$\boxed{\text{R20}}$ $\boxed{\text{SET - 1}}$

III B. Tech II Semester Regular Examinations, July -2023
GEO TECHNICAL ENGINEERING-II
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Explain in detail about the methods of soil exploration. [7M]
    b) The cone penetration resistance obtained in a clay soil in a CPT was 50 kg/cm^2. Determine the undrained strength of the clay. The total over burden pressure at the depth was 100kN/m^2. [7M]

(OR)

2. Define Boring. Explain in detail the different methods of boring. [14M]

UNIT-II

3. a) Discuss the probable types of failure of a slope. [7M]
    b) Determine the factor of safety with respect to cohesion only for a submerged embankment 25m high whose upstream face has an inclination of 45^0. The soil has the following properties: C=40kN/m^2, ǿ=10^0, γ=18kN/m^3. The relevant stability number is equal to 0.108. [7M]

(OR)

4. a) What are the assumptions in coulomb's theory? [7M]
    b) Explain in detail the Cullman's graphical method. [7M]

UNIT-III

5. a) Explain the IS code method to determine the bearing capacity? [7M]
    b) A footing 2m square is laid at a depth of 1.3m below the ground surface. Determine the net ultimate bearing capacity using IS code method. Take γ=20kN/m^3, ǿ=30^0 and C'=0. [7M]

(OR)

6. a) Explain types of foundations and factors to be considered in their location. [7M]
    b) Discuss the assumptions made in the derivation of Terzaghi's bearing capacity theory? Write the equation for the ultimate bearing capacity. [7M]

UNIT-IV

7. a) Discuss various methods of determination of the allowable bearing pressure. What are their limitations? [7M]
    b) A purely cohesive soil has a unit weight of 20kN/m^3 and a cohesion of 150kN/m^2. Determine the safe bearing capacity for a rectangular footing 8mx2m founded at a depth of 4m in clay, F. S=3.0 [4M]

(OR)

8. a) What are the types of foundation settlements? How is these determining? Discuss it. [7M]
    b) Estimate the immediate settlement of a concrete footing 1mx2m size founded at a depth of 1m in a soil with E=10^{4}kN/m^2, μ=0.3. the footing is subjected to a pressure of 200kN/m^2. Assume footing is to be rigid. [7M]

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UNIT-V

9. a) Explain in detail sinking of wells.   [7M]
    b) Explain with neat sketch different components of wells and their functions.   [7M]

(OR)

10. a) Explain the various dynamic formulae of piles. What are their limitations?   [7M]
    b) Discuss the uses of pile load tests for the estimation of load-carrying capacity of   [7M]
        piles.
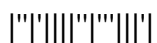
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SET - 2

III B. Tech II Semester Regular Examinations, July -2023
GEO TECHNICAL ENGINEERING-II
(Civil Engineering)

Time: 3 hours
Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
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UNIT-I

1.	a)	Discuss various types of soil samplers.	[7M]
	b)	The field N value in a deposit of fully submerged fine sand was 40 at a depth of 6m. the average saturated unit weight of the soil is $19kN/m^3$. Calculate the corrected N value as per IS: 2131-1981.	[7M]

(OR)

2.	Explain the three penetrometer tests in detail.	[14M]

UNIT-II

3.	a)	Discuss the Swedish arc method for the stability analysis of slopes.	[7M]
	b)	A cutting of depth 10m is to made in soil which has $C=30kN/m^2$, $\gamma=19kN/m^3$ and $\acute{o}=0$. There is a hard stratum below the original soil surface at a depth of 12m. Find the safe slope of cutting if the factor of safety is 1.5. For $D_i=1.20$, $S_n=0.143$ for $i=30^0$, $S_n=0.101$ for $i=15^0$	[7M]

(OR)

