**Banasthali Vidyapith**

**Department of Computer Science**

***Seminar Proposal***

**July – December 2025**

**Examination Roll Number: 2316097 Student Name: SHRUTI**

**Class: BTECH CS-AI Smart Card Id: BTBTS23132**

**Seminar Title:** **Quantum entanglement Communication**

**Abstract (150-200 words):**

Quantum entanglement underpins a transformative approach to secure communication by enabling quantum key distribution (QKD) that is fundamentally immune to eavesdropping. Recently, IIT Delhi, in collaboration with the Defence Research and Development Organisation (DRDO), achieved a landmark demonstration: free-space entanglement-based quantum secure communication over more than one kilometer, without using fibers. Conducted under the DRDO-Industry-Academia Centre of Excellence (DIA-CoE), the experiment attained a secure key rate of nearly 240 bits per second with a quantum bit error rate (QBER) below 7%, illustrating robust performance even in non-ideal real-world conditions [The Quantum Insider](https://thequantuminsider.com/2025/06/20/india-takes-significant-step-in-quantum-communication-with-one-kilometer-entanglement-test/?utm_source=chatgpt.com)[Press Information Bureau](https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=2136702&utm_source=chatgpt.com).

This milestone expands the scope for Quantum Entanglement Learning (QEL)—leveraging entangled qubits not only for secure key generation but also as a paradigm for learning complex correlations in distributed environments. By using free-space entanglement, QEL models can potentially encode and transfer quantum information across mobile platforms, drones, and satellite nodes, enabling adaptive, real-time quantum-enhanced decision-making. Furthermore, entanglement-based methods offer resilience against device imperfections, a vital trait for practical QEL implementations [Press Information Bureau](https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=2136702&utm_source=chatgpt.com)[Swarajya](https://swarajyamag.com/commentary/drdos-quantum-breakthrough-crucial-step-in-global-quantum-tech-leadership?utm_source=chatgpt.com). This seminar will explore principles of entanglement, its integration into secure learning frameworks, and the implications of recent defense-driven breakthroughs for developing next-generation quantum learning systems**.**

**References in APA format (at least 5):**

**1. Press Information Bureau. (2025, June 16). *DRDO & IIT Delhi demonstrate Quantum Entanglement-Based Free-Space Quantum Secure Communication over more than 1 km distance*. Press Information Bureau, Ministry of Defence, Government of India.**

**2. Swayne, M. (2025, June 20). *India takes significant step in quantum communication with one-kilometer entanglement test*. The Quantum Insider.**

**3. Gupta, S. (2025, June 17). *India demonstrates quantum-secure communication over 1 km*. Analytics India Magazine**

**4. Philip, S. A. (2025, June 16). *In quantum leap, DRDO & IIT-D exhibit ability to set up secure comms over laser sans optical fibre*. ThePrint.**

**5. Wikipedia contributors (2025). *Projects of DRDO* [Wikipedia page]. Wikipedia. Retrieved August 2025, from project description of quantum communication initiatives by IIT Delhi and DRDO.**

Signature

Name:

**(Seminar Mentor)**