CE8501 DESIGN FO REINFORCED CEMENT CONCRETE ELEMENTS

Important 13 Mark Questions

Part-B

1. Design an isolated footing for a square column, 450 mm × 450 mm, reinforced with 8–25 φ bars, and carrying a service load of 2300 kN. Assume soil with a safe bearing capacity of 300 kN/m 2 at a depth of 1.5 m below ground. Assume M 20 grade concrete and Fe 415 grade steel for the footing, and M $_{25}$ concrete and Fe 415 steel for the column.
2. Design an isolated square footing for a column 500mm x 500m transmitting a load of 600kN and a moment of 30 kN-m. The SBC of soil is 1230 kN/m2. Use M20 grade concrete and M.S. grade –I bars. Draw the reinforcement details.
3. A 230 mm thick masonry wall is to be provided with reinforced concrete footing on a site having soil with SBC, unit weight and angle of repose of 125 kN/m2, 17.5 kN/m3and 30˚ respectively, use M20 grade of concrete and HYSD steel bars of grade Fe415, design the footing when the wall supports at service state, a load of 150 kN/m length.
4. A 250 mm thick masonry wall is to be provided with reinforced concrete footing on a site having soil with SBC, unit weight and angle of repose of 145 kN/m^2, 17.5 kN/$m^3$and 30˚ respectively, use M20 grade of concrete and HYSD steel bars of grade Fe415, design the footing when the wall supports at service state, a load of 150 kN/m length
5. Calculate ultimate moment of resistance of the beam of size 300mm x 500 mm provided with tensile reinforcement of 9000 mm^2 and compression reinforcement of 3000 mm^2. Take the effective cover at top and bottom is 40 mm.
6. A rectangular RC column of size 300mm x 450mm carrying an axial load of 1500kN. If the safe bearing capacity of the soil is180 kN/m2, design a suitable footing. Consider M25 grade concrete and Fe415 grade steel are used.
7. Design a combined footing for the two columns at a multi-storey building. The columns of size 450mmx450mm transmit a working load of 300kN each and they are spaced at 5m c/c. The safe bearing capacity of soil at site is 185 kN/m^2. Adopt M20 grade concrete and Fe415 grade steel.

8. A reinforced concrete column of 500 x 650 carries the axial dead load of 670 kN, axial imposed load of 330kN and dead load moment of 66kNm, imposed load of 34kNm. If the SBC of soil is 150kN/m2and use concrete grade of M25 and steel grade of Fe415. The foundation has to be designed to resist the ultimate moment and shear resulting from these loads.
9. A reinforcement concrete beam section of size 300x700 mm effective depth is reinforced with 3 bars of 20 mm diameter in tension. Determine the moment of resistance and the maximum stresses induced in the materials using working stress method?
10. A doubly reinforced concrete beam has a depth of 500 mm and a width of 250mm L. L=30kn/m. use M20 and Fe415 steel. Design a beam using LSD.
11. A rectangular beam with b=350mm and d=550mm has a factored shear of 400kN at the critical section near the support. The steel at the tension side of the section consists of four 32mm dia bars which are continued to support. Assume, f_{ck}=25N/mm^2 and f_y=415N/mm^2 design the vertical stirrups for the section. Use limit state method.
12. A RC beam having a rectangular cross section 300 mm wide is reinforced with 2 bars of 12 mm diameter at an effective depth of 550mm.the section is subjected to a service load moment of 40kNm. Develop the stress in concrete and steel.
13. What are the methods involved in the design of RC structures? Briefly explain the design procedure of the methods.
14. Calculate the ultimate flexural strength of a flanged beam having the following section properties. Width of flange 1300mm, depth of flange 120mm, width of web 300mm, effective depth 600mm. Ast =3928mm^2. Use $M_{20\ and}$ Fe_{415} Steel.
15. A T beam slab floor of an office comprises of a slab 150 mm thick spanning between ribs spaced at 3 m centres. The effective span of the beam is 8 m. Live load on floor is 4 KN/m^2. Use M20 grade concrete and Fe 415 HYSD bars; select one of the intermediate T beams.
16. A rectangular beam width b=250mm and effective depth 500mm reinforced with 4 bars of 20mm diameter. Determine the shear reinforcement required to resist a sheer force of 150kN. Use concrete M20 and steel Fe415.
17. Design a cantilever slab projecting one meter from the support Using M_{20} and Fe_{415} grade HYSD bars. Adopt live load of 3Kn/m^2.
18. A reinforced concrete beam of rectangular section 350mm width reinforced with 4 bars of 20mm dia at an effective depth of 550mm out of which 2 bars are bent up near the

support section where a factored sheer force of 400Kn is acting. Using M_{20} and Fe_{415} grade HYSD bars. Design suitable shear reinforcement at the support section.

19. Design a one-way slab with a clear span of 3.6m simply supported on 200mm thick concrete masonry walls to support a live load of 4kn/m^2. Using M_{20} and Fe_{415} grade HYSD bars.
20. Design a dog-legged stair case for floor-to-floor height of 3.2 m, stair case clock of size 2.5m×4.75m; Subjected to live load of 3kN/m 23kN/m2 and floor finish 1.25kN/m2.1.25kN/m2. Design flights from plinth beam to mid landing and mid landing to floor landing. Draw reinforcement details for both flights.
21. Determine the ultimate load carrying capacity of rectangular column section 400x600mm reinforced with 10nos. Of 25mm dia. Use M_{25} concrete and Fe415 steel.
22. Design of short column subjected to biaxial bending. Determine the reinforcement for a short column for the following data. Column size: 400mmx600mm, Pu=2000kN Mux= 160kN, Muy=120kN.Use M_{20} grade concrete and Fe415 grade steel.
23. Design a uniaxial spiral circular short column with details as given below. (i) Factored axial load = 300kN (ii) Factored bending moment = 80kNm (iii) Column size = 400mm Use M_{20} and Fe415 combination.
24. A rectangular column of effective height 4m is subjected to a load of 1800kN and bending moment of 100 kNm about major axis of the column. Design a suitable section for the column so that the width should not exceed 400mm.Use M_{25} concrete and Fe415 steel.