

# 國立成功大學

## 112學年度碩士班招生考試試題

編 號： 99

系 所： 土木工程學系

科 目： 土壤力學

日 期： 0206

節 次： 第 2 節

備 註： 可使用計算機

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Note: Make rational assumptions if necessary.

一、Answer the following questions (簡答題) (total 20 pts):

1. List and explain two methods/theories proposed by Karl Terzaghi. (10 pts)
2. List and explain two methods/theories proposed by Arthur Casagrande. (10 pts)

二、Answer the following questions related to water in the soil. (total 25 pts)

1. Describe the setup of the falling head permeameter test and use it to derive the equation for permeability calculation. (10 pts)
2. Draw a flow net for the single row of sheet piles driven into a permeable layer as shown in Figure 1 and use the flow net to compute the seepage loss per meter length of the sheet pile in  $m^3/day$ . Given:  $H_1=3.5$  m,  $H_2=0.5$  m,  $D=1.5$  m,  $D_1=3.75$  m, Permeability of the permeable layer  $k=4 \times 10^{-4}$  cm/s. (15 pts)

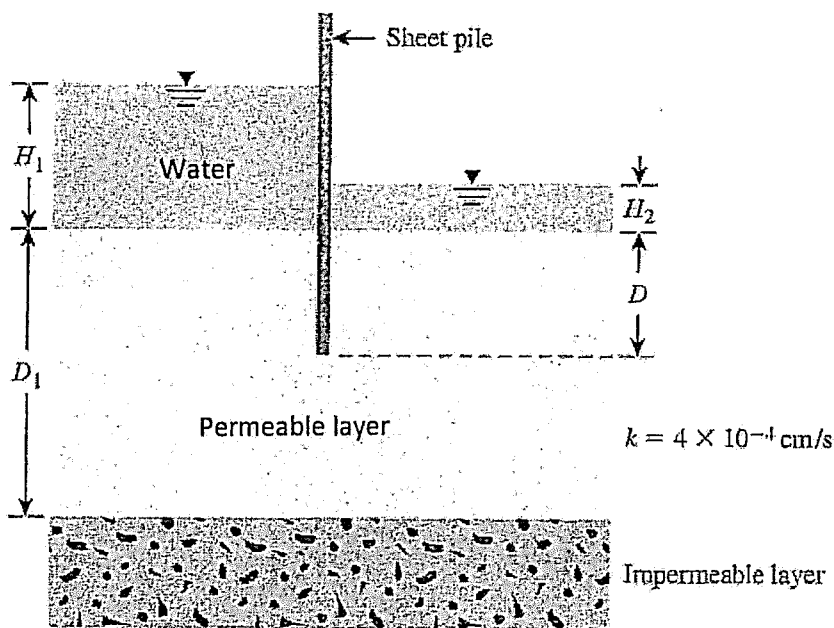


Figure 1

三、Answer the following questions related to the compressibility of soils. (total 25 pts)

1. Derive the governing equation of 1-D consolidation. (10 pts)
2. List the three types of settlements induced by building foundations and explain the mechanism of each type. (9 pts)
3. List two methods for accelerating consolidation settlement and explain the mechanism of the methods. (6 pts)

四、Answer the following question about in-situ stress and shear strength. (total 30 pts)

1. For the soil profile shown in Figure 2, plot the profiles of (a) total vertical stress, (b) pore pressure, and (c) effective vertical stress, down to the bottom of the silty clay layer. (10 pts)

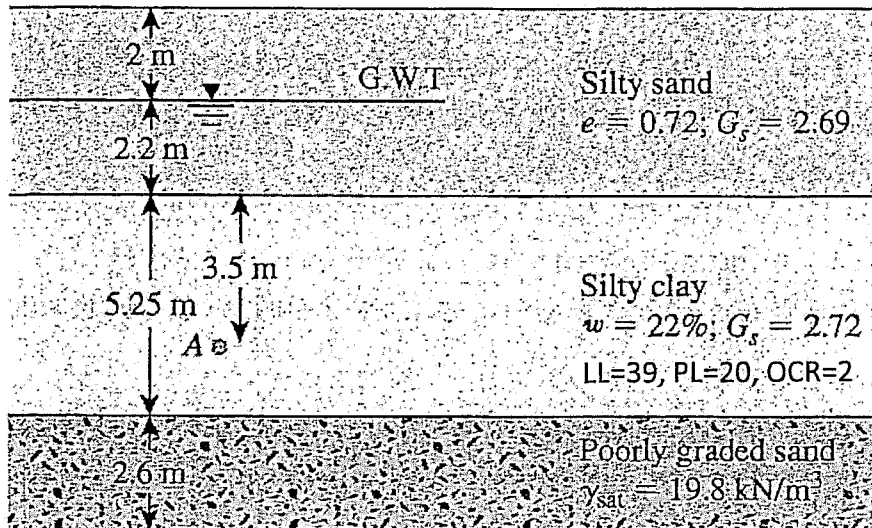


Figure 2

2. Estimate the undrained shear strength ( $S_u$ ) at point A in Figure 2. (For NC clay, Skempton (1957):

$$\frac{S_u}{\sigma_v} = 0.11 + 0.0037(PI). \text{ (10 pts)}$$

3. The results of SCD triaxial tests of the silty clay are listed in Table 1. Based on the stress path proposed by Lambe (1964), derive the equation of the  $K_f$ -line and compute the effective strength parameters of the silty clay. (10 pts)

Table 1

Test no.	Confining stress (kPa)	Deviator stress at failure (kPa)
1	100	216
2	200	310