FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF PHYSICAL SCIENCES
DEPARTMENT OF GEOLOGY

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BTech (GEOLOGY), 2015/2016 SESSION

COURSE: GEL 413 (ENGINEERING GEOLOGY)   UNIT: 3

DATE: 8th April, 2016.   TIME ALLOWED: 2½ Hours

Instructions: This paper has two sections. Answer two questions from each.

1.   Table 1 shows the results of sieve analysis. Use it to answer the following questions.

Table 1 Results of sieve analysis.

Sieve diameter (mm)	2.000	0.800	0.4000	0.2000	0.175	0.150	pan
Weight of sample retained (g)	16.787	77.431	59.486	11.773	23.437	5.340	36.442

   a. Calculate the percentage passing.
   b. Plot the graph of percentage passing against sieve sizes in millimetres.
   c. Determine the coefficient of curvature, coefficient of uniformity and permeability from the graph assuming $C = 1.5$.
   d. Comment on your results.

2a. Define the following terms: (i). Consistency limit. (ii). Liquid limit. (iii). Plastic limit. (iv). Plasticity index (v). Liquidity index. (vi). Relative consistency
2b. Highlight in detail the procedures for the determination of liquid limit.
2c. Highlight in detail the procedures for the determination of plastic limit.
3a. Explain the terms 'moisture content'
3b. Explain the terms 'specific gravity'

SECTION B

1. Write brief notes on any three of the following:
   (a) Failure criteria for soils and rocks.
   (b) Behaviour of rocks and soils under stress conditions.
   (c) Stress and strain.
   (d) Stability of slopes and excavations.

2. What is bearing capacity? Describe the procedure for calculating safe bearing capacity of soil on site.

3. Explain the type of foundation investigations that will be required for the following structures.
   (a) Buildings.
   (b) Bridges.
   (c) Roads.