4.	a)	Explain the Rankine's theory for various conditions to calculate active and passive state earth pressure.	[7M]
	b)	Determine the passive pressure by Rankine's theory per unit run for a retaining wall 4m high, with $i=15^0$, $\acute{o}=30^0$, and $\gamma=19kN/m^3$. The back face of the wall is smooth and vertical.	[7M]

UNIT-III

5.	a)	Discuss the various factors that affect the bearing capacity of shallow foundations.	[7M]
	b)	Discuss the Meyerhof's bearing capacity theory.	[7M]

(OR)

6.	A circular plate of diameter 1.05m was placed on a sand surface of unit weight $16.5kN/m^3$ and loaded to failure. The failure load was found to give a pressure of 1,500 kN/m^2. Determine the value of the bearing capacity factor N. The angle of shearing resistance of the sand measured in a triaxial test was found to be 39^0. Compare this value with the theoretical value of N. use Terzaghi's theory.	[14M]

UNIT-IV

7.	a)	Describe plate -load test. What are its limitations and uses?	[10M]
	b)	What is the significance of immediate settlement?	[4M]

(OR)

8.	a)	Discuss the methods for estimating immediate settlements of foundation on clay.	[7M]
	b)	A rectangular footing 3mx2m exerts a pressure of $100kN/m^2$ on a cohesive soil $E_s=5x10^4$ kN/m^2 $\mu=0.5$. Determine the immediate settlement at the center assuming the footing is flexible and taking $I_f=1.36$.	[7M]

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UNIT-V

9. a) Explain the different types of piles and their functions with neat sketches. [8M]
    b) What are the advantages and disadvantages pneumatic caissons over open caissons? [6M]

(OR)

10. a) Explain with a neat sketch different forces acting on well foundation its construction and sinking of wells. [7M]
    b) Discuss the causes and remedies for tilts and shifts. [7M]

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SET - 3

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Max. Marks: 70

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UNIT-I

1. a) What is meant by the "significant depth of exploration" and discuss about the lateral extent of the investigation. [7M]
   b) How is the static cone penetration test different from standard penetration? Discuss it. [7M]

(OR)

2. a) What makes pressure meter testing quite distinctive as compared to other field tests? Discuss it? [7M]
   b) Describe the salient features of a good site investigation report? [7M]

UNIT-II

3. a) What is a stability number? What is its utility in the analysis of stability of slopes? [4M]
   b) Explain Culamn's graphical method and also its advantages. [10M]

(OR)

4. a) A rectangular wall is 7m high, with its back face smooth and vertical. It retains sand with its surface horizontal. Using Rankine's theory, determine active earth pressure at the base when the backfill is (a) dry (b) saturated and (c) submerged, with water table at 2m below the surface. Take $\gamma_i=18kN/m^3$, $\gamma_{sat}=21kN/m^3$ and $\acute{o}=30^0$. [10M]
   b) What are the assumptions of Rankine's theory? [4M]

UNIT-III

5. a) Explain the difference between (i) local and general shear failure (b) gross and net safe bearing capacity. [7M]
   b) A square footing 1.5mx1.5m is located at a depth of 1.0m in a clay deposit consisting of two layers. The top layer is 1m thick and has $C_1=150kN/m^2$ and $\gamma_1=16kN/m^3$. The bottom layer has $C_2=50kN/m^2$ and $\gamma_2=15kN/m^3$. Determine the net ultimate bearing capacity. [7M]

(OR)

6. a) Discuss Meyerhof's bearing capacity theory. How does it differ from Terzaghi's theory? [8M]
   b) Explain types of foundations and factors to be considered in their locations. [6M]

UNIT-IV

7. a) Explain in detail the methods for determining the safe bearing pressure based on N-value. [7M]
   b) What is the allowable load for 2.0m square column in a dense sand $\gamma=20kN/m^3$ and $\acute{o}=40^0$ at a depth of 1.2m, if the settlement is not to exceed 30mm, F.O.S against shear failure is 3. Water table is at a great depth. [7M]

