

1a (i) What is a Crystal.

(ii) Write in tabular form, at least five (5) characteristics of SC , BCC and FCC lattices.

(b) With aid of appropriate diagram briefly discuss simple crystal structure with reference to CsCl or sodium chloride structure .

2a (i) Magnetic Crystals

(ii) Thin Crystals.

The above crystals structures are to be studied using diffraction of waves. Discuss with appropriate equations and justifications which among x-rays, neutrons, and electrons will you use for diffraction in each case.

(b) The susceptibility of paramagnetic  $FeCl_3$  is  $3.7 \times 10^{-3}$  at  $27^\circ C$  . What will be the value of its relative permeability,  $\mu_r$  at  $200^\circ K$  and  $500^\circ K$

3 (a) What is meant by point defects and describe types of points defects.

(b) With reference to band theory of solid clearly distinguish Insulators, Semiconductors, and Conductors.

4 (a) State and explain the properties of superconductivity.

(b) The lead material works as superconductivity at a temperature of  $T_c = 8.36 K$  . If the characteristics of lead material at  $0K$  is  $H_{0} = \frac{8 \times 10^5}{4\pi}$  , what is the value of the magnetic field in the lead at  $5K$ .

5(a) Fully discuss the following diffraction process

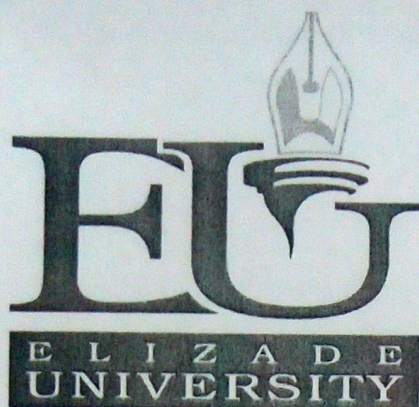
- (i) Bragg law
- (ii) Lave method
- (iii) Rotating -crystal method
- (iv) Power method

(b) Under what condition will a crystal be stable and hence define Cohension energy.

6 (a) Describe the following magnetic materials

- (i) Paramagnetic
- (ii) Diamagnetic
- (iii) Ferromagnetic
- (iv) Ferrimagnetic.
- (v) Antiferro magnetic

(b) The magnetic field intensity in Tin material is zero at  $4.69 K$  and  $\frac{4 \times 10^5}{4\pi}$  at  $0 K$  . Calculate the temperature of the superconductor if the field intensity is measured as  $\frac{3 \times 10^5}{4\pi}$  .



**ELIZADE UNIVERSITY**

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**FACULTY: Basic and Applied Sciences**  
**DEPARTMENT: Physical and Chemical Sciences**  
**FIRST SEMESTER EXAMINATIONS**  
**2018/2019 ACADEMIC SESSION**

**COURSE CODE: PHY 309**

**COURSE TITLE: SOLID STATE PHYSICS 1**

**DURATION: 2 HOURS**

**HOD's SIGNATURE**

**TOTAL MARKS:**

**Matriculation Number:** \_\_\_\_\_

**INSTRUCTIONS:**

1. Write your matriculation number in the space provided above and also on the cover page of the exam booklet.
2. This question paper consists of 2 pages with printing on both sides.
3. Answer all questions in the examination booklet provided.
4. More marks are awarded for problem solving method used to solving problems than for the final numerical answer.
5. Box your final answers.
6. Attempt any 4 of the 6 questions