Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – May/June 2026

Date: 14 – 05- 2026 **Time:** 01:00pm – 04:00pm

School: SOCSE	**Program:** B.Tech	
Course Code: CSI2503	**Course Name:** Quantum Computing	
Semester: VI	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**
Marks	**26**	**26**	**24**	**24**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Define quantum superposition principle.	**2 Marks**	**L1**	**CO1**
2.	What is Dirac notation?	**2 Marks**	**L2**	**CO1**
3.	State Schrödinger equation.	**2 Marks**	**L1**	**CO1**
4.	Differentiate pure and mixed states.	**2 Marks**	**L2**	**CO2**
5.	What is Pauli-Y gate?	**2 Marks**	**L2**	**CO2**
6.	Define bra and ket notation with examples.	**2 Marks**	**L1**	**CO2**
7.	Define phase kickback.	**2 Marks**	**L2**	**CO3**
8.	What is Simon's algorithm?	**2 Marks**	**L1**	**CO3**
9.	Define Quantum Phase Estimation.	**2 Marks**	**L1**	**CO4**
10.	Explain quantum decoherence.	**2 Marks**	**L2**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Represent $\|\psi\rangle = (1/\sqrt{2})(\|0\rangle+\|1\rangle)$ on Bloch sphere.	**7 Marks**	**L2**	**CO1**
	b.	Calculate probability of measuring $\|1\rangle$ for state $\alpha\|0\rangle+\beta\|1\rangle$ where $\alpha=\sqrt{0.3}$.	**7 Marks**	**L3**	**CO1**
	c.	Compare obtained results numerically with classical bit.	**6 Marks**	**L3**	**CO1**
		Or			
12.	**a.**	What is tensor? Compute tensor product of $\|0\rangle$ and $\|1\rangle$.	**7 Marks**	**L3**	**CO1**
	b.	Find measurement probabilities of state $(\sqrt{3}/2)\|0\rangle+(1/2)\|1\rangle$.	**7 Marks**	**L**	**CO1**
	c.	Determine normalization condition numerically.	**6 Marks**	**L2**	**CO1**

13.	**a.**	Apply Hadamard gate and Pauli-X gate on $\|0\rangle$ sequentially and compute output.	**7 Marks**	**L3**	**CO2**
	b.	Calculate matrix form of Pauli-X and Pauli-Z gate on $\|1\rangle$.	**7 Marks**	**L4**	**CO2**
	c.	Sketch a circuit for Toffoli gate and compute output state.	**6 Marks**	**L3**	**CO2**
		Or			
14.	**a.**	Apply CNOT on $\|10\rangle$ and compute output.	**7 Marks**	**L3**	**CO2**
	b.	Employ Bell state or EPR state numerically in details. Analyze entanglement result with neat and clean diagram.	**13 Marks**	**L4**	**CO2**

15.	**a.**	Solve Deutsch problem for f(0)= f(1).	**7 Marks**	**L3**	**CO3**
	b.	Calculate Grover's search iteration for N=4.	**7 Marks**	**L3**	**CO3**
	c.	Examine the success probability for the above problem.	**6 Marks**	**L4**	**CO3**
		Or			
16.	**a.**	Explain steps of Shor algorithm and compute the value for N=15.	**7 Marks**	**L3**	**CO3**
	b.	Compute simple Quantum Fourier Transform on $\|1\rangle$.	**7 Marks**	**L3**	**CO3**
	c.	Analyze complexity numerically in details.	**6 Marks**	**L4**	**CO3**

17.	**a.**	Compute Bell state probabilities and discuss its properties.	**7 Marks**	**L3**	**CO4**
	b.	Discuss quantum information theory. Calculate the entropy of a qubit.	**7 Marks**	**L3**	**CO4**
	c.	Compare classical vs quantum entropy numerically.	**6 Marks**	**L4**	**CO4**
		Or			
18.	**a.**	Prove No-cloning theorem. Discuss it using an example.	**7 Marks**	**L3**	**CO4**
	b.	Apply simple Quantum Machine Learning and it classification with an example.	**7 Marks**	**L3**	**CO4**
	c.	Break down output numerically.	**6 Marks**	**L4**	**CO4**