ANURAG Engineering College
(An Autonomous Institution)
III B.Tech II Semester Supplementary Examinations, Dec-2023/Jan–2024
FOUNDATION ENGINEERING
(CIVIL ENGINEERING)

Time: 3 Hours   **Max.Marks:75**

Section – A (Short Answer type questions)   (25 Marks)
## Answer All Questions

		Course Outcome	B.T Level	Marks
1.	As per IS: 2131-1981, SPT values obtained from the field is to be corrected before using it for empirical correlations and design charts. Name those corrections applied.	CO1	L1	2M
2.	What do you understand by Slope Failure, Toe Failure and Base Failure of a finite slope? Illustrate with diagram.	CO1	L2	3M
3.	List down the assumptions involved in Rankine's earth pressure theory, originally proposed by Rankine in 1857.	CO2	L1	2M
4.	Solve for the depth of unsupported cut, with a factor of safety of 3.0, in cohesive – frictional soil having following geotechnical parameters: Cohesion = 50 kPa, unit weight = 18 kN/m^3, angle of internal friction = 20°	CO2	L2	3M
5.	List down the assumptions involved in Terzaghi's bearing capacity theory, originally proposed by Terzaghi in the year 1943.	CO3	L1	2M
6.	Explain the terms local and punching shear failures?	CO3	L2	3M
7.	Distinguish immediate settlement and primary consolidation settlement.	CO4	L2	2M
8.	List down the limitations of Plate Load Test.	CO4	L1	3M
9.	Explain overlapping of stressed zone in case of piles installed in group and its influence on group capacity.	CO5	L2	2M
10.	List down minimum 5 forces (Live Loads) that act on the well foundation.	CO5	L1	3M

Section B (Essay Questions)
Answer all questions, each question carries equal marks.   (5 X 10M = 50M)

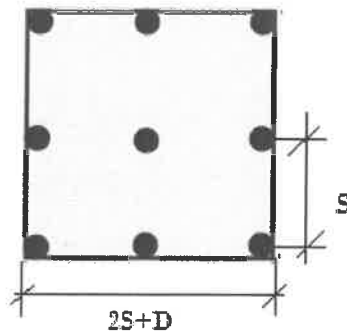|				
11. A)	Explain the step-by-step procedure to estimate the factor of safety of a finite slope using Fellenius method of slices, also known as Swedish Circle Method. Also, develop expression for Factor of Safety, for a given trial slip surface.	CO1	L2	10M
	OR			
B)	An infinite slope is to be constructed of a clay soil at a slope angle of 35°. The Ground Water Table is at the ground surface, with seepage parallel to the ground. Estimate the factor of safety of the infinite slope along a plane parallel to the ground surface at a depth of 5.0 m. Geotechnical properties of the soil are: Effective cohesion (c′ = 50 kPa, Effective angle of internal friction ($\square′$ = 20°) and saturated unit weight = 19.5 kN/m^3.	CO1	L3	10M
12. A)	Explain step by step procedure to estimate active earth pressure on a retaining wall with inclined back and inclined backfill surface having no surcharge load. The backfill is dry, cohesionless, homogeneous and isotropic and back of the wall is smooth.	CO2	L3	10M
	OR			
B)	Estimate the Active earth pressure (Force) on the gravity retaining	CO2	L3	10M

wall shown in the following figure.
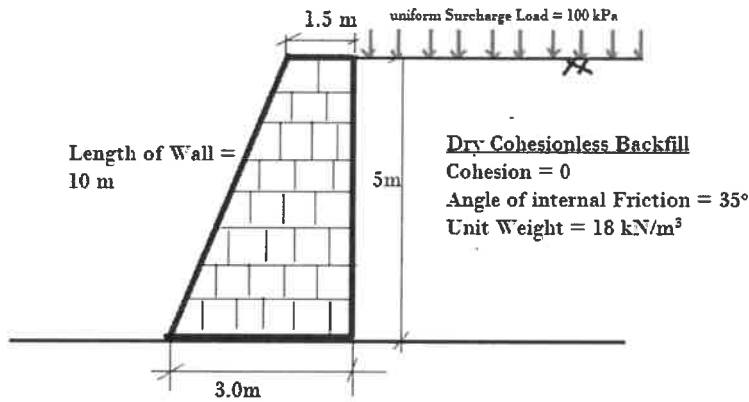
Use Rankine's Active earth pressure theory.

13. A)	Discuss the empirical adjustments proposed for estimating the load carrying capacity of shallow footing of size L×B for the following cases: i) When local shear Failure anticipated ii) Eccentric loading P with e_x and e_y	CO3	L3	10M	

OR

B) A Column carrying a load of 1000 kN is supported by a square footing placed at 1.5 m depth. Estimate the size of the square footing to carry the load safely with a factor of safety of 3.0. Geotechnical Properties of the foundation soil are: c' = 25 kPa, $\Box'$ = 25°, Saturated Unit Weight = 20 kN/m³. Assume Ground Water Table (GWT) at the Ground Surface. Use Terzaghi's Bearing capacity equation with Bearing Capacity Factor values as N_c = 25.1, N_q = 12.7 and $N_\Box$ = 9.7   CO3   L3   10M

14. A) Discuss how ultimate load carrying capacity of the shallow strip footing of width B placed in cohesive – frictional soil at a depth D_f gets affected due to rise in ground water table (GWT) as below (2.5 marks each):
i) When the GWT is deep below the footing
ii) When the GWT is at the base of the footing
iii) When the GWT is at the ground surface
iv) When the GWT is above the ground surface
Use Terzaghi's bearing capacity equation to explain.   CO4   L3   10M

OR

B) Discuss in detail the corrections applied to amount of primary consolidation settlement, before arriving at the actual foundation settlement.   CO4   L3   10M

15. A) Develop expression for the static pile formula for estimating the ultimate load carrying capacity of single pile (Q_u) installed in granular soil (c = 0). Neglect the effect of ground water table. Assume diameter of pile D and Length of Pile L. Consider both point bearing and frictional resistance.   CO5   L3   10M

OR

B) 9 piles were driven and installed in a square pattern in normally consolidated soft soil. Assuming piles to be in circular section of diameter 300 mm and 12 m long. Work out the spacing of the piles to achieve group efficiency 80%. Neglect bearing and assume adhesion factor 0.8.   CO5   L3   10M

(Plan)