

國立臺北科技大學九十五學年度碩士班招生考試

系所組別：3120 土木與防災研究所乙組

第一節 土壤力學與基礎工程 試題

填准考證號碼

第一頁 共二頁

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注意事項：

1. 本試題共 5 題，平均配分，共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。
4. 計算條件若有不足，請作合理假設。

一、某實驗室針對一正常壓密黏土進行下列三種三軸試驗。試以圖表示這些試驗之總應力與有效應力摩爾圓 (Mohr circles) 及其破壞包絡線 (failure envelopes)：

1. 不壓密不排水試驗 (Unconsolidated Undrained (UU) test)：(7 分)
2. 壓密不排水試驗 (Consolidated Undrained (CU) test)：(7 分)
3. 壓密排水試驗 (Consolidated Drained (CD) test)。(6 分)

二、翻譯及說明下列名詞之意義：(每題 2 分)

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|--------------------------|--|
| 1. Unit weight | 6. Excess pore water pressure |
| 2. Chemical grouting | 7. Rankine coefficient of earth pressure |
| 3. Liquefaction | 8. Coefficient of consolidation |
| 4. Capillary force | 9. Long-term stability analysis |
| 5. Effective stress path | 10. Undrained shear strength |

三、假設一長條形圍堰 (long cofferdam) 內部之滲流狀態如圖 Q3 所示。此土層之厚度非常深且其水平及垂直滲透係數均為 0.02m/s 。若兩排鋼板樁內之水位面與開挖面保持在同一高度：

1. 試計算流進圍堰內部之每單位長的滲流量；(7 分)
2. 試計算並描繪作用於版樁內、外兩側之水壓力分佈；(7 分)
3. 試計算此結構是否安全。(6 分)

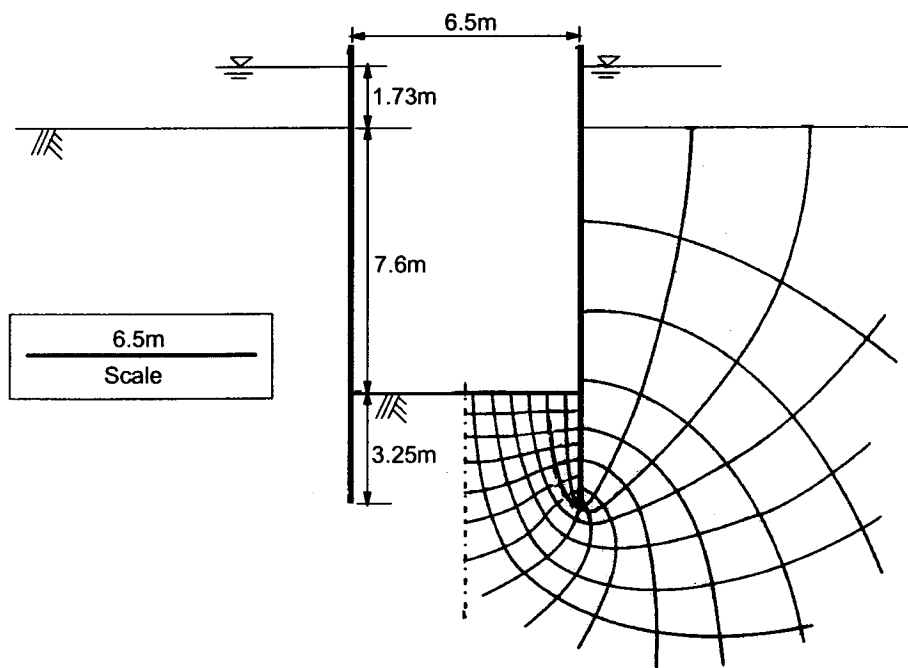


Fig Q3.

四、Fig Q4 shows a uniformly distributed load of 200 kN/m acting on a concrete strip footing ($\gamma=24 \text{ kN/m}^3$). The soil profile consists of 5m of clay ($\gamma=16 \text{ kN/m}^3$) overlying rock. The undrained shear strength of the clay is 100 kPa and the compressibility is $1 \times 10^{-4} \text{ m}^2/\text{kN}$. Neglecting the spread of the load beneath the footing and any side cohesion on the foundations, determine: (每題 10 分)

1. The width of the footing (B) if the factor of safety against undrained shear failure of the clay is 2.5. Assume bearing capacity factor $N_c=5.7$;
2. Its ultimate consolidation settlement.

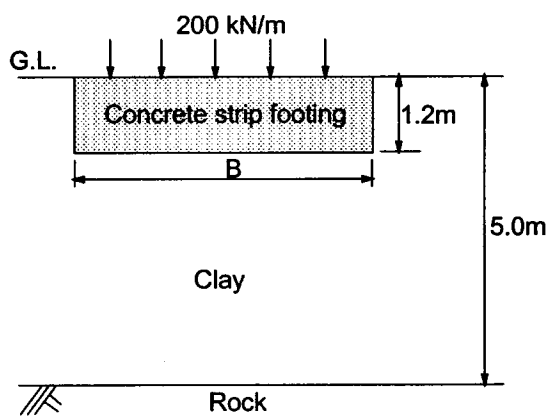


Fig Q4.

注意：背面尚有試題

五、 An 11m long anchored sheet-pile wall retains soil of height 6.4m as shown in Fig Q5. The soil has unit weight $=18 \text{ kN/m}^3$, $\phi=30^\circ$ and the surface is level with the top of the wall. The tie-rods are 1.2m below the surface and are spaced 2.5m apart horizontally. Neglecting friction on the surface of the piling and assuming "free-earth support", determine : (每題 10 分)

1. The percentage of the mobilized passive resistance against theoretical maximum passive resistance of the wall;
2. The pull (tension) in the tie rod.

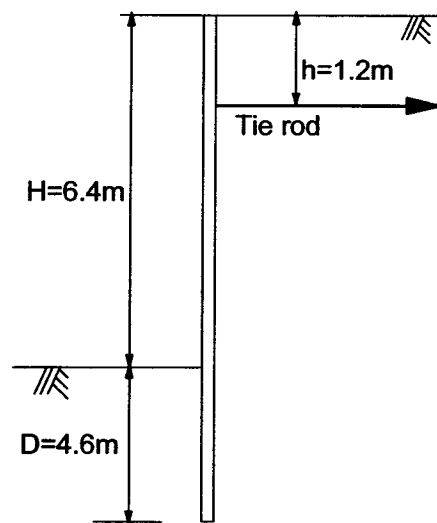


Fig Q5.