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L'Université canadienne
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CVG 3109 Fall – 2015
SOIL MECHANICS I
ASSIGNMENT #1
Due September 22, 2015

Soil Mechanics – Brief Review

Q1. For the sieve and hydrometer analysis results shown below

- **a.** Plot the grain size vs. percent passing on a semi-logarithmic scale (i.e. **Grain Size Distribution Curve**) using a graphic tool such as MS-EXCEL.
- **b.** Compute the coefficients of uniformity **(C_U)** and curvature **(C_Z)**
- **c.** Assign **group symbol(s)** to the soil (w_l = 20%, w_p = 13%)

Table 1. Sieve analysis results (M_s = 523.8 g)

Sieve Number	Diameter (mm)	Mass of Sieve (g)	Mass of Sieve + Soil Retained (g)	Soil Retained (g)	Percent Retained (%)	Percent Passing (%)
4	4.75	116.23	166.13			
10	2	99.27	135.77			
20	0.84	97.58	139.68			
40	0.425	98.96	138.96			
60	0.25	91.46	114.46			
140	0.106	93.15	184.15			
200	0.075	90.92	101.12			
Pan	……	70.19	301.19			
Total Mass of soil =						

Table 2. Hydrometer analysis results

Diameter (mm)	Adjusted % Passing
0	…..
0.03029	37.8
0.02844	33.3
0.02054	31.6
0.0149	28.6
0.01094	24.1
0.00771	20.8
0.00411	14.9
0.0013	8.4

Q2. A saturated soil has a moisture content of 25.7% and a void ratio of 0.668. Determine the **saturated soil density and the specific gravity of soil solids** (Hint: You can perform the calculations based on assumed either volume or mass of soil solids).

Q3. Results from liquid limit tests for a soil are summarized below.

Number of Blows	Water Content (%)
11	34
17	28
32	19

Using the data:

a. Draw the **flow line** (by fitting a straight line to the data points) and obtain the **liquid limit** of the soil.
b. What is the **plasticity index** of the soil, if the Plastic limit of the soil is12 %.
c. Determine the **liquidity index** of the soil when the *in-situ* moisture content is 14%.
d. How are the Atterberg limits useful in engineering practice?

Q4. The following results were obtained from a standard compaction test on a soil:

Mass (g)	2010	2092	2114	2100	2055
Water Content (%)	12.8	14.5	15.6	16.8	19.2

The value of G_s is 2.67. Plot the **dry unit weight (kN/m³) vs water content (%)** and give the optimum water content and maximum dry unit weight. Plot also the **zero-air-voids**, **S= 90%** and **S= 50%** curves. The volume of the mold is 1000cm³.