Duration: 3hrs **[Max Marks: 80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1		Attempt **any FOUR**	**[20]**
	a	Explain CNOT gate with matrix and circuit representation.	**05**
	b	Explain artificial atoms with respect to circuit QED.	**05**
	c	What are Pauli Matrices?	**05**
	d	Write a short note on applications and limitations of Shor's algorithm.	**05**
	e	Two vector in C3 are given by $$\|a\rangle = \begin{pmatrix} -2 \\ 4i \\ 1 \end{pmatrix}, \quad \|b\rangle = \begin{pmatrix} 1 \\ 0 \\ i \end{pmatrix}$$ Determine 1. <a| , <b| 2. <a | b>, <b |a>	**05**
	f	What is qubit? Explain superposition.	**05**
2	**a**	Explain Shor's Algorithm in detail.	**[10]**
	b	What is DiVincenzo's criteria? Explain in detail.	**[10]**
3	**a**	Explain the features of the Rigetti Quantum Development Kit	**[10]**
	b	Explain Circuit QED and how it is different from Cavity QED	**[10]**
4	**a**	Compare Classical and quantum Computer.	**[10]**
	b	Explain CCNOT and Hadamard gate with matrix and circuit representation.	**[10]**
5	**a**	Draw and Explain the Architecture of a Quantum Computing platform.	**[10]**
	b	Prove how two vectors can be orthogonal?	**[10]**
6	**a**	Explain 3 qubit code with respect to Quantum Error Correction.	**[10]**
	b	Explain Cirac-Zollar mechanism. State significance of harmonic oscillator in Quantum Computing.	**[10]**

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