

**CEL 222: Engineering Geology and Soil Mechanics**

**Major Exam 29/4/2008**

*Please write clear, precise, point to answers*

Time: 60 minutes

Credit: 40%

**Name:**

**Registration No.:**

**Group:**

1. A level fence line 200 m long is recorded on a vertical photograph taken with a camera having a 152 mm lens. A topographic map indicates that the fence line is at an elevation of 1120 m above the sea level. If the fence line is 20 mm long on the photograph, determine the flying height above the sea level. *(10 Points)*
2. A proposed construction site is underlain by a sedimentary rock that was formed from rounded gravel size particles and sand. The gravel size particles represent 75% of the total mass. What is the name of the rock? Would you expect it to provide good support for the proposed structural foundations? Will it be difficult to excavate? *(10 Points)*
3. List three principal differences in air-photo identification of granitic rock versus sandstone. *(10 Points)*
4. Which would probably provide a better support for a large, heavy building, diorite or shale? Why? *(3 Points)*

**Department of Civil Engineering**  
**CEL222 Engineering Geology and Soil Mechanics**  
**Major Test (part 2)**

Answer all questions  
Assume suitable value/s of the missing data

Time 1 hour  
April 29<sup>th</sup>, 2008  
Max Marks: 40

**Write the description of all symbols/notations and their units**

Q1. An undisturbed soil sample of normally consolidated clay thick deposit was obtained from a El. -16m. The water table was on the ground surface at El. 0m. The specific gravity of the soil was determined as 2.64 and bulk density as  $16.25 \text{ kN/m}^3$ . The unit weight of water may be assumed as  $10 \text{ kN/m}^3$ . The sample was placed in an oedometer and stresses of 25, 50, 100, 250, 500 and  $1000 \text{ kN/m}^2$  were applied and at each stage complete consolidation took place. At the end of this the void ratio was 0.6. Now the sample was unloaded up to a stress level of  $50 \text{ kN/m}^2$  and then reloaded in stages up to  $1600 \text{ kN/m}^2$ .

- a. Draw the typical  $e$  vs log effective stress curve/s for the test conducted.
- b. Determine Compression Index.
- c. Estimate the value of past maximum effective stress this sample has experienced in the field.
- d. Explain the procedure of another test you would like to conduct to determine the permeability of this soil.

**(20)**

Q2. It is observed that for some soils the  $S_u$  value is greater than  $S_d$  value and for other soils  $S_d$  is greater than  $S_u$ . State the type/s of soil where these behaviours can be observed and explain the reasons for this behaviour. Is it possible to have  $S_u = S_d$ ? If yes, for what soil type it would be valid?

**(10)**

Q3. Write short notes on pore water pressure parameter B.

**(5)**

Q4. Draw typical curves of Deviator stress vs axial strain and volumetric strain vs axial strain for loose, medium dense and dense sand. Also write the test from which you will obtain this data.

**(5)**