বাংলাদেশ আর্মি ইন্টারন্যাশনাল ইউনিভার্সিটি অব সায়েন্স এন্ড টেকনোলজি (বাইউস্ট), কুমিল্লা
BANGLADESH ARMY INTERNATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY (BAIUST), CUMILLA

Mid Term Examination, Spring-2025

Department of Computer Science and Engineering
Level-1, Term-II
Course Code: PHY 121
Course Title: Physics I
Credit Hour: 3.00

Notes: **Time: 01 Hour 30 Minutes**

a. Each question carries 30 marks. **Full Marks: 90**
b. Answer any **three (03)** questions from the following four (04) questions.
c. Figure on the right of each question indicate marks for respective question.

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01. a. **Discuss** about the classification of solids in crystallography with examples. **08**

b. **Analyze** different types of point defects in solids with figure. **12**

c. **Calculate** the number of atoms per unit cell for an FCC lattice of *KCl* crystal. It is given that a = 6.30 Å, the molecular weight of *KCl* is 74.55, density of *KCl* is 1989 kgm^{-3}, and N = 6.023×10^{26} per kmole. **10**

02. a. **Explain** Conductor, Insulator, and Semiconductor by dint of band diagrams. **08**

b. **Sketch** the crystal planes for the Miller indices (002), (101), $(\bar{1}02)$, and $(\bar{1}1\bar{1})$. **12**

c. X-ray beam is allowed to fall on a rock salt crystal plane (201) at a glancing angle of 30^0. **Calculate** the wavelength of X-ray for second-order diffraction. Given that the lattice constant, a = 1.2 Å. **10**

03. a. **Differentiate** between Energy level and Energy band. **08**

b. **Analyze** Bragg's law of X-ray Diffraction with proper illustration. **12**

c. **Calculate** the glancing angle at which the first and second-order diffraction maxima will be observed when X-rays of 1.92 Å wavelength are reflected from a cleavage plane of calcite for which d = 3.029 Å. **10**

04. a. "In case of semiconductors, the conductivity increases with the increase of temperature"-**Explain**, why? **08**

b. **Prove** with suitable figure that the atomic packing factor for the Body Centered Cubic (BCC) structure is 68%. **12**

c. X-rays of wavelength 0.36 Å are diffracted in first order at an angle of 4.8^0 in Bragg's crystal spectrometer. **Determine** the effective spacing of atomic layers in the crystal. **10**