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School of Computing Science and Engineering

Bachelor of Technology in Computer Science and Engineering

Mid Term Examination - May 2024

Duration : 90 Minutes

Max Marks : 50

Sem VI - 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 the difference between single qubit and multiple qubits? K2 (2)
- 2) The Hadamard gate creates equal superpositions of $|0\rangle$ and $|1\rangle$ states. K1 (3)
- 3) Illustrate the Pauli's gates applied in quantum architecture. K2 (4)
- 4) a qubit in the state $|0\rangle$. 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 $|01\rangle$, 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 $|01\rangle$, Deduce the final state K4 (12)