

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-B)

Q.1 Which one of the following is the appropriate triaxial test to assess the long term stability of soil?

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

Q.2 A retaining wall 6 m high with a smooth vertical back retains a clay backfill with $c = 15 \text{ kN/m}^2$, $\phi = 25^\circ$ and $\gamma = 18 \text{ kN/m}^3$. The passive earth pressure at the top will nearly be equal to ----- kN/m^2 .

Q.3 A direct shear box test on a specimen of sand has been performed; normal and shear stress was found to be 100 and 50 kN/m^2 respectively. What the value of shear strength (in kN/m^2) of soil at 5 m from the ground surface if the soil has specific gravity of solid as 2.65 and void ratio as 0.65. The water table is at the ground surface? Take $\gamma_w = 10 \text{ kN/m}^3$

- (a) 27.56 (b) 25.01 (c) 19.03 (d) 17.30

Q.4 A soil specimen having a cohesion $c = 90 \text{ kN/m}^2$ and $\phi = 8^\circ$ is tested in a triaxial test apparatus. The angle which the failure plane of the sample will make with the vertical axis of the sample is -----degree.

Q.5 A vertical wall 5m high above the water table retains a 20° soil slope. The retained soil slope has $\gamma = 19 \text{ kN/m}^3$, $c = 0$ and $\phi = 30^\circ$. The active earth thrust (in kN/m) at the base of the wall is -----

Q.6 Consider the following statements:

1. The yield of a retaining wall required to reach plastic equilibrium in active case is more than that in passive case.
2. In case of non-cohesive soils the coefficient of active earth pressure and earth pressure at rest are equal.
3. Cohesion decreases active earth pressure and increases passive earth pressure.
4. For masonry gravity retaining wall Coulomb's theory of earth pressure is preferred for design.

- (a) 1, 2, 3 and 4 are correct (b) 2 and 3 are correct (c) 3 and 4 are correct (d) 1 and 4 are correct

Q.7 Shear parameters 'c' and 'φ' are dependent on water content of soil. (True/ False) -----

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. = 1μm)
1.	38.9	19
2.	149.6	47

Shear box is 60 x 60 mm and the proving ring constant is 23 N/ μm. The cohesion of soil -----
-----N/mm² and angle of internal friction is ----- degree.

Q.9 In a consolidated drained triaxial test (CD test) a specimen of saturated sand failed under a deviator stress of 250 kPa when the cell pressure was 110 kPa. If the pore water pressure is 60 kPa then effective cohesion-----kPa and effective angle of internal friction ----- degree.

Q.10 When a vertical face excavation was made in clayey silt, having density of 22 kN/m³, it failed at a depth of excavation of 6m. What is the cohesive strength (in kN/m²) of the soil if its angle of internal friction was 30⁰?

- (a) 23.1 (b) 21.05 (c) 19.1 (d) 17.2

Q.11 Coulomb's theory of earth pressure is based on

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

Q.12 A 6 m high smooth retaining wall with a vertical face retains a cohesive backfill having cohesion of 20 kN/m², $\gamma = 19 \text{ kN/m}^3$ and $\phi_u = 30^\circ$. The critical height is -----m and the total active thrust (in kN/m) before the tension crack is ----- . Assume the backfill surface is horizontal.

Q.13 In a triaxial test (UU test), a sample of clay 110 mm long and 55 mm in diameter fails under a deviator load of 160 kN at 12 % lateral strain. If the cell pressure is 110 N/mm² the value of angle of internal friction----- degree and cohesion ----- N/mm².

Q.14 Given that for a soil deposit ($c = 60 \text{ kN/m}^2$, $\phi = 20^\circ$, $\gamma = 19 \text{ kN/m}^3$) the pressure under which the deposit has been fully consolidated in the past is 95 kN/m² and the present overburden pressure is 95 kN/m². The value of lateral earth pressure coefficient ----- when there is no movement of the wall.

Q.15 When movement of a wall under the earth pressure from the backfill was prevented the coefficient of earth pressure was recorded as 0.55. The ratio of the coefficient of active and passive earth pressures of the backfill is -----

Q.16 Taylor's stability number curves are used for the analysis of stability of slopes. The angle of shearing resistance used in the chart is the:

- (a) Effective angle (b) Apparent angle (c) Mobilised angle (d) Weighted angle

Q.17 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 is:

- (a) $6/7\Pi$ (b) $5/7\Pi$ (c) $4/7\Pi$ (d) $3/7\Pi$

Q.18 Find the depth of embedment 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) 7.604 (b) 6.702 (c) 5.621 (d) 4.702

Q.19 Taylor stability number depends on

- (a) Cohesion and unit weight of soil (b) Factor of safety
(c) Height of slope (d) All

Q.20 An infinite natural slope with angle of slope 15° has a saturated unit weight of 18 kN/m^3 and an effective angle of internal friction 35 degree. The factor of safety against failure of the slope when the slope is completely dry or submerged but without seepage ----- and when seepage occurs at a parallel to the surface of slope is -----respectively.

- (a) 2.61, 1.19 (b) 0.97, 1.63 (c) 3.56, 2.67 (d) 1.97, 0.67

< END OF THE QUESTION PAPER >

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