



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

DEPARTMENT OF PURE AND APPLIED SCIENCE

2020_2 EXAMINATIONS...

COURSE CODE: PHY 407
COURSE TITLE: SOLID STATE PHYSICS II
CREDIT UNIT: 3
TIME ALLOWED: (2½ HRS)

INSTRUCTION: Answer question 1 and any other four questions

QUESTION 1

- a. Briefly explain what you understand by the word dielectric. (2 marks)
- b. State four (4) properties of the local electric field. (8 marks)
- c. Derive the expression for Weiss field constant from Curie-Weiss law. (8 marks)
- d. Write an expression to explain Curie-Weiss law. (4 marks)

QUESTION 2

- a. Write the expression for:
 - (i) Electric susceptibility (3 marks)
 - (ii) Polarisation of a crystal. (3 marks)
- b. Hence or otherwise, obtain Clausius-mossotti equation. (6 marks)

QUESTION 3

Write on any six (6) properties of a dielectric material. (12 marks)

QUESTION 4

From the definition of magnetic susceptibility per unit volume, show that the Langevin expression for Diamagnetic material is

$$\psi = \frac{Ze^2N}{6mc^2}$$

(12 marks)

QUESTION 5

- a. Differentiate between dipole relaxation and dielectric losses. (6 marks)
- b. Differentiate between ferromagnetic and antiferromagnetic materials (6 marks)

QUESTION 6

Discuss the major categories of crystalline defects. (12 marks)