ELIZADE UNIVERSITY, ILARA-MOKIN

ONDO STATE

FACULTY: BASIC AND APPLIED SCIENCES

DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES

FIRST SEMESTER EXAMINATIONS

2016/2017 ACADEMIC SESSION

COURSE CODE: AGY 403

COURSE TITLE: ENGINEERING GEOLOGY

DURATION: 2 ½ Hours

HOD's SIGNATURE

TOTAL MARKS: 60

INSTRUCTIONS: ANSWER FOUR (4) QUESTIONS IN ALL. QUESTION ONE (1) IS
COMPULSORY

1.   (a)   What is site investigation?
     (b)   Discuss the objectives of site investigation.
     (c)   Write short notes on site investigation procedures.

2.   (a) Define the following Atterberg limits:
     (i)   Liquid limit   ii) Plastic limit   iii) Plasticity index   iv. Shrinkage limit
     (b)   Consistency limit tests carried out on a soil sample yielded the following data.

Number of blows	20.00	12.50	10.00	6.30
Moisture content (%)	56.4	53.4	50.2	47.2

Given that the plastic limit is 20.8%. Determine
i)   the liquid limit
ii)   the plasticity index

3.   (a)   Discuss the importance of Engineering Geology.
     (b)   The following results were obtained from a particle size analysis on a soil. The total mass of the sample was 3142 g.

Sieve size (mm)	20.00	12.50	10.00	6.30	5.60	2.80	2.00	1.40	0.50	0.355	0.180	0.063	pan
Mass retained (g)	0	30	33	31	32	267	173	157	1476.	363	448	130	2

     (a)   Plot the grain size distribution for the soil.
     (b)   Determine the effective grain size and the uniformity coefficient of the soil.

4.   (a)   Differentiate between the mechanism of compaction and consolidation in soil compressibility.
     (b)   During a aedometer consolidation test performed on a soil sample, a static load of 25 KN was placed per square meter of the sample. The following results were obtained.

Time (minutes)	0	0.25	2.25	4.25	9.00	16.00	25.00	36.00	49.00	1440
Deformation (μm)	0	109	236	361	432	525	610	665	687	770

Given the thickness of saturated soil sample as 20 mm and the thickness of soil in situ as 3m, determine the

(i)   coefficient of consolidation in m^3/yr
(ii) coefficient of compressibility
(iii) coefficient of permeability
(iv) amount of settlement of a structure expected to impose stress of 120 KN/m^2 on the foundation.

5. (a) Discuss the factors affecting the permeability of soils.
    (b) Discuss reasons why there is always some doubt as to the validity of laboratory permeability test results.
    (c) A saturated soil sample has a moisture content of 29% and a saturated unit weight of 19.22 KN/m^3. Determine the
         (i)   dry unit weight
         (ii) void ratio
         (iii) specific gravity of the soil particles
         (iv) bulk unit weight of the soil when it has a degree of saturation of 90%, assuming there is no change in void ratio as a result of change in moisture content.

6. (a) What are discontinuities?
    (b) Explain their characteristics.
    (c) In a compaction test on a residual lateritic soil sample, the following results were obtained.

Moisture content	Dry density (kg/m^3)
11.6	1420
13.2	1500
15.6	1580
20.8	1570
23.2	1480
24.0	1425

         (i)   Draw the compaction curve for the soil sample.
         (ii) Determine its optimum moisture content (OMC) and maximum dry density (MDD).