

系所組別： 土木工程學系乙組

考試科目： 土壤力學

考試日期：0225，節次：2

You can answer the following problems with Chinese or English.

1. (24 分) Translate following terminologies to Chinese and explain its meaning:
(1) specific surface (2) quick clay (3) excess pore water pressure (4) back pressure
(5) seepage force (6) coefficient of compressibility
2. (15 分) (a) Describe the standard compaction test, stating its object. (b) What constitutes consolidation of clay soil? (c) List the differences between soil compaction and soil consolidation?
3. (7 分) Differentiate the soil structure between flocculation and dispersion?
4. (24 分) (a) What is Mohr-Coulomb failure criterion? (b) What is Mohr-Coulomb failure envelope? (c) What does the K_f line represent? (d) What is stress path? Stating the purpose of stress path? (e) Derive an equation for the relationship between $(\sigma_1 + \sigma_3)/2$ and $(\sigma_1 - \sigma_3)/2$ in terms of c and ϕ . (f) Draw a typical total and effective stress path for a triaxial compression (CU) test of normally consolidated clay.
5. (20 分) (a) What assumptions are made regarding to Terzaghi's one dimensional consolidation theory? (list five at least) ,
(b) Derive the following governing equation for one dimensional consolidation theory [in vertical (z) direction]:
$$\frac{\partial \cdot u}{\partial \cdot t} = c_v \frac{\partial^2 u}{\partial \cdot z^2}$$
6. (10 分) Derive the equation for computing hydraulic conductivity from a falling head permeability test for the case of radial flow in a soil sample with a central sand drain. (assume the radius of sand drain and sample are r_w and r_o , respectively, and the height of sample is H).