Jashore University of Science and Technology

Department of Physics

Bachelor of Science with Honours in Physics

1st semester of 3rd year

Course no.: PHY 3103 **Course title: Quantum Mechanics I**

Class test no.: 03 **Date: April 30, 2023**

Roll:	

1. For a quantum harmonic calculate $[\hat{a}^\dagger,\ \hat{p}]$. [4]

2. For a quantum harmonic calculate $\hat{a}^\dagger\hat{a}\hat{a}^\dagger\psi_0$. [4]

3. What is the energy of a quantum harmonic oscillator at the 3rd exited state? [3]

4. Why is the position expectation value for a quantum harmonic oscillator zero? [3]

5. For a quantum harmonic calculate $\langle\hat{x}^2\rangle_{\psi_n}$. [6]