



VIT

Vellore Institute of Technology
Established by Vellore Education Trust, Vellore, Tamil Nadu, India

REG.NO.:

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2025-2026

SLOT: B1

Programme Name & Branch : B.Tech Information Technology
Course Code and Course Name : BITE 407L, Quantum Computing
Faculty Name : Dr. Aswani Kumar Cherukuri
Class Number(s) : VL2025260506092
Date of Examination : 28.1.26
Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions

Q. No	Question	M	CO	BL
1.	Consider the following qubit $ \psi\rangle = \frac{1}{4} 00\rangle + \frac{1}{2} 01\rangle + \frac{1}{\sqrt{2}} 10\rangle + \frac{\sqrt{3}}{4} 11\rangle$ Find $(H \otimes X) \psi\rangle$.	10	3	4
2.	A qubit is in the state $\frac{1}{2} 0\rangle - \frac{\sqrt{3}}{2} 1\rangle$. Write the qubit's state in terms of $ +\rangle$ and $ -\rangle$. If you measure it in the basis $\{ +\rangle, -\rangle\}$, identify the states with probabilities.	10	2	4
3.	a) Consider a single qubit that undergoes a quantum operation resulting in the following amplitude evolution, as depicted: From $ +\rangle$ transformed to $ +\rangle + -\rangle$. What would be the final transformation? Write the steps in the transformation. Write your understanding. Contrast it with classical probabilistic system. b) Compare and contrast classical and quantum algorithms.	5	1	3
4.	Consider the complex number $z = 1+2i$. Write it in polar form and also its complex conjugate. Given the two complex numbers $(3 + 2i)$ and $(4 + 4i)$, what is the distance between them Recall that quantum states can be obtained from tensor product of individual qubits. Find the new state you obtain from the states $ +\rangle$ and $ -\rangle$.	5	2	4
5.	Prove that Pauli Y gate is a valid quantum gate. Why it is NOT a classical gate? Justify your answer.	10	3	4