



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

DEPARTMENT OF PURE AND APPLIED SCIENCE

OCT/NOV 2019 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) (i) State Archie's law. **3 Marks**  
(ii) Discuss the term apparent resistivity. **3 Marks**  
(b) Write short note on Non-polarizing electrodes. **4 Marks**  
(c) (i) With the aid of a diagram, write short note on VLF transmissions. **5 Marks**  
(ii) Draw a Typical EM-16 profile in area of high geological noise, with superimposed anomaly due to rabbit-proof fence. **4 Marks**  
(d) What do you understand by Massive sulphide ores? **3 Marks**

**QUESTION 2**

- (a) Discuss the field procedure of CSAMT principles. **4 Marks**  
(b)i. Draw a Comparison between EM-16 and horizontal loop EM results across a shear zone in granite. **5 Marks**  
(b)ii. What are Cables? **3 Marks**

**QUESTION 3**

- (a) Draw a graph of Archie's law variation of bulk resistivity,  $\rho$ , for rocks with insulating matrix and pore-water resistivity  $\rho_w$ . **5 Marks**  
(c) Define disseminated sulphide ores. **3 Marks**  
(c) Name the essential DC survey instruments. **4 Marks**

**QUESTION 4**

- (a)i. Draw a variation in skin depth,  $d$ , with frequency and resistivity. **4 Marks**  
(a)ii. What is phase angle? **4 Marks**  
(b) Draw a Phase in sinusoidal waves **4 Marks**

**QUESTION 5**

- (a) Briefly discuss Coupling in VLF. **3 Marks**  
(b) List three (3) VLF instruments. **3 Marks**  
(c) Briefly describe the CSAMT data. **6 Marks**

**QUESTION 6**

- (a) The instruments that measure voltage in DC and IP surveys are known as receivers.  
Justify your position. **8 Marks**
- (b) Discuss briefly on depth penetration in varying current methods. **4 Marks**