National Quantum Mission (NQM)

Prelims: *Current events of national and international importance | Science & Technology*

Why in News?

India's National Quantum Mission has deployed a 1,000 km secure quantum communication network in under 3 years.

> ***Quantum technology*** *is a broad field of physics and engineering that develops new devices and systems by directly harnessing the unique principles of quantum mechanics.*

- **Launched in -** April 2023.
- **Duration -** 2023–2031.
- **Aim -** To seed, nurture, and scale scientific R&D in quantum technologies (QT).
- **Implemented by -** The Department of Science and Technology (DST) through 4 thematic hubs.
    - **Thematic Hubs (T-Hubs) –**
        - IISc Bengaluru – Quantum Computing.
        - IIT Madras & C-DOT – Quantum Communication.
        - IIT Bombay – Quantum Sensing & Metrology.
        - IIT Delhi – Quantum Materials & Devices.
- **Nodal Ministry –** Ministry of Science and Technology
- **Quantum Technology Cell (QTC) –** A specialized division responsible for overseeing and implementing the National Quantum Mission (NQM).

> ***Quantum Diamond Microscope (QDM)*** *is India's first indigenous QDM was recently launched by the IIT Bombay T-Hub for advanced magnetic field imaging.*

- **Types of Quantum Technology –**

	Meaning	NQM's Role
Quantum Computing	Uses qubits and quantum mechanics to solve problems too complex for classical supercomputers.	Develop intermediate-scale quantum computers with 50–1,000 physical qubits using superconducting and photonic platforms.
Quantum Communication	Uses quantum states to create secure, unhackable channels for transmitting information.	Establish 2,000 km of satellite-based secure quantum communication between ground stations
Quantum Sensing	Uses atomic-level sensitivity to achieve ultra-precise measurements of motion, gravity, and magnetic fields.	Develop high-sensitivity magnetometers and ultra-precise atomic clocks for applications in navigation and precision timing.
Quantum Simulation	Uses one quantum system to model and study the behaviour of another complex quantum system	Build high-fidelity simulators to model complex materials, drug interactions, and chemical processes for industrial self-reliance

References

1. PIB | NQM
2. DST | NQM

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