國立中興大學

111 學年度
碩士班考試入學招生

試題

招生系所：土木工程學系丙組

科目名稱：土壤力學與基礎工程

I.選擇題 (40% 每題 5 分)

1. The relationship between void ratio (e) and porosity ratio (n) is:
(A) $n = (1 + e)/(1 - e)$
(B) $e = (1 + n)/(1 - e)$
(C) $n = e/(1 - e)$
(D) $e = n/(1 - n)$

2. Effective stress on soil
(A) Increases voids ratio and decreases permeability
(B) Increases both voids ratio and permeability
(C) Decreases both voids ratio and permeability
(D) Decreases voids ratio and increases permeability

3. The shear strength of a soil
(A) Is directly proportional to the angle of internal friction of the soil
(B) Is inversely proportional to the angle of internal friction of the soil
(C) Decreases with increase in normal stress
(D) Decreases with decrease in normal stress

4. Factor of safety against sliding of a slope, is the ratio of
(A) Actual cohesion to that required to maintain stability of slope
(B) Shear strength to shear stress along the surface
(C) Neither (a) nor (b)
(D) Both (a) and (b)

5. Select the incorrect statement.
(A) Bearing capacity of a soil depends upon the amount and direction of load
(B) Bearing capacity of a soil depends on the type of soil
(C) Bearing capacity of a soil depends upon shape and size of footing
(D) Bearing capacity of a soil is independent of rate of loading

6. A normally consolidated clay settled 10 mm when effective stress was increased from 100 kN/m2 to 200 kN/m2. If the effective stress is further increased from 200 kN/m2 to 400 kN/m2, then the settlement of the same clay is

(A) 10 mm

(B) 20 mm

(C) 40 mm

(D) None of the above

7. The passive earth pressure of a soil is proportional to (where φ is the angle of internal friction of the soil.)

(A) $\tan(45° - φ)$

(B) $\tan(45° + φ)$

(C) $\tan2(45° - φ)$

(D) $\tan2(45° + φ)$

8. In a triaxial compression test when drainage is allowed during the first stage (i. e. application of cell pressure) only and not during the second stage (i.e. application of deviator stress at constant cell pressure), the test is known as

(A) Consolidated drained test

(B) Consolidated undrained test

(C) Unconsolidated drained test

(D) Unconsolidated undrained test

II.解釋名詞 (20% 每題 5 分)

1. 土壤液化

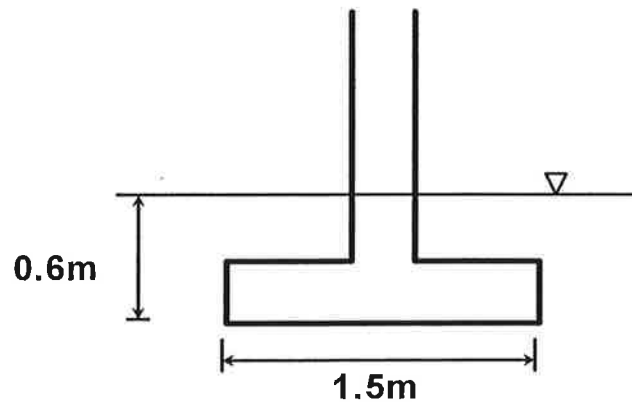2. 相對密度

3. 過壓密比

4. 滲透係數

III.計算題 **(40%)**

1. 考慮一方形基腳位於地下水位之下 **0.6m**，請計算承載力安全係數為 **3.0** 條件下之最大垂直荷重 P 　　　**(20%)**

   $q_{ult} = 1.3c'N_c + \sigma'_{zD}N_q + 0.4\gamma BN_\gamma$

   Nc = 37.2, Nq = 22.5, N$_\gamma$=20.1 with c' = 10kN/m^2, φ' = 30°, γ = 19kN/m^3

0.6m

1.5m

2. 考慮一直徑 **40cm** 長度 **15m** 支鋼管樁承受垂直荷重 **800kN**，樁身穿越土層及樁壁摩擦力如圖示，試計算安全係數 **3.0** 之容許承載力並說明此設計是否得當。**(20%)**

800kN

4m　clay
fs=25kPa

10m　silty sand
fs=100kPa

1m

clay
fs=100kPa
q_t=2000kPa