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Question Paper Code: 95103

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Fifth Semester

Civil Engineering

19UCE503 – DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Partial Safety factor for M20 concrete as per Working Stress and Limit State   CO1- U
   Methods.
   (a) Dynamic   (b) Static   (c) Compile time   (d) None of the mentioned

2. L/d ratio for cantilever slab of span 1.5 m is   CO2- App

   (a) 7   (b) 20   (c) 26   (d) 35

3. The Effective cover can be defined as   CO2- U

   (a) Nominal Cover +Radius of bar   (b) Nominal cover + Diameter of bar

   (c) Nominal cover + Radius of bar/2   (d) Nominal cover + twice the diameter of bar

4. The effective cover of column of size 400 x 400 mm reinforced with 4   CO2- App
   numbers of 16 mm diameter bar is

   (a) 40mm   (b) 48mm   (c) 50mm   (d) 52mm

5. Spread footing for a single column is known as the   CO3- R

   (a)) Isolated footing   (b) Combined footing   (c) Strip footing   (d) Eccentric Footing

PART – B (5 x 3= 15 Marks)

6. Explain any three assumptions made in Working Stress Design.   CO1- U

7. Determine the effective depth of a simply supported slab of span 3 m.   CO2- App

8. A reinforced concrete beam has a support section with a width of 300 mm and effective depth of 600 mm. The support section is reinforced with 0.25 % of tension reinforcement. Using M-20 Grade concrete and Fe-415 HYSD bars, analyze the shear resisted by the concrete and justify whether it can bear ashear force of 100 kN.   CO3- Ana

9. A rectangular column is reinforced with 6 numbers of 22 mm diameter bars. The grade of concrete is M20 and steel is Fe500.Analyze whether the column can take a load of 2000 kN.   CO3- Ana

10. Explain where the bending moment and shear will be critical in a footing.   CO1- U

PART – C (5 x 16= 80Marks)

11. (a) A simply supported reinforced concrete one way slab with an effective span of 4 m is reinforced with 10 mm diameter, Fe 415 HYSD bars spaced at 200 mm centers at an effective depth of 150 mm. Using M 20 grade concrete, analyze whether the slab can take the maximum permissible live load of 5 kN /m^2, if the self-weight of the slab and finishes are 5.5 kN/m^2.   CO3- Ana   (16)

Or

(b) A simply supported R.C.C. slab is having the following specifications.Overall Depth = 160 mm, Effective Depth = 150 mm reinforced with 12mm dia. bars at 120 mm spacing. The effective span is 4 m. Self-weight of the slab and finishes is 4.2 kN/m^2. Analyze whether the slab can take the maximum permissible live load of 5 kN /m^2, Adopt M 20 grade concrete and Fe 415 steel.   CO1- Ana   (16)

12. (a) Design a one – way slab with a clear span of 3.5 m, simply supported on 200 mm thick concrete masonry walls to support a live load of 4 kN/m^2. Adopt M – 20 grade concrete and Fe – 415 HYSD bars as per limit state method followed in IS456:2000.   CO2- U   (16)

Draw the reinforcement details.

Or

(b) Design a two – way slab for an office floor of size 3.5 m by 4.5 m, with discontinuous and simply supported edges on all the sides with corners prevented from lifting and supporting a service live load of 4 kN/m^2. Adopt M – 20 grade concrete and Fe – 415 HYSD bars as per limit state method followed in IS456:2000.Draw the reinforcement details.   CO2- U   (16)

13. (a) Design a singly reinforced beam to suit the following data: CO2- App (16)

Clear Span = 4 mWidth of support = 300 mm Service Load = 5 kN / m Materials : M – 20 Grade Concrete Fe415 HYSD bars

Or

(b) Design a reinforced concrete beam to suit the following data: CO2- App (16)

Clear Span = 5 m Width of support = 250 mm Overall depth = 500 mm Service Load (DL + LL) = 30 kN / m Effective cover = 50 mm Materials : M – 20 Grade Concrete Fe415 HYSD bars

14. (a) Design a rectangular column of size 300 x 600 mm to carry an ultimate load of 2500kN. The unsupported length of the column is 3m. The ends of the column are effectively held in position and also restrained against rotation. The grade of concrete and steel are M20 and Fe 415 respectively. CO2- App (16)

Or

(b) Design a square column of size 450 x 450 mm to carry an ultimate load of 3000kN. The unsupported length of the column is 3m. The ends of the column are effectively held in position and also restrained against rotation. The grade of concrete and steel are M20 and Fe 415 respectively. CO2- App (16)

15. (a) Design a suitable footing for a R.C. column of size 300x500mm. Supporting a factored axial load of 1500kN. Assume safe bearing capacity of soil as 200kN/m^2 . Adopt M20 grade of concrete and Fe415 grade of steel. Design the footing and sketch the details of reinforcements in footings. CO2- App (16)

Or

(b) Design a dog legged stairs for an office building in a room measuring 2.8mx5.8m clear. Vertical distance between the floors is 3.6m.width of flight is to be 1.25m.allow a live load of 3kN/m 2 .sketch the details of the reinforcements. Use M20 concrete and Fe415 steel. Assume the stairs are supported on 230mm walls at the end of outer edges of landing slabs. CO2- App (16)

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