

國立高雄第一科技大學 100 學年度 碩士班 招生考試 試題紙

系 所 別：營建工程系

組 別：大地組

考科代碼：1115

考 科：土壤力學

注意事項：

- 1、本科目得使用本校提供之電子計算器。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. A soil profile is shown in following *Figure 1*. In this soil profile, clay layer is normally consolidated.

(1) Please calculate and plot the variation of total stress, pore water pressure and effective stress with depth. (6%)

(中文簡譯: 繪總應力、孔隙水壓、有效應力與深度關係圖)

(2) If this ground surface is subjected by a flexible rectangular (24m×30m) loading ( $P=100\text{kPa}$ ) shown as following *Figure 2*, please (a) plot the variation of total stress, pore water pressure and effective stress with depth under the middle of the rectangular load (6%) (hint: Including short term and long term). (b) calculate settlement of the clay layer caused by primary consolidation at point a, b, c? (6%) ( $C_c=0.45$ )

(中文簡譯: (a)分別繪短期與長期總應力、孔隙水壓、有效應力與深度關係圖

(b)計算 a、b、c 三點的主要壓密沈陷量)

(3) Calculate (a) settlement of a, b, c in the 2<sup>nd</sup> year of consolidation and (b) the time of 80% consolidation. (12%)

$C_v = 0.616 \text{ m}^2/\text{year}$ ,

$$T_v = \frac{\pi}{4} \left( \frac{U^2}{100} \right), \quad U \leq 60\%$$

$$T_v = 1.781 - 0.933 \log(100 - U), \quad \text{當 } U > 60\%$$

$$T_v = \frac{c_v t}{H_{dr}^2} = \frac{c_v t}{\left( \frac{H}{n} \right)^2}$$

(中文簡譯: (a)計算 a、b、c 在第二年時的壓密沈陷量 (b)計算達 80% 壓密沈陷量的時間點)

