



1. Differentiate thick walled and thin walled sampler.
2. When do you apply dilatancy correction in soils ?
3. Mention the important factors affecting bearing capacity of soils.
4. Determine the immediate settlement under the foundation of dimension $12\text{ m} \times 24\text{ m}$ that exerts a pressure of 150 kN/m^2 in sand. The value of E for sand is $60 \times 10^3\text{ kN/m}^2$. Take $I_s = 1$ and Poisson's ratio as 0.5.
5. Define contact pressure.
6. What is floating foundation ?
7. Give the classification of piles based on their functions.
8. How does a pile group behave in cohesionless and cohesive soils ?
9. Distinguish between active and passive earth pressure.
10. What is critical depth ?

loads	Column A	Column B
DE	400 kN	750 kN
LL	400 kN	

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PART – B

(5×13=65 Marks)

11. a) Explain wash boring method of advancing borehole with a neat sketch and highlight the limitations of the method.

(OR)

- b) Describe the principle and procedure of conducting subsoil exploration study using seismic refraction method.
12. a) Derive the expression of determining the ultimate bearing capacity of strip footing by Terzaghi's method.

(OR)

- b) i) In the field, a soft normally consolidated clay layer exists for a thickness of 20 m. The natural water content, specific gravity of solids and the liquid limit of the clay are 40%, 2.7 and 60% respectively. The ground water table is at the surface and the saturated unit weight is 19.81 kN/m^3 . The vertical stress increment at the centre of the clay layer due to the foundation load is 10 kN/m^2 . Estimate the settlement of the foundation. (5)
- ii) Explain the factors governing the location and depth of foundation. (8)
13. a) Discuss briefly the various types of shallow foundation with simple sketches and under what circumstances these foundation types are preferred ?

(OR)

- b) Proportion a strap footing for the following data. The allowable soil pressure for DL + reduced LL is 150 kN/m^2 and for DL + LL is 250 kN/m^2 . Centre to centre distance between the columns is 5 m and the projection beyond column A is not to exceed 0.5 m. The column loads are tabulated below.

Loads	Column A	Column B
DL	600 kN	750 kN
LL	400 kN	880 kN

14. a) A square group of 25 piles extends between depths of 3 m and 10 m in a deposit of 20 m thick stiff clay which is undrained by rock. The diameter of the pile is 0.5 m and the c/c spacing of piles is 1 m. The undrained shear strength of clay at the pile base level is 150 kPa and the average value of the undrained shear strength over the depth of the pile is 100 kPa. Calculate the capacity of the pile group if $N_c = 9$, $\alpha = 0.70$ and factor of safety is 3.

(OR)



b) Write explanatory notes on the following :

i) Under-reamed piles.

(6)

ii) Drag down phenomenon.

(7)

15. a) Explain Culmann's graphical method to evaluate active thrust.

(OR)

b) i) Compare Coulomb's theory and Rankine's theory of earth pressure.

(6)

ii) A concrete retaining wall of 5 m height supports sandy backfill and has been designed to resist a horizontal force of 150 kN/m. The properties of backfill are : $\phi = 32^\circ$ and $\gamma = 18 \text{ kN/m}^3$. Determine the height to which water can be allowed to rise before the allowable force on the wall is exceeded ?

(7)

PART - C

(1×15=15 Marks)

16. a) Compute the active earth pressure distribution and the total lateral force for a smooth vertical wall of 5 m with clay backfill

i) For the short term : $C = 45 \text{ kN/m}^2$, $\phi = 0^\circ$ and $\gamma = 18 \text{ kN/m}^3$.

ii) For the long term : $C = 5 \text{ kN/m}^2$, $\phi = 20^\circ$ and $\gamma = 18 \text{ kN/m}^3$.

(OR)

b) Explain why the displacement necessary to produce the passive state is much more than that required to produce the active state ?