R22 Regulation *Subject code: 4P8GA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VIII Semester Regular Examinations, May 2026

Quantum Computing

(CSE (AI&ML))

Maximum Marks: 60 Date:06.05.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	What is entanglement?	1	1	L1
b)	What is a Pauli-X gate?	1	1	L1
c)	State Pauli Exclusion Principle.	1	2	L1
d)	Define quantum entanglement.	1	2	L1
e)	Define a quantum unit of information	1	3	L1
f)	What is the Bloch Sphere?	1	3	L1
g)	What is Grover's Algorithm?	1	4	L1
h)	What problem does Deutsch's algorithm solve?	1	4	L1
i)	What is decoherence?	1	5	L1
j)	What is Quantum Cryptography	1	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	A. Describe the interdisciplinary relationship between mathematics, physics, and biology B. Compare classical and quantum logic gates in detail.	5+5	1	L2
	OR			
3	A. Explain the concept of quantum computing and its advantages over classical computing. B. Explain superposition and measurement of qubits.	5+5	1	L2
4	A. Explain the fundamentals of quantum mechanics. B. Describe the Central Dogma of Molecular Biology with a diagram.	5+5	2	L2
	OR			
5	A. Explain the role of inner product spaces in quantum mechanics. B. Explain superposition and entanglement with diagrams.	5+5	2	L2
6	A. Explain different physical implementations of qubits with examples. B. Explain multi-qubit gates such as CNOT and Toffoli gates.	5+5	3	L2
	OR			

7	A. Explain how Bell states are generated using quantum circuits. B. Explain rotations on the Bloch sphere.	5+5	3	L2
8	A. Explain Shor's Algorithm for integer factorization. B. Explain different complexity classes: P, NP, and BQP.	5+5	4	L2
	OR			
9	A. Compare classical and quantum approaches for Deutsch's problem. B. Explain Grover's Algorithm with example.	5+5	4	L2
10	A. Describe quantum error correction with examples B. Explain fault-tolerant quantum computation	5+5	5	L2
	OR			
11	A. Describe the steps involved in quantum teleportation. B. Explain entropy in classical systems and quantum systems.	5+5	5	L2