編號： 101

國立成功大學 105 學年度碩士班招生考試試題

系　　所：土木工程學系

考試科目：土壤力學

考試日期：0227，節次：2

※ 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。
(可用中文或英文作答)

1. Translate following terminologies to Chinese and explain its meaning: (5% each)
   (1) Consistency
   (2) Thixotropy
   (3) Hydraulic gradient
   (4) Excess pore water pressure
   (5) Flow net

2. An "undisturbed" sand sample obtained by piston sampler was carefully taken from a boring and had the following properties:
   Specific Gravity, G_s = 2.65.　Total weight, W_t = 160 grams.
   Total volume, V_t= 80.00 cc　Water content, ω = 25%.
   Determine the following properties of the soil:　(5% each, total 20%)
   (a) The total unit weight, γ_t
   (b) The dry unit weight, γ_d
   (c) Void ratio.
   (d) Degree of saturation.

3. What is stress path?　What does the K_f line represent?
   How to find the cohesion and friction angle from the K_f line? (15%)

4. The following question pertains to a consolidated-undrained test on a normal consolidated clay. The specimen was first consolidated isotropically under a total confining (cell) pressure of 500 kPa and a back pressure (initial pore water pressure) of 250 kPa. The total confining pressure was then increased to 700 kPa with the drainage line to the base of the specimen closed in order to check the degree of saturation of the specimen. The specimen was determined to be fully saturated. The specimen was then sheared by increasing the axial load to failure under the total confining pressure of 700 kPa. The principal stress difference at failure was 200 kPa and the total pore water pressure at failure was 600 kPa (including the pore water pressure before shear). (20%)
   (a) Calculate the major and minor effective principal stresses at failure.
   (b) Calculate the value of φ' at failure assuming zero effective cohesion.
   (c) What was the pore water pressure just before shear?
   (d) Calculate the pore water pressure coefficient A at failure?

5. (1) Write down five (at least) assumptions used for Terzaghi 's one dimensional consolidation theory.(10%)　(2) Derive the consolidation equation: $\frac{\partial \cdot u}{\partial \cdot t} = c_v \frac{\partial^2 u}{\partial \cdot z^2}$ (10%)