Seminar Topic SummaryReport

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Institution Name: Basaveshwar Engineering College, Bagalkot

Department of ComputerApplications (MCA)

Course: MCA

Semester: IISem

Topic:Quantum Computing

USN:2BA24MC032

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Date of Submission: 26/06/2025

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Introduction:

Quantum Computing is a rapidly evolving field of computer science and physics that leverages the principles of quantum mechanics to perform computations. Unlike classical computers that use bits(0or1),quantum computers use quantum bits (qubits), which can exist in multiple states simultaneously through the concept of superposition. This allows quantum computers to solve complex problems significantly faster than classical counterparts.

Seminar Topic Details:

- Topic Name: Quantum Computing
- Area/Domain: quantum hardware ,algorithms, and applications in areas like simulation, optimization, machine learning, and cryptography.

Keyword:

Key keywords in quantum computing include qubits, superposition, entanglement, quantum gates, quantum circuits, quantum algorithms, and quantum measurement

Topic Summary:

Quantum computing aims to revolutionize how we solve problems in cryptography, drug discovery ,optimization ,and machine learning. While still in its early stages, it promises exponential speedups in tasks like factoring large numbers or searching unsorted databases. Key areas covered in this seminar include.

- Differences between classical and quantum computers.
- Qubits, superposition ,and entanglement.
- Quantum gates and circuits.
- Applications and limitations

Relevance to MCA Curriculum:

Quantum Computing aligns with several core subjects in the MCA curriculum, such as:

- Theory of Computation : Introduction to computational models and limits.
- Cryptography and Network Security: Quantum-safe cryptography.
- Artificial Intelligence and Machine Learning: Quantum ML algorithms.
- Emerging Technologies : A growing topic of interest in computer science and research.

Understanding quantum computing opens doors to interdisciplinary research and cutting-edge software development in the future.

Learning Objectives:

- Understand the basic principles of quantum mechanics applied to computing.
- Learn about the structure and function of quantum computers.
- Identify real-world applications of quantum computing.
- Analyses the potential of quantum computing in solving complex problems.
- Explore programming tools for quantum development.

Expected Outcome:

- Gain foundational knowledge of how quantum computers differ from classical ones.
- Be aware of current advancement and challenges in the field.
- Understand how quantum computing is in fluencing industries and research.
- Be motivated to explore further studies or projects in emerging technologies

References:

[1]. Author- MichaelA.Nielsen&IsaacL.Chuang –Quantum Computation and Quantum Information

[2]. Website–https://quantum-computing.ibm.com

[3]. Wikipedia–https://en.m.wikipedia.org/wiki/Quantum_computing

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