

# 國立成功大學

## 115學年度碩士班招生考試試題

編 號： 75

系 所： 土木工程學系

科 目： 基礎工程

日 期： 0203

節 次： 第 1 節

注 意： 1. 可使用計算機  
2. 請於答案卷(卡)作答，於  
試題上作答，不予計分。

Make reasonable assumptions if necessary.

1、 Answer the following questions briefly with texts and/or figures: (25 %)

- (1) List the cases suitable for mat foundations. (5 %)
- (2) Provide the failure modes of mechanically stabilized earth walls. (5 %)
- (3) State the design requirements for anchored sheet pile walls. (5 %)
- (4) Provide the failure modes of braced cut excavations. (5 %)
- (5) List three in-situ testing techniques for estimating the undrained shear strength of cohesive soils. (5 %)

2、 Answer the following questions on lateral earth pressures. (25 %)

- (1) For a vertical retaining wall with level backfill, compare the differences between the Rankine and Coulomb active earth pressures on (a) general assumptions, (b) failure surface, and (c) magnitude and direction of active force. (10 %)
- (2) Based on the cantilever retaining wall shown in Fig. 1 and values tabulated in Table 1, in which the Rankine's coefficients of active and passive earth pressure are  $K_{AR}$  and  $K_{PR}$ , respectively, compute the following properties: (a) Rankine active and passive forces ( $P_{AR}$ 、 $P_{PR}$ ) per meter of the wall, (b) the location of the resultants ( $H_{AR}$ 、 $H_{PR}$ ), and (c) the factors of safety against overturning and sliding including the effect of  $P_{PR}$ . (15 %).

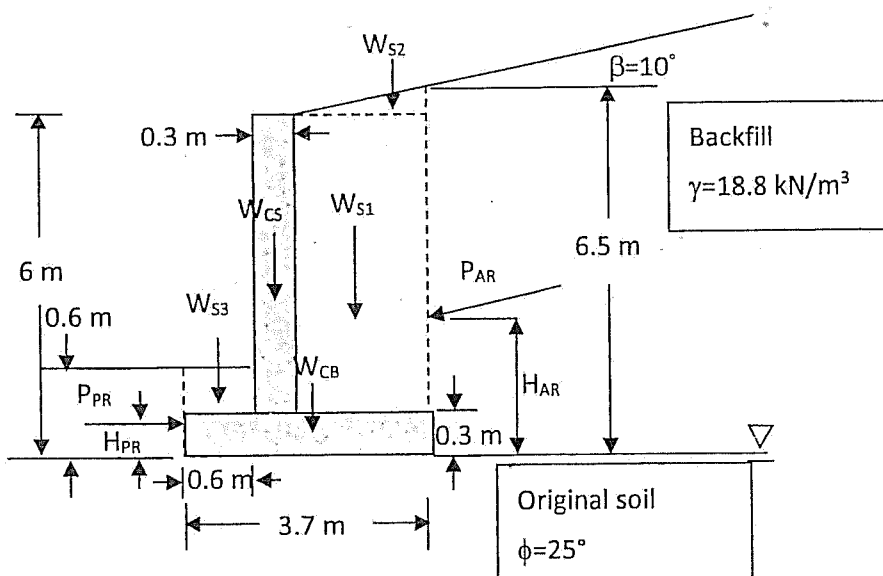


Fig. 1

Table 1

$W_{CS}$ (kN/m)	$W_{CB}$ (kN/m)	$W_{S1}$ (kN/m)	$W_{S2}$ (kN/m)	$W_{S3}$ (kN/m)	$K_{AR}$	$K_{PR}$
43	27.7	304.3	12.7	3.3	0.43	2.46

3、 Answer the following questions on the bearing capacity of shallow foundations: (25 %)

- (1) Derive the factor of safety with Meyerhof's general bearing capacity equation for a compensated

foundation subjected to vertical loads on saturated clays with  $\phi=0$ . (10 %)

(Note  $F_{cs} = 1 + \frac{0.195B}{L}$ ,  $F_{cd} = 1 + 0.4(\frac{D_f}{B})$  where  $B$  and  $L$  are the width and length of the foundation, respectively, and  $D_f$  is the embedded depth)

- (2) A square column foundation has to carry a gross allowable load of 2200 kN with FS=3.0. Given  $D_f=1.5$  m,  $\gamma=15.9$  kN/m<sup>3</sup>,  $\phi'=0$ ,  $c_u=25$  kPa. Use Terzaghi's equation to determine the size of the foundation if general shear failure occurred. (15 %)

4. A circular, closed-end pipe pile with a diameter of 0.5 m is driven to an embedded depth of 30 m from the seabed. The soil profile below the seabed is simplified in Table 2. Answer the following questions: (25 %)

- (a) Evaluate the ultimate point capacity with Meyerhof's (1976) method. (5 %)
- (b) Estimate the ultimate shaft resistances by (a)  $\alpha$ -method with  $\alpha = 0.5(\frac{\sigma'_0}{c_u})^{0.45}$ , (b)  $\beta$ -method with  $\phi'_R = 25$  and  $30^\circ$  for A and B layer, respectively, and (c)  $\lambda$ -method with  $\lambda=0.14$ . (15 %)
- (c) Compute the net allowable pile capacities for the three shaft resistances for FS=4.0. (5 %)

**Table 2**

Layer	Depth from seabed (m)	USCS	Soil properties
A	0.0 -10.0	CL	$\gamma_{sat}=18.0$ kN/m <sup>3</sup> , OCR=1.0 $c_u=50$ kPa
B	10.0 - 40.0	CL	$\gamma_{sat}=19.0$ kN/m <sup>3</sup> , NC clay $c_u=100$ kPa