Jashore University of Science and Technology

Department of Physics

Bachelor of Science with Honours in Physics

2nd semester of 3rd year (2023–2024)

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

Assignment no.: 2 **Date: 15 December 2025**

Deadline for submission: 19 December 2025, 10:00 PM

1. Define density of states. Show that, in a 2D system, density of states does not depend on energy.

2. Derive an expression to calculate the density of states of a solid in 3D?

3. Describe the Fermi-Dirac distribution function, accompanied by an appropriate sketch of the distribution. How does it explain the occupancy of energy states in a fermion system?

4. Why is the derivative of the Fermi-Dirac distribution function non-zero within the temperature range of k_BT around the Fermi energy (E_F), and how does this behavior relate to the thermal excitation of electrons?

5. State and explain Bloch's theorem. How does it simplify the study of electrons in a periodic lattice?