Jashore University of Science and Technology

Bachelor of Science in Electrical and Electronic Engineering

1st semester of 3rd year, Academic session: 2025–2026

Course no.: 053311 PHY 3101 **Course title: Electrical Engineering Materials**

Class test no.: 01 **Date: 28 September 2026**

Roll:	

1. State the postulates of quantum mechanics. [5]

2. Is $\psi(x) = Axe^{-x^2}$ an acceptable wave function in quantum mechanics? Justify your answer. [5]

3. Define the commutator of two operators. Explain the concept of commutation and show that the position and momentum operators do not commute. [5]

4. When is an operator said to be Hermitian? State the properties of a Hermitian operator. [5]

5. What is quantum tunneling? Explain with a suitable example. [5]

6. Calculate the expectation value of position, $\langle x \rangle$, for the following wave functions:

$$\psi(x) = \sqrt{\frac{2}{a}} \sin\left(\frac{\pi x}{a}\right), \quad 0 < x < a \text{ and zero elsewhere.} \qquad [5]$$