

**GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENCE AND TECHNOLOGY
LOK SABHA
UNSTARRED QUESTION NO. 836
TO BE ANSWERED ON 07/02/2024**

National Quantum Mission

836. SHRI SUMEDHANAND SARASWATI:

DR. MANOJ RAJORIA:

Will the Minister of **SCIENCE AND TECHNOLOGY** विज्ञान और प्रौद्योगिकी मंत्री be pleased to state:

- (a) the details of the specific goals and objectives of the National Quantum Mission and the expected timelines for achieving these goals;
- (b) the key areas of research and development that the mission will focus on;
- (c) the details of funds allocated for the National Quantum Mission and the manner in which these funds will be distributed across different research initiatives;
- (d) the manner in which the National Quantum Mission will support the National priorities like Digital India, Make in India, Skill India and Stand-up India, Start-up India, Self-reliant India and Sustainable Development Goals (SDGs); and
- (e) the manner in which the Mission will benefit communication, health, financial and energy sectors?

ANSWER

**MINISTER OF STATE (INDEPENDENT CHARGE) FOR THE
MINISTRY OF SCIENCE AND TECHNOLOGY
(DR. JITENDRA SINGH)**

विज्ञान और प्रौद्योगिकी मंत्रालय के राज्यमंत्री (स्वतंत्र प्रभार)
(डॉ. जितेंद्र सिंह)

(a) The National Quantum Mission (NQM) is for a period of eight years. However, the implementation broadly has three timelines, i.e. 3 years, 5 years and 8 years. Following are the specific goals and objectives of the mission:

1. Develop intermediate scale quantum computers with 20-50 physical qubits, 50-100 physical qubits and 50-1000 physical qubits in 3 years, 5 years and 8 years, respectively.

2. Develop satellite based secure quantum communications between two ground stations over a range of 2000 kilometres within India as well as long distance secure quantum communications with other countries.

3. Develop inter-city quantum key distribution over 2000 km with trusted nodes using wavelength division multiplexing on existing optical fibre.

4. Develop multi-node Quantum network with quantum memories, entanglement swapping and synchronised quantum repeaters at each node (2-3 nodes).

5. Develop magnetometers with 1 femto-Tesla/sqrt(Hz) sensitivity in atomic systems and better than 1 pico-Tesla/sqrt(Hz) sensitivity in Nitrogen Vacancy-centers; Gravity measurements having sensitivity better than 100 nano-meter/second² using atoms and Atomic Clocks with 10⁻¹⁹ fractional instability for precision timing, communications and navigation.

6. Design and synthesis of quantum materials such as superconductors, novel Semiconductor structures and topological materials for fabrication of quantum devices for quantum computing and communication.

(b) The key areas of focus for the NQM are Quantum Computing, Quantum Communication, Quantum Sensing & Metrology and Quantum Materials & Devices.

(c) The National Quantum Mission was approved by the Union Cabinet at an outlay of Rs.6003.65 Crores for a period of eight years. The funds allocated for the Mission is for establishing four Thematic Hubs (T-Hubs) in four quantum technology areas namely Computing, Communication, Sensing & Metrology and Materials & Devices through an open call for proposals in the form of consortia. Each of these T-Hubs is required to undertake major activities viz. Technology Development, Human Resource Development, Entrepreneurship and startup ecosystem and international collaborations

(d) The National Quantum Mission is positioned to support significantly to the following national priorities:

(i) Digital India: NQM supports Digital India by advancing quantum technology for computing and communication, fostering a digitally empowered society.

(ii) Make in India: NQM promotes indigenous research, development, and manufacturing in quantum technologies ensuring self-reliance in quantum devices.

(iii) Skill India: NQM promotes quantum skill development through training and education, preparing the workforce in the areas of Quantum technologies.

(iv) Stand-up India, Start-up India: NQM fosters entrepreneurship and innovation in the areas of quantum technologies, thereby encouraging quantum-related startups.

(v) Self-reliant India: NQM supports development of quantum technologies domestically, thereby reducing dependency on external sources.

(vi) Sustainable Development Goals (SDGs): Objectives of the NQM aligns with SDGs leveraging quantum technologies to address climate, energy, and healthcare challenges.

(e) The National Quantum Mission is poised to bring significant benefit to various sectors:

(i) Communication: Quantum communication enables secure, unbreakable encryption and high data transfer speeds.

(ii) Health: Quantum computing accelerates drug discovery and genomic research and Quantum sensors offer unparalleled precision for medical diagnostics.

(iii) Financial: Quantum computing optimizes complex financial modeling and risk analysis and Quantum cryptography enhances the security of financial transactions.

(iv) Energy: Quantum technologies improve energy grid optimization and resource management and Quantum computing aids in solving complex problems related to energy efficiency.
