18CV62

Sixth Semester B.E. Degree Examination, June/July 2025
Applied Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any may be suitably assumed.

Module-1

1   a.   What is stabilization of Bore Holes? Mention various methods and explain any one method. **(08 Marks)**

   b.   With the help of neat sketch, explain seismic Refraction method of soil exploration. Using this method, determine the velocity of waves in soil Layers and thickness of the top stratum for the following details.

Time(s):	0.1	0.2	0.3	0.40	0.45	0.50	0.55
Distance (m)	40	80	120	160	200	240	280

Geophone's are placed at a spacing of 40m in a straight line and the time taken for the last wave to be received at each geophone is given. **(12 Marks)**

OR

2   a.   List and explain types of soil sample's. **(08 Marks)**

   b.   Explain the determination of ground water level by Hvorslev's Method. Using this method estimate the ground water table level for the following data: Depth up to which water is boiled out = 15m ; water rise on first day = 0.80 m water rise on second day = 0.70m ; water rise on third day = 0.60 m. **(12 Marks)**

Module-2

3   a.   Explain briefly types of settlements? **(08 Marks)**

   b.   Define Isobar. Using Boussenesq's Equation construct Isobar of Intensity 0.25 Q (25% Isobar), where 'Q'' is point load acting on the surface. **(12 Marks)**

OR

4   a.   A circular area 6 m diameter carrie's a uniformly distributed load of $10KN/m^2$. Determine the vertical stresses at a depth of 2m, 4m and 8m. Plot the variation of vertical stress with depth. **(08 Marks)**

   b.   A square footing 1.2m × 1.2m rests on a saturated clay layer 4m deep. $W_L = 30\%$ $\gamma_{sat} = 17.8$ KN/m^3 ; W = 28% and G = 2.68. Determine the settlement if the footing carries a load of 300 kN. **(12 Marks)**

Module-3

5   a.   Explain Fellinious method of obtaining Centre of Critical Slip surface in the case of stability analysis of C − φ soil. **(10 Marks)**

   b.   Compute the Intensities of Active and Passive earth pressure at depth of 8 m in dry cohesionless sand with an angle of Internal friction of 30° and unit weight of 18kN/m^3. What will be the Intensities of active and passive earth pressure if the water level rises to the ground level? Take saturated unit weight of sand as 22 kN/m^3. **(10 Marks)**

OR

6 a. Derive equations for the earth pressure co-efficient K_a and K_p by considering Back fill with horizontal surface. Use Rankine's Theory. **(08 Marks)**

   b. An embankment is to be constructed with a soil having $c = 20 kN/m^2$, $\phi = 10°$ and $\gamma = 19 kN/m^3$. The desired factor of safety with respect to cohesion as well as friction as 1:5. determine :
   i) Safe height of the desired slope if slope is 2H to 1V.
   ii) Safe angle of slope if the desired height is 15 m. For $\phi = 10°$; Taylor's stability numbers are as follows.

Stability No:	0.04	0.08
Slope angle (i) :	20	30

   (12 Marks)

Module-4

7 a. With the help of sketches, explain effect of water table and eccentric loading on bearing capacity soil. **(10 Marks)**

   b. A square footing 2.5m by 2.5m is built in a homogeneous bed of sand of unit weight $20 kN/m^3$ and having an angle of shearing resistance of 36°. The depth of the base of footing is 1.5m below the ground surface. Calculate the safe load that can be carried by a footing with a factor of safety of 3 against complete shear failure. Use Terzaghis Analysis; $N_c = 65.4$; $N_q = 49.4$; $N\gamma = 54.0$ **(10 Marks)**

OR

8 a. Explain standard Penetration Test with suitable corrections. **(10 Marks)**

   b. A square footing located at a depth of 1.3m below the ground has to carry a safe load of 800kN. Find the size of the footing if desired factor of safety is 3. The soil has the following properties; void's ratio = 0.55 .Degree of saturation = 50% ; G = 2.67; $C = 8 kN/m^2$ $\phi = 30°$; $N_c = 37.2$; $N_q = 22.5$; $N\gamma = 19.7$. Use Terzaghis Analysis. **(10 Marks)**

Module-5

9 a. With the help of sketch, Explain Negative skin friction. **(10 Marks)**

   b. 200mm diameter, 8 m long piles are used as foundation for a column in a uniform deposit of medium clay (unconfined compressive strength = $100 kN/m^2$ and adhesion factor = 0.9). There are nine piles arranged in a square pattern of 3×3. For a group efficiency = 1, find the spacing between the piles. **(10 Marks)**

OR

10 Write short notes on any four of the following :
   i) Efficiency of Pile group
   ii) Group Capacity of piles
   iii) Pile Load Test
   iv) Settlement of Piles
   v) Under Reamed Piles
   vI) Single loaded pile capacity

   (20 Marks)

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