



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES

DEPARTMENT OF PURE AND APPLIED SCIENCE

SET1 EXAMINATIONS

COURSE CODE: PHY 461
COURSE TITLE: GEOPHYSICS III
CREDIT UNIT: 3
TIME ALLOWED: (2½ HRS)

INSTRUCTION: Answer question 1 and any other four questions

QUESTION 1

- a) Briefly describe the basic theory of Electrical resistivity (10 Marks)
b) State eight (8) areas of application of this method (4 Marks)
c) What is the difference between electrical methods and electromagnetic methods of geophysical survey? (3 marks)
d) The attenuation constant is given by

$$\alpha = \omega \left[\mu_a \varepsilon_a \left\{ \left(\sqrt{1 + \sigma^2 / \omega^2 \varepsilon_a^2} \right) - 1 \right\} / 2 \right]^{1/2}$$

Define the parameters of the equation and state its significance. (5 marks)

QUESTION 2

- a) List any five (5) electrode array in electrical resistivity method (5 Marks)
b) Discuss briefly the concept of Vertical Electrical Sounding (VES) and 2D Electrical Resistivity Imaging (ERI) (7 Marks)

QUESTION 3

- a) Briefly describe any four Electrical Resistivity Field instrument (8 Marks)
b) List four (4) sources of Noise in resistivity data (4 Marks)

QUESTION 4

- a) State the step to be taken during the electrical resistivity survey (4 Marks)
b) Name and classify the following rocks and minerals based on their resistivity contrasts.

s/no	Rocks and materials	Resistivity (Ωm)	Classification
1	Gravel		
2	Clay		
3	Granite		
4	Hematite		
5	Magnetite		
6	Pyrrhotite		

7	Galena		
8	Sphalerite		

(8 marks)

QUESTION 5

- a) With the aid of diagram, describe the general basic principle of Electromagnetic surveying. (7 Marks)
- b) State five (5) areas of application of this method. (5 Marks)

QUESTION 6

- a) Explain the working principle of CST method with annotated diagram. (6 Marks)
- b) Discuss briefly the interpretational concept of Vertical Electrical Sounding (VES) (6 Marks)