系所組別：土木工程學系乙組

考試科目：基礎工程

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

Make rational assumptions if needed.

1、Answer the following questions briefly with texts and/or figures: (30 pts)

(1) Define N_{60} and list the necessary corrections to correlate the measured SPT-N value and N_{60}. (6 pts)

(2) Define the logarithmic spiral surface in the radial shear zone of shallow foundations cases. (6 pts)

(3) Define the K_0 condition and describe how to evaluate the K_0 value for OC soils. (6 pts)

(4) List the conditions that require pile foundations. (6 pts)

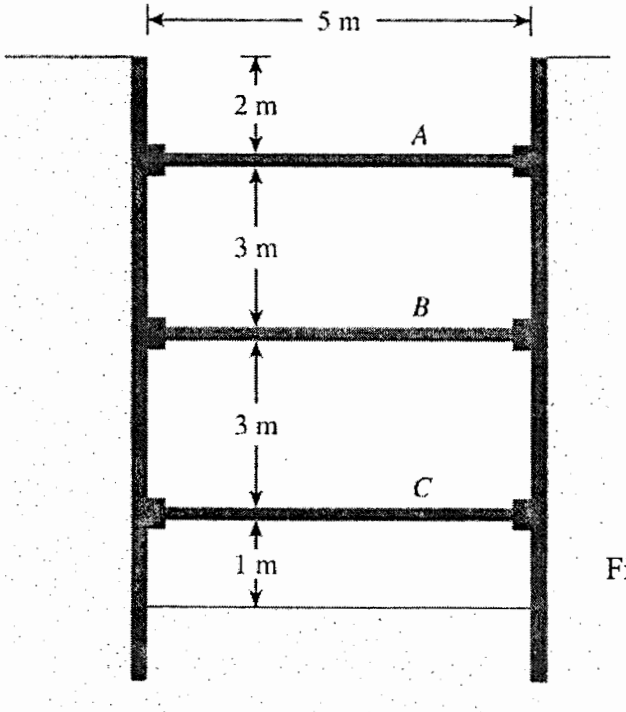
(5) Describe how to determine the allowable bearing capacity of shallow foundations. (6 pts)

2、Answer the following questions related to lateral earth pressures. (30 pts)

(1) Briefly describe how to implement the Mononobe-Okabe method to evaluate the active earth pressure for earthquake conditions. (8 pts)

(2) List the assumptions of the apparent pressure envelopes by Peck (1969). (8 pts)

(3) Draw the earth-pressure envelope and determine the strut loads at level A, B, and C in Fig. 1. (14 pts)



$\gamma = 18$ kN/m^3

$c = 35$ kN/m^2

$\phi' = 0$

Spacing=4 m

Fig. 1

3、Answer the following questions related to shallow foundations. (20 pts)

(1) Draw the failure surface assumed in Terzaghi's bearing capacity theory for rough, rigid strip foundation in ϕ=0 soil. (8 pts)

(背面仍有題目,請繼續作答)

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(2) For saturated clay with ϕ=0 and a vertical loading, the shape and depth factors associated with cohesion are $F_{cs}=1+\frac{B}{L}(\frac{N_q}{N_c})$ and $F_{cd}=1+0.4(\frac{D_f}{B})$, respectively, and where B=width, L=length, D_f=embedded depth. Derive the factor of safety against bearing capacity failure for a compensate foundation subjected to a vertical loading Q on a saturated clay stratum. (12 pts)

4、Answer the following questions related to pile foundations. (20 pts)

(1) The section of a 4×4 group pile in a layered saturated clay is shown in Fig. 2. The piles are square in cross section (0.4 m×0.4 m). Use the Meyerhof's method for tip resistance and α-method for frictional resistance with $\alpha=0.6(\frac{\bar{\sigma}'_0}{c_u})$ to determine the ultimate load-bearing capacity of a single pile. (10 pts)

(2) Determine the allowable load-bearing capacity of the pile group in (1) with FS=3. (10 pts)

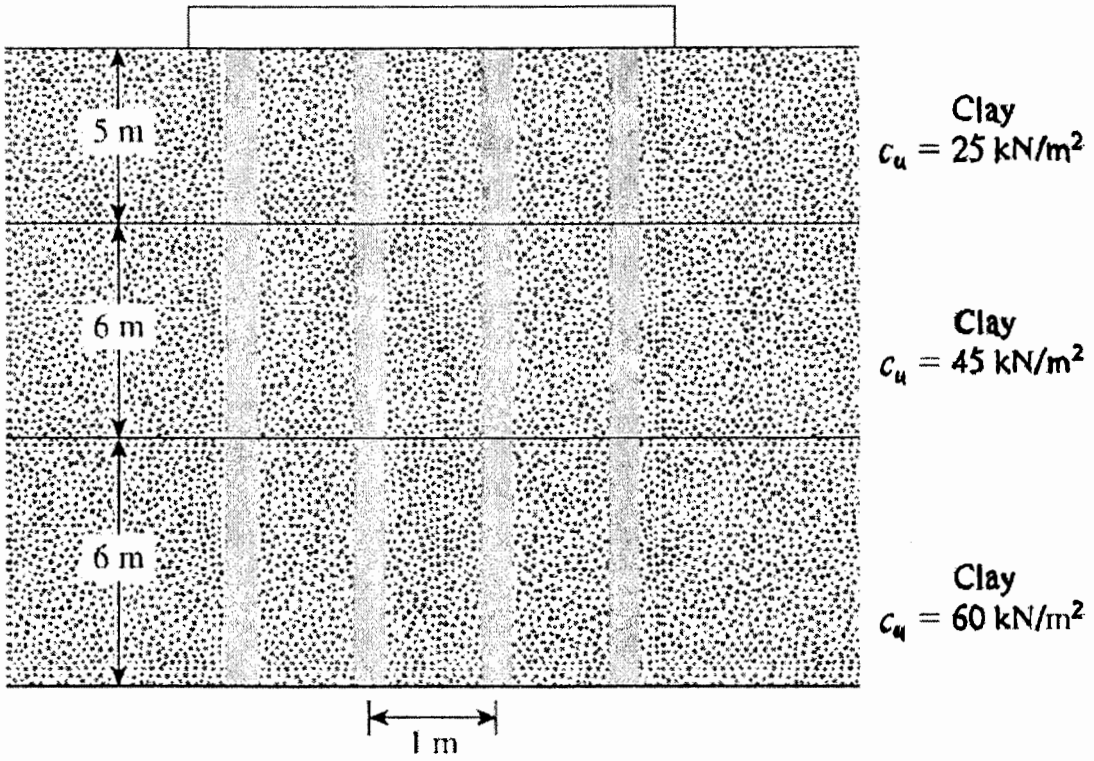

Fig. 2