

KATIHAR ENGINEERING COLLEGE, KATIHAR

CIVIL ENGINEERING, 3rd Year (Semester-VI)

Subject: Soil and Rock Mechanics

Max. Marks: 05

Time Allotted: 75 Minutes

Instructor: Prof. Rashid Mustafa

Test-II (Set-A)

Q.1 A retaining wall 8 m high with a smooth vertical back retains a clay backfill with $c = 15 \text{ kN/m}^2$, $\phi = 15^\circ$ and $\gamma = 18 \text{ kN/m}^3$. The active pressure at the top will nearly be equal to -----
----- kN/m^2

Q.2 When a vertical face excavation was made in clayey silt, having density of 20 kN/m^3 , it failed at a depth of excavation of 4m. What is the cohesive strength (in kN/m^2) of the soil if its angle of internal friction was 30° ?

(a) 23.1

(b) 20.0

(c) 11.6

(d) 10.2

Q.3 When movement of a wall under the earth pressure from the backfill was prevented the coefficient of earth pressure was recorded as 0.50. The ratio of the coefficient of passive and active earth pressures of the backfill is -----

Q.4 A soil specimen having a cohesion $c = 100 \text{ kN/m}^2$ and $\phi = 6^\circ$ is tested in a triaxial test apparatus. The angle which the failure plane of the sample will make with the major principal axis of the sample is -----degree.

Q.5 Given that for a soil deposit ($c = 50 \text{ kN/m}^2$, $\phi = 30^\circ$, $\gamma = 18 \text{ kN/m}^3$) the pressure under which the deposit has been fully consolidated in the past is 125 kN/m^2 and the present overburden pressure is 75 kN/m^2 . The value of lateral earth pressure coefficient ----- when there is no movement of the wall.

Q.6 A direct shear box test on a specimen of sand has been performed; normal and shear stress was found to be 150 and 50 kN/m^2 respectively. What the value of shear strength (in kN/m^2) of soil at 4 m from the ground surface if the soil has specific gravity of solid as 2.70 and void ratio as 0.70. The ground water table is at a depth of 1 m from the ground surface? Take $\gamma_w = 10 \text{ kN/m}^3$

(a) 27.56

(b) 20.56

(c) 15.30

(d) 11.30

Q.7 A 5 m high smooth retaining wall with a vertical face retains a cohesive backfill having cohesion of 15 kN/m^2 , $\gamma = 18 \text{ kN/m}^3$ and $\phi_u = 0^\circ$. The height of tension crack -----m and the total active thrust (in kN/m) -----, assuming the tension crack has fully developed. The backfill surface is horizontal.

Q.8 A shear box test carried out on sandy clay gave the following results:

S.No	Vertical Load (kg)	Division of proving ring dial gauge (1 div. = 1 μ m)
1.	36.8	17
2.	146.9	44

Shear box is 60 x 60 mm and the proving ring constant is 20 N/ μ m. The cohesion of soil -----
-----N/mm² and angle of internal friction is ----- degree.

Q.9 In a triaxial test (UU test), a sample of clay 100 mm long and 50 mm in diameter fails under a deviator load of 150 kN at 10 % lateral strain. If the cell pressure is 100 N/mm² the value of angle of internal friction----- degree and cohesion -----N/mm².

Q.10 In a consolidated drained triaxial test (CD test) a specimen of saturated sand failed under a deviator stress of 220 kPa when the cell pressure was 100 kPa. If the pore water pressure is 50 kPa then effective cohesion-----kPa and effective angle of internal friction ----- degree.

Q.11 A vertical wall 4m high above the water table retains a 25⁰ soil slope. The retained soil slope has $\gamma = 18$ kN/m³, $c = 0$ and $\phi = 40^0$. The passive earth thrust (in kN/m) at the base of the wall is -----

Q.12 Coulomb's theory of earth pressure is based on

- (a) Theory of elasticity (b) Theory of plasticity (c) Empirical rules (d) Wedge theory

Q.13 Consider the following statements:

1. Coulomb's earth pressure theory doesn't take the roughness of wall into consideration.

2. In case of non-cohesive soils the coefficient of active earth pressure and earth pressure at rest are equal.

3. Uniform surcharge increases active earth pressure and decreases passive earth pressure.

- (a) 1, 2 and 3 are correct (b) 2 and 3 are correct (c) only 3 is correct (d) None of the above

Q.14 Which one of the following is the appropriate triaxial test to assess the immediate stability of an unloading problem, such as an excavation of a clay slope?

- (a) UU test (b) CU test (c) CD test (d) Unconsolidated drain test

Q.15 Shear parameters 'c' and ' ϕ ' vary with drainage condition of shear test (**True/ False**) -----

Q.16 Cohesion is 15 kN/m², the unit weight of soil is 20 kN/m³, the factor of safety is 1.5 and stability number is 0.05; the safe height of the slope is

- (a) 5 m (b) 8 m (c) 10 m (d) 12 m

Q.17 During the first stage of triaxial test when the cell pressure is increases from 0.10 N/mm^2 to 0.26 N/mm^2 , the pore water pressure increases from 0.07 N/mm^2 to 0.15 N/mm^2 . What is the value of Skempton's pore pressure parameter B?

- (a) 0.5 (b) -0.5 (c) 2 (d) -2

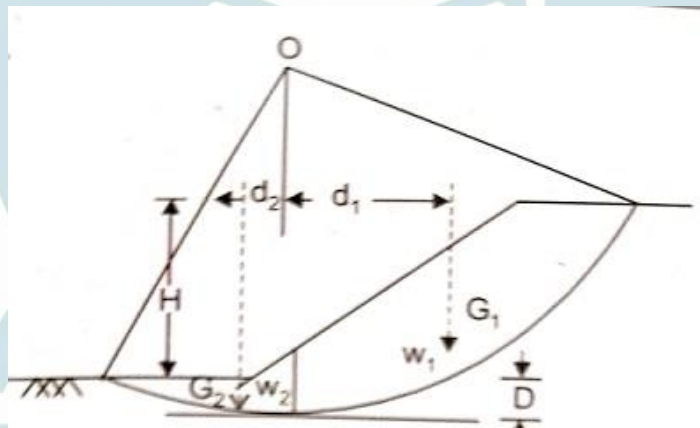
Q.18 A cut is to be made in a soil that has $\gamma = 16 \text{ kN/m}^3$, $c' = 28 \text{ kN/m}^2$ and $\phi' = 40$. The side of the cut slope will make an angle of 45 degree with the horizontal. What should be the depth of the cut that will have a factor of safety of 3.5?

- (a) 2.119 m (b) 2.341 m (c) 1.116 m (d) 1.326 m

Q.19 Find the depth of embedment (in m) of the cantilever sheet pile for a 6 m deep excavation in a sandy soil layer for $\gamma = 18 \text{ kN/m}^3$ and $\phi = 35$ degree for a factor of safety of 2.0

- (a) 4.702 (b) 5.621 (c) 6.702 (d) 7.604

Q.20 The depth factor in slope failure in the situation shown in the figure below will be



- (a) >1 (b) $1 <$ (c) $=1$ (d) $= 0$

Q.21 A and B are Skempton's pore pressure coefficients. For saturated normally consolidated soils

- (a) $A >1$ and $B >1$ (b) $A > 1$ and $B <1$ (c) $A <1$ and $B >1$ (d) $A < 1$ and $B = 1$

<END OF THE QUESTION PAPER>

NOTE: Solution of class test-II will be uploaded on the college website www.keck.ac.in