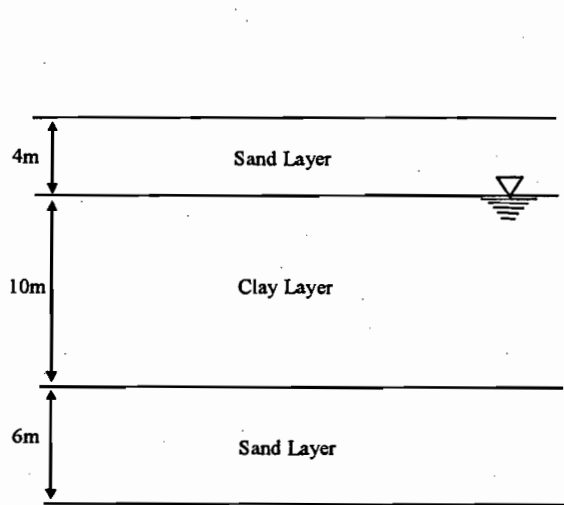


Figure 1

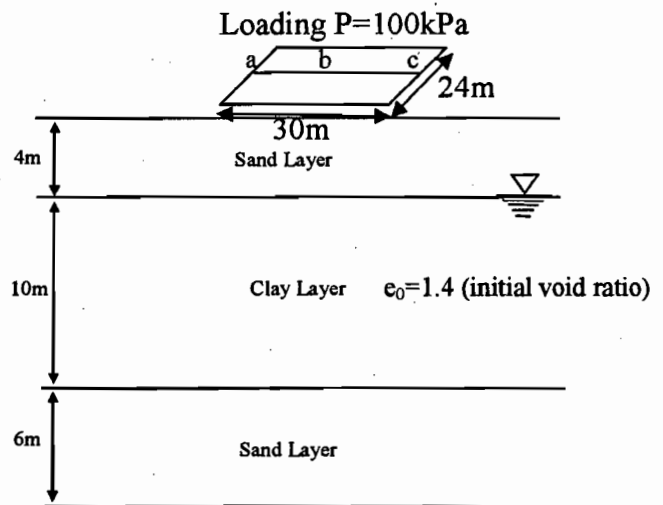
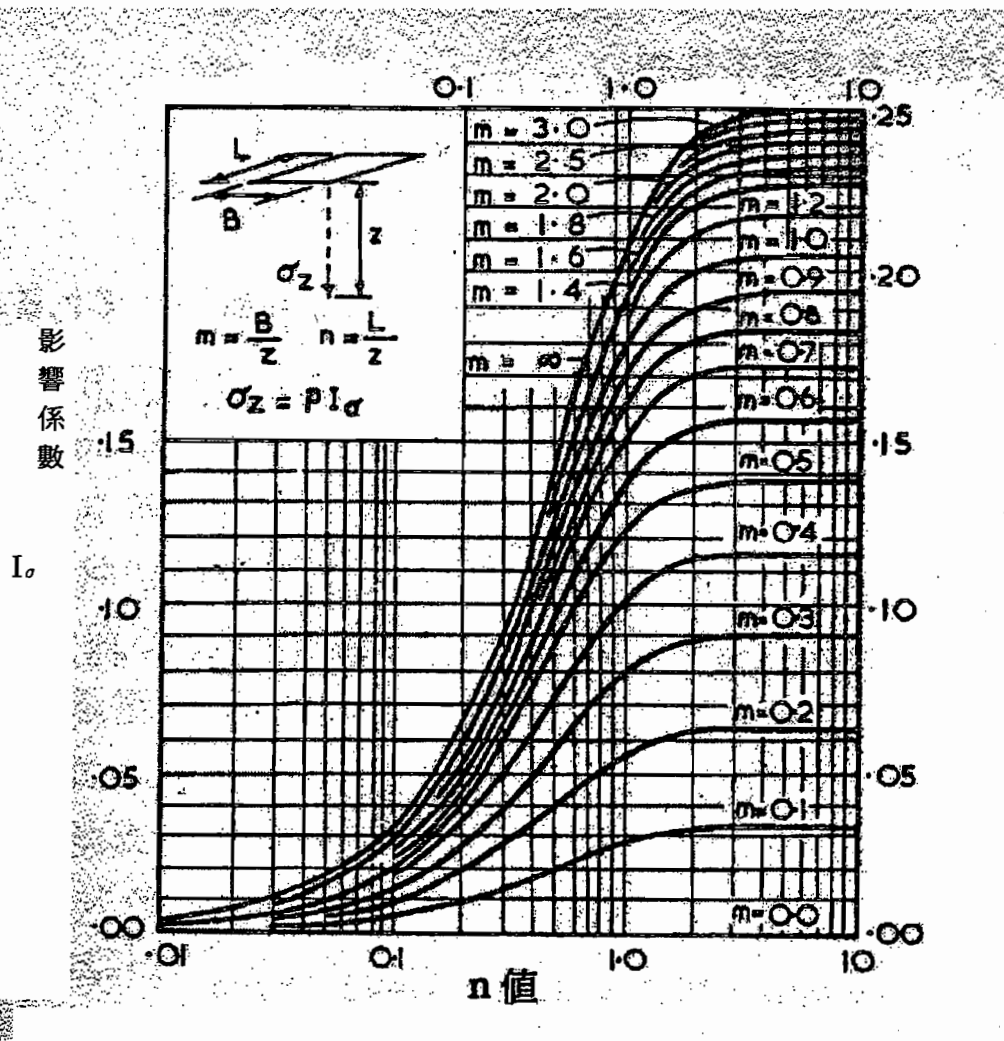


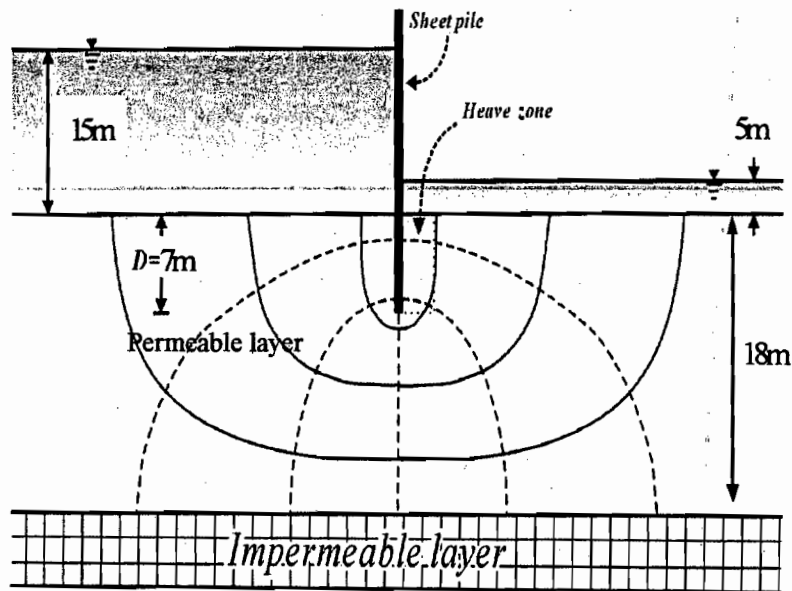
Figure 2



2. (1) 請說明流線網繪製原則 (6%)  
 (2) 計算下圖(a)隆起區之安全係數 (10%).  
 (b)由左滲流至右側之滲流量 (4%)

$$k=6.5 \times 10^{-5} \text{ m/sec}$$

$$\gamma_{\text{permeable layer}}=19 \text{ kN/m}^3$$



3. 試定義並說明以下之名詞：(30%)

- (1) 塑性指數(plasticity index)
- (2) 液性指數(liquidity index)
- (3) 黏土過壓密比(overconsolidation ratio)
- (4) 砂質土壤之相對密度(relative density)
- (5) 粒徑分佈曲線之曲率係數(coefficient of curvature)
- (6) 黏土之活性度(activity)

4. 有一土壤之含水量為 18% 時之濕土單位重為  $19.21 \text{ kN/m}^3$ ，已知其土壤顆粒比重(specific gravity of soil solids)為 2.71，試計算：(20%)

- (1) 孔隙比(void ratio)
- (2) 飽和度(degree of saturation)
- (3) 乾土單位重(dry unit weight)
- (4) 飽和單位重(saturated unit weight)