

9. The active earth pressure K_a generally refers to
(a) Effective stresses (b) total stresses (c) neutral stresses (d) All the above
10. The minimum allowable factor of safety against sliding in the case of a cantilever retaining wall is
(a) 2.0 (b) 3.0 (c) 1.50 (d) 2.50

PART B (10 x 2 = 20 Marks)

11. Find the area ratio for the soil samples with outer diameter 54mm and inner diameter 51mm.
12. Define SPT Number.
13. Give the Terzaghi's bearing capacity equation of strip footing for local shear failure.
14. Define immediate settlement.
15. Define contact pressure.
16. When do you provide Mat or Raft foundation?
17. Can the group efficiency greater than one? If so when?
18. What are the methods to determine the load carrying capacity of a pile?
19. What are the assumptions made in Rankine's theory?
20. How do you check the stability of retaining wall?

PART C (5 x 14 = 70 Marks)

21. a) What are the different methods of soil exploration? Explain.

(OR)

- b) What are the different types of foundation? Explain it uses.

22. a) Compute the safe bearing capacity of a continuous footing 1.8m wide, and located at a depth of 1.2m below ground level in a soil with unit weight $\gamma=20\text{kN/m}^3$, $c=20\text{kN/m}^2$, and $\phi=20^\circ$. Assume a factor of safety of 2.5. Terzaghi's bearing capacity factors for $\phi=20^\circ$ are $N_c=17.7$, $N_q=7.4$ and $N_r=5$, What is the permissible load per meter run of the footing?

(OR)

- b) Soil profile at a building site consists of dense sand upto 2m depth. Normally loaded soft clay from 2m to 6m depth and impervious rock below 6m depth ground water table is at 0.4m depth below ground level. Sand has a density 1.85t/m^3 above water table and 1.9t/m^3 below water table. For clay $w=50\%$, $LL=65\%$, $G=2.65$. Calculate the settlement resulting from a uniformly distributed surface of 4t/m^2 applied over an extensive area of site.

23. a) Proportion a rectangular combined footing for uniform pressure under dead load plus reduced live load, the following data:

Allowable soil pressures:

150kN/m² for DL+reduced LL

225 kN/m² for DL+LL

Column Loads:

	Column A	Column B
DL	540kN	690kN
LL	400kN	810kN

Distance c/c of columns=5.4m.

Projection of footing beyond column A = 0.5m.

(OR)

- b) Explain mat foundation, types and its uses.
24. a) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9m respectively. If the confined compression strength of the clay is 90kN/m², and the pile spacing is 90 cm centre to centre, what is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75.

(OR)

- b) A reinforced concrete pile weighing 30kN inclusive of helmet and dolly is driven by a drop hammer weighing 40kN and having an effective fall of 0.8m. The average set per blow is 1.4cm. The total temporary elastic compression is 1.8cm. Assuming the coefficient of restitution as 0.25 and a factor of safety of 2, determine the ultimate bearing capacity and the allowable load for the pile.
25. a) (i) State assumptions made in Rankine's earth pressure theory.
- (ii) A 4.5 m high gravity retaining wall that is restrained from yielding retains sand of angle of internal friction of 30°. The water table is at a depth of 3m from the top of the backfill. The unit weight of sand above and below water table is 16kN/m³ and 19.81kN/m³ respectively. Find the total force on the wall.

(OR)

- b) Explain the Culmann's graphical method of earth pressure theory?
