Jashore University of Science and Technology

Department of Physics

Bachelor of Science with Honours in Physics

2nd semester of 3rd year (2022 – 2023)

Course code: PHY 3205 **Course title: Solid State Physics I**

Class test no.: 1 **Date: 22 December 2024**

Roll:	

1. Write down the primitive translational vectors for a FCC lattice. Illustrate these vectors in a clear, labeled sketch of the FCC structure. [4]

2. Calculate the atomic packing fraction of a BCC lattice. [4]

3. Draw (010), (101) and (111) plane of a simple cubic lattice. [3]

4. Show that each lattice point in an FCC lattice has twelve nearest neighbors, all equidistant from the lattice point. Derive the expression for this distance in terms of the lattice constant a of the conventional unit cell. [3]

5. Define the term Reciprocal Lattice. Show that the reciprocal lattice of a FCC lattice is a BCC. [6]

6. Determine the angle at which first-order Bragg diffraction occurs from the (110) plane in a simple cubic lattice with a unit cell of side $a = 3.238$ Å, using chromium K_α radiation of wavelength $\lambda = 2.29$ Å. [5]