



- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.
 12. Use of non programmable calculator is permitted.

1. a) What do you understand by the term disturbed and undisturbed soil samples? State clearly the significance of the following in sampling. 7
- i) Area ratio
 - ii) Inside clearance
 - iii) Outside clearance ratio
- b) Enlist various methods of Boring Explain any one with neat sketch. 6
- OR**
2. a) Explain any one geophysical methods of exploration & its limitations. 7
- b) Explain the procedure of standard penetration Test with diagram. Explain it's corrections. 6
3. a) Explain types of slope failure & method of improving stability of slopes. 7
- b) Find the factor of safety of a slope of infinite extent having 7
 $C' = 30\text{kN/m}^2$, $\phi' = 20^\circ$, $e = 0.65$, $G = 2.7$ under the following conditions:
- i) When soil is dry
 - ii) When the slope is submerged
The angle of slope $\alpha = 25^\circ$.
- OR**
4. a) Explain 'friction circle method' of slope stability analysis. 7

- b) A new canal is excavated to a depth of 6m below ground level, through a soil having the following characteristics. 7

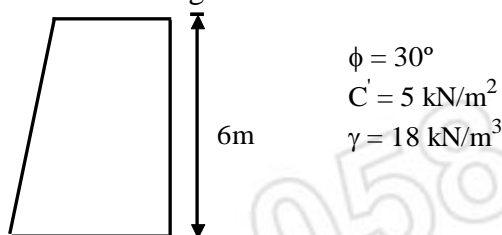
$$c = 14 \text{ kN/m}^2, \phi = 10^\circ, e = 0.8 \text{ \& } G = 2.7$$

The slope of banks is 1 in 1.

calculate the factors of safety with respect to cohesion when the canal runs full. If it is suddenly and completely emptied, what will be the factor of safety? The stability number are.

$i \backslash \phi$	5°	10°	15°	20°	25°
30°	0.110	0.075	0.046	0.025	0.009
45°	0.136	0.101	0.083	0.062	0.044

5. a) Explain Culman's graphical method for determining of active earth pressure. 6
- b) A 6m high retaining wall is shown in figure below. 7



Determine the Rankine's active earth pressure on the wall at.

- a) Before the formation of the crack.
- b) After the formation of an crack.

OR

6. a) Explain in detail types of lateral earth pressure. 6
- b) A retaining wall 7m high supports a dry cohesionless backfill having Batter angle of 10° , angle of wall friction is 20° , unit weight of soil is 16.5 kN/m^3 , angle of internal friction is 30° , surcharge angle 10° . Compute the total active thrust on a wall use Rebhan's method. 7
7. a) What do you mean by soil improvement? Give brief description of the available methods of soil improvement. 7
- b) Write notes on application of Geosynthetics in civil engineering works. 6

OR

8. a) Explain vibroflotation method of ground improvement. 7
- b) Discuss about "Sand drain" in brief. 6

9. a) Explain the various types of shear failure in foundation soil. 6
 b) Determine the ultimate bearing capacity of strip footing 1.5m wide with its base at a depth of 1m. Take: $r_d = 17 \text{ kN/m}^3$, $\phi' = 38^\circ$, $c = 0$, $N_q = 60$ $N_r = 75$. 7

OR

10. a) Explain plate load test and its limitation. 6
 b) A square footing $1.2\text{m} \times 1.2\text{m}$ is to be founded at a depth of 1.2m below G. L. The soil properties are: $C = 20 \text{ kN/m}^2$, $\phi = 20^\circ$, $r = 19 \text{ kN/m}^3$, $r_{\text{sat}} = 21 \text{ kN/m}^3$. 7
 Local shear failure is expected to occur at the site. Determine:
 i) The net ultimate bearing capacity without water table effect.
 ii) Change in net ultimate B.C. if the water table rises 0.5m above foundation level.
 The B. C. factors are.

ϕ	N_C	N_q	N_r
10	9.6	2.7	1.2
15	12.9	4.4	2.5
20	17.7	7.4	5.0
25	25.1	12.7	9.7

11. a) Enumerate different types of pile foundation. 6
 b) A group of 12 piles was driven into soft clay. The diameter and length of piles were 400mm & 9.5m respectively. If unconfined compressive strength of clay is 90 kN/m^2 and spacing is 900mm C/C, what is the capacity of the group. Assume F.O.S. is 2.5 and adhesion factor 0.8. 8

OR

12. a) Explain the steps involved in computations of consolidation settlement of a pile group. 6
 b) In a two layered cohesive soil bored piles of diameter 350mm are installed. The top layer has a thickness of 4m and the bottom layer is of considerable depth. The shear strength of the top layer is 50 kN/m^2 & that of bottom 100 kN/m^2 . Determine the length of the pile required to carry a safe load of 500kN allowing a factor of safety of 2.5. Assume $\alpha = 0.5$. 8
