



BOWEN UNIVERSITY, IWO, OSUN
COLLEGE OF AGRICULTURE, ENGINEERING & SCIENCES (COAES)
DEPARTMENT OF ELECTRICAL/ELECTRONICS ENGINEERING
B. ENG. ELECTRICAL/ELECTRONICS ENGINEERING
2022/2023 SECOND SEMESTER EXAMINATIONS

COURSE ODE:	EEE 206	COURSE TITLE:	ELECTRICAL ENGINEERING MATERIALS
COURSE UNIT:	2	TIME:	2 HOURS
INSTRUCTION(S):	INSTRUCTIONS: ANSWER QUESTION ONE (I) AND ANY OTHER THREE QUESTIONS		

QUESTION ONE

- a. Discuss the following with regards to electrical engineering materials
- i. Mechanism of strengthening metals 4 Marks
 - ii. Electrical characteristics of alloys used for commercial purposes 4 Marks
 - iii. Electrical resistivity of metals 4 Marks
- b. The resistivity of pure copper is 1.56 micro-Ohm-cm. An alloy of copper containing 2 atomic percent nickel has a resistivity of 4.06 micro-Ohm-cm. An alloy of copper, containing 1 atomic percent silver, has a resistivity of 1.7 micro-Ohm-cm. Find the resistivity of a copper alloy containing 1 atomic percent nickel and 3 atomic percent silver 4 Marks
- c. Discuss the electron principle according to Bohr and wave mechanical model. 6 Marks

QUESTION TWO

- a. In a tabular form draw a comparison between conductor, semi-conductor and insulator 6 Marks
- b. Explain five classifications of bonds in solid material. 5 Marks
- c. Discuss the term transducer and give two examples. 5 marks

QUESTION THREE

- a. (i) Discuss the term piezoelectricity 2 Marks
(ii) List four areas of application 4 Marks
- b. (i) Explain the term semi-conductors, and 2 Marks
(ii) distinguish between intrinsic and extrinsic semi conducting materials 6 Marks
(iii) Using a neat diagram illustrate the fundamental concept of an atom 2 Marks

QUESTION FOUR

- a. Explain three dielectric related phenomena 3 Marks
- b. Write short notes on the following terms
- i. Polarizations 2 Marks
 - ii. dielectric material 2 Marks
 - iii. electron mobility 2 Marks
 - iv. electrical conductivity 2 Marks

- c. Calculate the resistance of an aluminium wire 100 m long and having cross-sectional area of 3 sq. mm at 20°C. Given, the resistivity of Al at 20°C = $2.266 \times 10^{-8} \Omega\text{m}$ 5 Marks

QUESTION FIVE

- a. The density of nickel is $8.9 \times 10^3 \text{ kg/m}^3$. Avogadro's number $N_A = 6.023 \times 10^{23} \text{ atom/mol}$. atomic weight of Ni is 58.71 gm/mol. Calculate
- (i) the saturation magnetization 4 Marks
 - (ii) the saturation flux density 4 Marks
- b. State the properties and examples of the following material classification: metals, ceramics and polymers 8 Marks

QUESTION SIX

- a. Explain dielectric materials 4 Marks
- b. With the aid of suitable diagram illustrate the schematic representation of hysteresis curve for a ferroelectric material and explain the B-H processes involved 8 Marks
- c. Calculate the resistance of an aluminium wire 100 m long and having cross-sectional area of 3 sq mm at 20 °C. 4 Marks