(OR)

8. a) Discuss the procedure to determine the safe bearing capacity and settlement from plate load test data. [8M]
   b) What is the difference between immediate settlement, primary consolidation settlement and secondary consolidation settlement? [7M]

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UNIT-V

9. a) Explain with neat sketch different types of caissons based on their method of construction.　[8M]
    b) Discuss the various kinds of forces likely to act on a well foundation.　[7M]

(OR)

10. a) What are the factors that governs, during selection of piles.　[4M]
    b) In a 16 pile group, the diameter is 50cm and c/c spacing of square is 1.8m. If $C=40kN/m^2$, determine whether the failure would occur with a pile acting individually or as a group? Neglect the end bearing resistance of the piles. All the piles are 11m long. Take mobilization factor α for given cohesion is 0.7　[10M]

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SET - 4

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UNIT-I

1. a) Discuss standard penetration test. What are the various corrections? What is the importance of the test in geotechnical engineering? [7M]

   b) List out the Boring and sampling methods. [7M]

(OR)

2. a) Describe in detail the preparation of soil investigation report. [7M]

   b) Explain the step-wise procedure of pressure meter. [7M]

UNIT-II

3. a) Derive the expression to determine the stability number of a slope? [7M]

   b) An embankment is inclined at an angle of 35^0 and its height is 15m. The angle of shearing resistance is 15^0 and the cohesion intercept is $200kN/m^2$. The unit weight of soil is $18kN/m^3$. If Taylor's stability number is 0.06. Find the factor of safety with respect to cohesion. [7M]

(OR)

4. a) Discuss Rankine's theory of active earth pressure with sketch [7M]

   b) What are the different factors of safety used in stability of slopes? Wat are the different types of slope failures? [7M]

UNIT-III

5. a) Describe Skemptor's analysis for bearing capacity. [7M]

   b) Explain the differences between local and general failure and factors considered for their identification. [7M]

(OR)

6. a) A strip footing is 2m wide and founded at a depth of 2m in a soil of unit weight $20kN/m^3$ and a cohesion of $10kN/m^2$. Determine the increase in the bearing capacity when $\acute{\phi}$ is increased from 20^0 to 25^0 use Terzaghi's equation. Assume local shear failure. [7M]

   b) Write notes on (i) Terzaghi's bearing capacity (ii) Vesic's bearing capacity theory. [7M]

UNIT-IV

7. a) A footing 4mx2m is plan, transmit a pressure of $150kN/m^2$ on a cohesive soil has $E=6\times10^4$ kN/m^2 and $\mu=0.50$. Determine the immediate settlement of the footing at the centre assume it to be (a) a flexible footing, $I_f=1.52$ (b) a rigid footing $I_f=1.20$. [7M]

   b) What are different types of settlements which can occur in a foundation? How are these estimated. [7M]

(OR)

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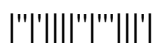
8. a) How would you determine the bearing capacity from plate load tests? What are the limitations of the plate load test. [7M]

   b) A square footing 2.5m size is founded at a depth of 1.5m in a sandy soil deposit has the corrected N value of 30. The water table is at a depth of 2m from the ground surface. Find the net allowable soil pressure if (i) the desired factor of safety is 3.0 (ii) the permissible settlement is 40mm. [7M]

UNIT-V

9. a) What is negative skin friction in piles? Explain the causes of negative skin friction. [6M]

   b) A pipe group consisting of 9 piles is arranged in 3 rows with 3 piles in each row. Diameter of each pile is 35cm and spacing is 1.2m. Length of pipe is 10m. The piles are driven completely in clayey soil having unconfined compressive strength of 100 kN/m^2. The piles are designed as frictional. Determine the capacity of pile group take $\alpha=0.7$ [8M]

(OR)

10. a) Draw well foundation and mention its parts [7M]

    b) What are the problems that encountered in well sinking? What are the remedial measures to control? [7M]

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