



বাংলাদেশ আর্মি ইন্টারন্যাশনাল ইউনিভার্সিটি অব সায়েন্স অ্যান্ড টেকনোলজি (বিএআইইউএসটি) কুমিল্লা
Bangladesh Army International University of Science and Technology (BAIUST) Comilla

Term Final Examination, Spring 2022

Department of Electrical & Electronic Engineering
Level-1, Term-I
Course Code: PHY 111
Course Title: Physics I

Time : 3 hr.

Full Marks : 150

Notes:

- a. Figure on the right of each question indicate marks for respective question.

PART - A

Answer any three (03) question from this part

01. a. Using band theory, **discuss** the behavior of semiconductor, insulator, and conductor with appropriate figures. 05
b. Write down the name of seven crystal systems in 3D with their axial **relationship** and inter-axial angles relationship. 13
c. The lattice parameter and atomic mass of a diamond crystal are 3.57 \AA and 12, respectively. **Calculate** the density of diamond. Number of atoms per unit cell is 8 for diamond. 07
02. a. **Distinguish** between Crystalline and non- Crystalline solids. 05
b. **Prove** Bragg's law of X-ray diffraction with suitable figure. 13
c. **Draw** crystal plane within an unit cell for each of the following Miller indices separately: (100), (111) & (101). 07
03. a. **Discuss** about Schottky defects and Frenkel defects. 05
b. **Show** that the atomic packing factor for BCC structure is 68%. 13
c. X-rays of wavelength 0.36 \AA are diffracted in first order at an angle of 4.8° in Bragg's crystal spectrometer. **Calculate** the effective spacing of atomic layers in the crystal. 07
04. a. What do you **understand** by Miller indices? 05
b. **Explain** the procedure to determine Miller indices of any crystal plane. 13

- c. **Calculate** the lattice constant for rock salt crystal of density 2180 kg/m^3 07
assuming that it has FCC lattice. Molecular weight of NaCl is 58.5.

PART - B

Answer any three (03) question from this part

05. a. What do you **understand** by drift velocity and current density? 05
b. **Establish** the expressions for drift velocity and current density with figure. 13
c. If 20A current flows through a wire of area of cross-section 5mm^2 then **calculate** 07
the drift velocity. The number of electron per unit volume $2 \times 10^{28} \text{m}^{-3}$?
06. a. What do you **understand** by electromotive force? 05
b. **Establish** an expression for electric field intensity at a point of electric field 13
produced due to a point charge.
- c. The parallel combination of two wires having resistance 20Ω and 30Ω is 07
connected to a cell. If the total electric current flowing through the circuit is
 0.16A , **calculate** the current flowing through each wire?
07. a. **Explain** Ampere's law of electric current. 05
b. **Establish** an expression for the magnetic force produced due to the charge 13
moving in a uniform magnetic field.
- c. A proton is moving with velocity of $2 \times 10^6 \text{ms}^{-1}$ making an angle of 30° with a 07
uniform magnetic field. If the acting force on proton is $4.8 \times 10^{-15} \text{N}$, **calculate** the
magnitude of the magnetic field.
08. a. **Discuss** about electromagnetic induction and magnetic flux. 05
b. **Analyzing** Faraday's laws of electromagnetic induction, show that $E = N \frac{d\phi}{dt}$; 13
where the symbols have their usual meanings.
- c. Number of turns of a coil is 50. Magnetic flux of each turn changes $30 \times 10^{-5} \text{Wb}$ 07
when the coil is moved away from a magnet in 0.01s. **Calculate** the induced
electromotive force in the coil.