

KATIHAR ENGINEERING COLLEGE, KATIHAR

CIVIL ENGINEERING, 3rd Year (Semester-VI)

Subject: Soil & Rock Mechanics

Max. Marks: 10

Time Allotted: 60 Minutes

Instructor: Rashid Mustafa

Test-I

Q.1 Assume that the back of the retaining wall to be smooth and vertical and height of retaining wall to be 6 m. What is the magnitude of total at-rest thrust acting on the wall (in kN/m) if the backfill has unit weight of 20 kN/m^3 and shear strength test results of backfill give $\sigma_3 = 50 \text{ kN/m}^2$ and $\sigma_1 = 150 \text{ kN/m}^2$ is -----

Q.2 A vane 20 cm long and 10 cm in diameter was pressed into soft marine clay at the bottom of a bore hole. Torque was applied gradually and failure occurred at 1000 kg-cm. The cohesion of the clay (in kg/cm^2) in terms of Π (pie) is -----

Q.3 Given that the effective angle of internal friction of a soil is 10° , the angle between the failure plane and the minor principle plane is in degree -----

Q.4 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 be nearly in kN/m^2 -----

Q.5 The confining pressure and deviator stress on a triaxial sample are respectively, 100 kN/m^2 and 300 kN/m^2 . The normal stress acting on the plane of maximum shear stress in kN/m^2 is -----

Q.6 A vertical cut is to be made in saturated clay with $c = 15 \text{ kN/m}^2$, $\phi = 0$ and $\gamma = 20 \text{ kN/m}^3$. What is the theoretical depth to which the clay can be excavated without side collapse (in m) -----

Q.7 In an unconfined compression test on saturated clay, the unconfined shear strength was found to be 6 t/m^2 . If a sample of the same soil is tested in an undrained condition in triaxial compression at a cell pressure of 20 t/m^2 , then the major principal stress at failure will be (in t/m^2) -----

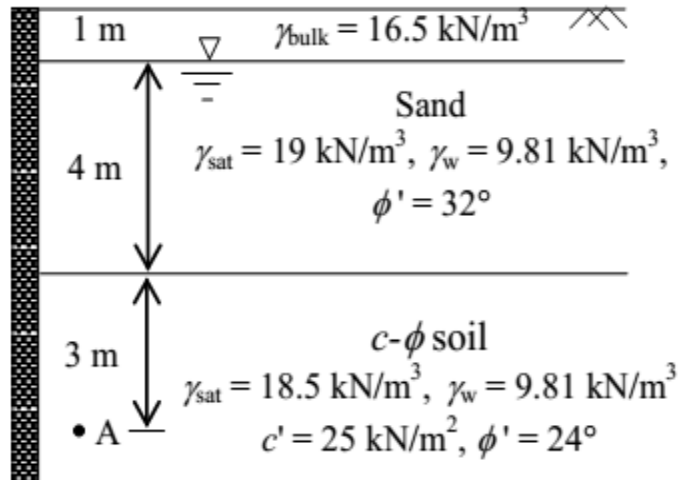
Q.8 A 6 m high retaining wall having a smooth vertical back face retains a layered horizontal backfill. Top 3 m thick layer of the backfill is sand having an angle of internal friction, $\phi = 30^\circ$ while the bottom layer is 3 m thick clay with cohesion, $c = 20 \text{ kPa}$. Assume unit weight for both sand and clay as 18 kN/m^3 . The total active earth pressure per unit length of the wall (in kN/m) is -----

Q.9 In an unconsolidated undrained triaxial test, it is observed that an increase in cell pressure from 150 kPa to 300 kPa leads to a pore pressure increase of 70 kPa. It is further observed that, an increase of 50 kPa in deviatoric stress results in an increase of 25 kPa in the pore pressure. The value of Skempton's pore pressure parameter B is -----

Q.10 A drained triaxial compression test on a saturated clay yielded the effective shear strength parameters as $c' = 20 \text{ kPa}$ and $\phi' = 22^\circ$. Consolidated Undrained triaxial test on an identical sample of this clay at a cell pressure of 150 kPa developed a pore water pressure of 100 kPa at failure. The deviator stress (expressed in kPa) at failure is -----

Q.11 A retaining wall with a smooth vertical backface has to retain a backfill of $c-\phi$ soil upto 5 m height. The surface of the backfill is horizontal and it has $\gamma = 1.8 \text{ t/m}^3$, $c = 1.5 \text{ t/m}^2$ and $\phi = 12^\circ$. The magnitude of total thrust (in kN/m) after tension crack is -----

Q.12 The soil profile at a site consists of a 5 m thick sand layer underlain by a $c-\phi$ soil as shown in figure. The water table is found 1 m below the ground level. The entire soil mass is retained by a concrete retaining wall and is in the active state. The back of the wall is smooth and vertical. The total active earth pressure (expressed in kN/m^2) at point A as per Rankine's theory is-----



Q.13 A 4 m high vertical earth retaining wall retains a dry granular backfill with angle of internal friction of 20° and unit weight of 20 kN/m^3 . If the wall is prevented from yielding (no movement), the total horizontal thrust (in kN per unit length) on the wall is-----

Q.14 A rigid smooth retaining wall of height 6.0 m with vertical backface retains saturated clay as backfill. The saturated unit weight and undrained cohesion of the backfill are 18 kN/m^3 and 19 kPa, respectively. The difference in the active lateral forces on the wall (in kN per meter length of wall, up to two decimal places), before and after the occurrence of tension cracks is -----

Q.15 In a triaxial test, a sample was consolidated under a cell pressure of 700 kN/m^2 and a back pressure of 350 kN/m^2 . There after with drainage not allowed, the cell pressure was raised to 800 kN/m^2 , resulting in the increased pore water pressure reading to 445 kN/m^2 . The axial load was then increased to give a deviator stress of 575 kN/m^2 . (While the cell pressure pressure remained at 800 kN/m^2) and a pore water reading of 640 kN/m^2 . The pore pressure coefficient A is ----- and B is -----

END OF THE PAPER