Write down the bending moment coefficients for a three-span continuous beam at salient points.

10. How do you fix the diameter of lateral tie and its spacing in case of square or rectangular columns?

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) The answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

(4) Assume any suitable data required during solving the problems. Answer all questions using limit state method, unless it is specified as working stress method.

11. A reinforced concrete beam 230 mm wide and 450 mm overall depth was reinforced with 4 no. of 16 mm at an effective cover of 33 mm in tension zone. If it is a simply supported beam with a clear span of 4m, find the maximum uniformly distributed load that can be applied over the beam including self weight of it. use Fe 415 steel and M20 concrete. Use working stress method.

12. An RC beam of rectangular section 230 mm wide and 410 mm overall depth is reinforced with 4 numbers of 16 mm bars in tension and 2 no. of 16 mm bars in compression. Using M20 grade concrete and Fe 415 grade steel. Calculate the ultimate of

moment resistance of the section. Take an effective cover of 33 mm on both sides.

13. An RC beam of rectangular section has to carry a factored shear force of 150 kN. If the beam is of 230 mm wide and 350 mm effective depth, determine the spacing of 8 mm two-legged vertical stirrups required to resist the given shear force. Use M20 grade concrete and Fe 415 grade steel.

14. A simply supported RC slab is provided over a room of internal dimensions 3m × 4m. Design the slab if the corners of the slab are not prevented from lifting. Use M20 grade concrete and Fe 415 grade steel. Support width 230 mm; take live load and weight of weathering course as 3 kN/m^2 and 1kN/m^2. Use limit state method.

15. A reinforced concrete T-beam of 1500 mm effective flange width, 150 mm slab thickness, 230 mm rib width and 450 mm effective depth is having a tension reinforcement of 600 mm^2. using M20 grade concrete and Fe 415 grade steel, calculate the ultimate of moment resistance of the section.

16. A continuous RC rectangular beam of size 230 mm × 350 mm overall is supported by 230 mm wide columns at clear intervals of 3.5 m. The beam carries a dead load of 18 kN/m (including its self weight) and an imposed load of 12 kN/m. Find the reinforcement required to be provided at middle of the intermediate panel, at the support next to end support and at the centre of end span. Use M20 grade concrete and Fe415 grade steel.

17. Design the reinforcement for a short axially loaded column of size 230 mm × 305 mm to withstand a factored load of 1500 kN. Use M20 grade concrete and Fe 415 grade steel.

18. Design a reinforced concrete footing of uniform thickness for a reinforced concrete column of 230 mm × 230 mm size and carrying an axial load of 900 kN using M20 grade concrete and Fe 415 grade steel. The safe bearing capacity of the soil is 150 kN/m^2.

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