

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - VII Computer Science & Business Systems : WINTER: 2025
SUBJECT: QUANTUM COMPUTATION & QUANTUM INFORMATION

Day : Tuesday
Date : 23/12/2025

W-24203-2025

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

- Q.1 Explain the difference between unitary and stochastic dynamics in quantum systems. (10)
- OR**
- Q.1 Analyze the role of decoherence in transitioning from unitary to stochastic dynamics. (10)
- Q.2 Justify why quantum circuits are generally reversible, unlike most classical circuits. (10)
- OR**
- Q.2 Design a quantum circuit to implement the quantum Fourier transform for a 3-qubit system. (10)
- Q.3 Evaluate the trade-offs between efficiency and security in discrete logarithm-based cryptographic schemes. (10)
- OR**
- Q.3 Illustrate the process of the Diffie-Hellman key exchange using an example. (10)
- Q.4 List three physical systems commonly used to realize quantum states. (10)
- OR**
- Q.4 Describe the role of the Born rule in connecting quantumness with measurement outcomes. (10)
- Q.5 Apply the concept of errors rates to analyse a QKD session with noise introduced by an eavesdropper. (10)
- OR**
- Q.5 Analyze the role of quantum superposition and measurement in the security QKD protocols. (10)
- Q.6 Justify the use of quantum repeaters in extending the range of QKD protocols. (10)
- OR**
- Q.6 Examine the advantages and limitations of using entanglement-based QKD protocols. (10)

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