



Geotechnical Engineering II (GT)

Assignments

- **Assignment No.1**

1. Estimate the ultimate bearing capacity and safe bearing capacity of strip footing with (B) width=2m and depth=1/5m. Dry unit wt of soil is 1.6 t/m^3 . Saturated unit wt is 1.8 t/m^3 .
Case (a): when $c = 0 \text{ t/m}^3$ and $\phi = 38^\circ$
Case (b): when $c = 2 \text{ t/m}^3$ and $\phi = 25^\circ$
 - I. GWT = 8m below GL
 - II. GWT = 1.5m below GL
 - III. GWT = 1m below GL
 - IV. GWT = 2m below GL
2. Estimate the safe bearing capacity of footing $2\text{m} \times 3\text{m}$, take to the depth of 1.5 m below GL on a sandy soil whose angle of shearing resistance is 27° , the effective unit wt of soil may be taken as 16.6 kN/m^3 and apparent cohesion 8 kN/m^2 , Find the safe bearing capacity assuming,
 - i) General shear failure.
 - ii) Local shear failure.Find the % change in the ultimate bearing capacity.
3. Following data refers to a plate load test on sandy deposit, the size of plate is $30 \times 30 \text{ cm}$, determine the allowable soil pressure of the settlement is not to exceed 20mm. Determine the size of sq. footing that can carry a load of 1500kN.
4. Explain the following term:-
 - i) Ultimate bearing capacity
 - ii) Net Ultimate bearing capacity (q_{nu})
 - iii) Safe bearing capacity (q_{SAC})
 - iv) Allowable bearing capacity (q_{au})

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5. Explain plate load test in detail and discuss it with references to test set up test procedure and interpretation and extrapolation of result and limitations.
6. Write a short note on :-
 - 1) Depth of shallow foundation.
 - 2) ABCD
 - 3) BCDS

• **Assignment No. 2**

1. Explain with the help of neat sketches, different methods of classification of piles.
2. Explain the pile load test in detail. What are the IS 2911-1985 recommendation to estimate the allowable load of pile.
3. A raft foundation is supported by pile group consisting of 15 pile arranged in 3 rows. The diameter length of each pile is 350 mm and 12 mm respectively. Spacing between piles is 1.2centre to centre. Foundation soil consist of soft clay layer having $c=3.5 \text{ t/m}^2$, $f_b=1.7 \text{ t/m}^3$. Determine the capacity of pile group.
4. The column of footing is loaded at a depth of 1.5m below GL and it supported by piles having a length a 10m. The subsoil consists of 3 layers. The properties of which are as follows:

layer one	$c=2.5\text{t/m}^2$,	$\phi = 0$;	$h=6.5\text{m}$,	$r=1.7\text{t/m}^3$
layer two	$c=5\text{t/m}^2$,	$\phi=0^0$,	$h=3\text{m}$,	$r=1.81\text{t/m}^3$
layer three	$c=0$,	$\phi=32^0$,	$h=3\text{m}$,	$r=1.84\text{t/m}^3$

Determine the safe load on each pile if the diameter of pile is 500mm. Assume $\alpha=0.72$ and F.O.S=2.5.
5. Write short note on:-
 - 1) Negative skin friction.
 - 2) Dynamic formulae and their limitations.
 - 3) Estimation of settlement of yr of pile in sand and in clay.

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• **Assignment No. 3**

1. Give the assumption of Rankine's theory on active earth pressure and derive an expression for the active earth pressure of retaining wall. Carrying an inclined backfill with an L inclination β with horizontal.
2. Explain the graphics procedure of active earth pressure by Ribhann's method.
3. Explain the Wulomb's wedge theory of active earth pressure.
4. Wulomb's numerical 20 June 2018
5. A vertical wall 5.1m high supports cohesionless backfill with horizontal ground surface in level with its top. The backfill has 17.5KN/m^3 & $\phi=33^\circ$. Determine the active and passive thrust 1m length of wall using Rankine's theory and also find point of application of resultant pressure. Water table rises behind wall upto top. Also determine the point of application and magnitude of resultant if backfill is fully submerged and carries a uniformly distributed load of 15KN/m^2 over its surface.
6. A retaining wall 12m high retains a backfill made up of 3 layers each layer 4m thick assumed the back to be smooth. Draw the active earth pressure distribution diagram the properties are as follows:-

Layer	Thickness in 'm'	Angle of inter friction ϕ in degree	c kN/m^2	r KN/m^3
Top layer	4m	36°	0	20
Middle layer	4m	26°	20	18.2
Base layer	4m	0°	35	16.4

Calculate the magnitude and point of application of resultant pressure.

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