



PAPER ID-310936

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Subject Code: KCS710

Roll No:

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**BTECH**  
**(SEM VII) THEORY EXAMINATION 2023-24**  
**QUANTUM COMPUTING**

**TIME: 3 HRS****M.MARKS: 100****Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief.**

Q no.	Question	Marks
a.	What is superposition in the context of quantum computing?	2
b.	What distinguishes qubits from classical bits in terms of information representation?	2
c.	Explain quantum gates.	2
d.	What is the significance of quantum algorithms?	2
e.	List the basic components of a quantum computer.	2
f.	What is ion trap and describe its function.	2
g.	What is Quantum Noise?	2
h.	What are Distance Measures for Quantum Information?	2
i.	Define stabilizer codes in the context of quantum error correction.	2
j.	What is the Shor code, and what is its primary application in quantum computing?	2

**SECTION B****2. Attempt any three of the following:**

a.	What are the underlying principles and computational models that define quantum computation?	10
b.	Discuss quantum gates and their role in quantum computation.	10
c.	Explain the concept of a harmonic oscillator quantum computer and its significance in quantum information processing.	10
d.	Explain the role of Markov processes in the manifestation of quantum noise. How do Markov processes influence the stability and reliability of quantum operations?	10
e.	Describe the methodologies and considerations involved in constructing quantum error-correcting codes.	10

**SECTION C****3. Attempt any one part of the following:**

a.	Explore the significance and potential applications of quantum algorithms in solving computational problems more efficiently than classical algorithms.	10
b.	Discuss the foundational postulates of quantum mechanics, emphasizing their role in shaping our understanding of the quantum world.	10

**4. Attempt any one part of the following:**

a.	Explain the concept of quantum circuits and their role in implementing quantum algorithms.	10
b.	Discuss the significance of quantum speedup and provide examples of algorithms where quantum computers outperform classical computers.	10

**5. Attempt any one part of the following:**

a.	Give the overview of optical photon quantum computers, focusing on the role of optical cavity quantum electrodynamics.	10
b.	Discuss the role of nuclear magnetic resonance (NMR) in quantum computing.	10

**6. Attempt any one part of the following:**

a.	Explain the fundamental principles underlying quantum operations and their significance in quantum information processing? How do quantum operations manipulate quantum states?	10
b.	Discuss distance measures. How are these measures employed in quantum information processing tasks?	10

**7. Attempt any one part of the following:**

a.	Illustrate how stabilizer codes contribute to fault-tolerant quantum computation and its role in preserving quantum information.	10
b.	Compare and contrast Shannon entropy with Von Neumann entropy, emphasizing their significance in quantum information theory.	10