School of Computing Science and Engineering
Bachelor of Technology in Computer Science and Engineering
Mid Term Examination - Nov 2023

Duration : 90 Minutes
Max Marks : 50

Sem V - E2UC506T - Quantum Computing

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) What is a qubit? — K2 (2)

2) The Hadamard gate creates equal superpositions of |0⟩ and |1⟩ states. — K1 (3)

3) Illustrate the Pauli's gates applied in quantum architecture. — K2 (4)

4) a qubit in the state |0>. Apply a quantum Hadamard gate (H gate) to it and find the resulting state. — K2 (6)

5) Construct the matrix representation of Pauli's Y gate. And find the eigenvalues and eigenvector for Y gate. — K3 (6)

6) a 2-qubit quantum circuit. Apply a CNOT gate with the second qubit as the control and the first qubit as the target, followed by a Z gate on the first qubit. If the initial state is |01>, what is the final state? — K3 (9)

7) What is quantum speedup? — K4 (8)

8) Analyse the reversability of Quantum gate. — K4 (12)

OR

a 2-qubit quantum circuit. Apply an X gate on the first qubit, followed by a CNOT gate with the first qubit as the control and the second qubit as the target. If the initial state is |01>, Deduce the final state — K4 (12)