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Reg. No. :

Question Paper Code : X10246

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Fifth Semester
Civil Engineering
CE 8501 – DESIGN OF REINFORCED CEMENT CONCRETE ELEMENTS
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What are the three methods of design of reinforced concrete structural elements ?
2. State four objectives of the design of reinforced concrete structure.
3. How to select cross sectional dimensions for beams ?
4. Define singly reinforced section.
5. What are the points to be considered in anchoring shear reinforcement ?
6. What are the types of reinforcement used to resist shear ?
7. What are braced and unbraced columns ?
8. What are the assumptions made in the design of short columns ?
9. What are the assumptions made in the design of footings ?
10. What are the common shapes of reinforcement ?

PART – B **(5×13=65 Marks)**

11. a) Design a balanced singly reinforced concrete beam section for an applied moment of 60 kNm. The width of the beam is limited to 175 mm. Use M20 and Fe415 steel bars (Limit state method). **(13)**

(OR)

b) Write down the properties of concrete and reinforcing steel. **(13)**

12. a) A T-beam has the following data : **(13)**

Width of the flange = 750 mm, breadth of beam = 250 mm, effective depth = 50 mm, thickness of flange = 90 mm, applied moment = 130 kNm. Design the beam. Use M20 and Fe415 steel.

(OR)

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b) Determine the moment of resistance of the following T-beam. Breadth of flange = 700 mm, effective depth = 600 mm, breadth of the beam = 240 mm, thickness of the flange = 90 mm, 5 no's of 25 mm diameter bars are provided. Use M15 concrete and Fe415 steel. **(13)**

13. a) Design a R.C. slab for a room having inside dimensions 3m × 7m. The thickness of the supporting wall is 300 mm. The slab carries 75 mm thick lime concrete at its top, the unit weight of which may be taken as 20 kN/m^3. The live load on the slab is 2 kN/m^2. Assume the slab to be simply supported at the ends. Use M20 and Fe415 steel. **(13)**

(OR)

b) Design a dog-legged staircase for a building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5 m × 5 m. The live load is 2500 N/m^2. Use M20 concrete and Fe415 steel bars. **(13)**

14. a) Design a short axially loaded square column, 500 mm × 500 mm for a service load of 2000 kN. Use M20 concrete and Fe415 steel bars. **(13)**

(OR)

b) Design a circular column to carry an axial load of 1000 kN. Use M20 concrete and Fe415 steel bars. **(13)**

15. a) Design an isolated square sloped footing for a column 500 mm × 500 mm., transmitting a axial load of 1200 kN. The column is reinforced with 8 bars of 20 mm diameter. The SBC of the soil is 120 tonnes/m^2. Use M20 and Fe415 steel. **(13)**

(OR)

b) Design a plain concrete footing for a 450 mm wall carrying 300 kN per meter length. Assume grade 20 concrete and bearing capacity of the soil to be 200 kN/m^2. **(13)**

PART – C **(1×15=15 Marks)**

16. a) Design a simply supported slab to cover a room with internal dimensions of 4.0 m × 5.0 m and 230 mm thick brick walls all around. Assume alive load of 3 kN/m^2 and a finish load of 1 kN/m^2. Use M20 concrete and Fe415 steel. Assume that the lab corners are free of lift up. Assume mild exposure conditions. **(15)**

(OR)

b) Calculate the ultimate moment carrying capacity of a rectangular beam with b = 250 mm, d = 350 mm, ast = 1800 mm^2. Assume grade 30 concrete and Fe250 steel. Work out the problem from fundamentals. **(15)**