



**ELIZADE UNIVERSITY
FACULTY OF BASIC AND APPLIED SCIENCES**

DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES

PROGRAMME: APPLIED GEOPHYSICS EXAM TITLE: DEGREE EXAMINATION

COURSE CODE & TITLE: AGP 423 – ENVIRONMENTAL GEOPHYSICS

TIME ALLOWED: 2 ½ hrs SEMESTER/SESSION: FIRST / 2019/2020

INSTRUCTIONS: Answer QUESTIONS 1 AND 4, and any other TWO questions.

Write your matriculation number only on your answer script(s) and NOT your name



HOD's SIGNATURE

1. (a) Briefly explain these terms: (i) contaminant (ii) effluent (iii) leachate (iv) Pollutant
- (b) (i) Outline **three (3)** advantages of Electromagnetic method and **three (3)** limitations of Ground Penetrating Radar (GPR) in environmental investigation.
- (ii) Use the correct letter key provided below the table to indicate the appropriateness of each geophysical method to the areas of application listed.

Geophysical Method	Hydrogeological investigations	Mapping of leachates and contaminated plumes	Forensic investigations
Electrical Resistivity			
Self Potential			
Induced Polarization			

P = Primary method; S = secondary method; M = not the best method, but may be adopted;
N = not suitable

- (c) Highlight **three (3)** advantages in adopting geophysical methods in investigating contaminated sites.

(18 marks)

2. (a) Discuss the impact of human activities on the environment.

- (b) State **six (6)** groundwater-soil remediation technologies.

(12 marks)

3. (a) (i) Explain the term soil “corrosivity” (ii) What geophysical method is most desirable for determination of soil corrosivity? (iii) Explain its interpretation principle.

- (b) On the basis of your answers in 3(a) above, complete the table below; using the listed terms: Very Corrosive, Corrosive, Non-corrosive and Moderately Corrosive.

Soil Type	Degree of Corrosivity
Sandy Clay	
Clayey Sand	
Clay	
Sand	

(12 marks)

4. (a) Dar zarouk parameters are found useful in soil characterization for the estimation of aquifer protective capacity. Outline these parameters and their empirical formulae. Define all terms.
- (b) Given the interpretation results from three locations as shown in **Table 1** below, use the Dar zarouk parameters stated in (4a) above to estimate the S , T , ρ_L , ρ_T and λ for each location. Show workings and present your answers in a typical tabular form (**Table 2**). (Give your answer in 4 decimal places). Identify the aquifer in each location. From high, low to very low; rank the protective capacity of the layers/horizons overlying the identified aquifer at each location.

Table 1

Location	Resistivity, (Ωm) $\rho_1/\rho_2/\rho_3.....\rho_n$	Layer Thickness, h (m) $h_1/h_2/h_3.....h_n$
1	1508/405/875/257/411	0.6/1.7/3.5/13.4/?
2	810/370/507/143/499	0.4/2.1/9.1/17.1/?
3	356/65/28/1308	1.0/2.0/24.9/?

Table 2

Location	S	T	ρ_L	ρ_T	λ	Rank
1						
2						
3						

(18 marks)

5. (a) Environmental Impact Assessment (EIA) program is considered a multidisciplinary approach that involves professionals from different disciplines. Mention six (6) professionals that could be involved in an EIA of a proposed mining site. State the role of each of these professionals.
- (b) An abandoned landfill in part of Ilara-Mokin town is suspected to constitute health hazard to inhabitants around the area. State the objectives of an environmental geophysicist in the investigation of the landfill.

(12 marks)