The Union Cabinet Approves The National Quantum Mission (NQM)

A Significant Boost To Study And Development Of Quantum Technologies

The Union Cabinet's approval of the National Quantum Mission (NQM) provided a significant boost to India's efforts in the study and development of quantum technologies. The mission will assist India in accelerating its industrial and scholarly R&D efforts and in developing a dynamic and creative quantum technology environment. The mission, which will run from 2023–2024 to 2030–2031, would accelerate economic growth fueled by quantum technology, support India's ecosystem, and position the country as a leader in the development of quantum technologies and applications (QTA). It will cost a total of Rs 6,003.65 crore. The Mission will boost India's scientific capabilities to previously unheard-of heights and bring it on par with the six select countries developing the technology, speeding QT-led economic growth and preserving the national ecosystem.

What is Quantum Computing?

It is a branch of computer science that is devoted to the creation of innovations guided by the ideas of quantum theory. It employs quantum physics' distinctive behaviour to find solutions to issues that are too complex for classical computation. Modern classical computers use a binary stream of electrical impulses (1 and 0), which can be used to encode information in bits. This restricts the amount of information they can process in comparison to quantum computing. Quantum computing uses subatomic particles like electrons and photons. Quantum bits, or qubits, allow these particles to exist concurrently in two states (i.e.1 and 0). Qubits can speed up calculations that would otherwise take millions of years by taking advantage of the interference between their wave-like quantum states.

What is the National Quantum Mission (NQM)?

The development of quantum computing technology and related applications will be supported by NQM. The mission will have specified milestones that must be met throughout an eight-year period (2023-24 to 2030-31). Following the United States, Austria, Finland, France, and China, India is the sixth nation to have a dedicated quantum mission. The top university and national R&D institutions in India will develop four theme hubs, or T-Hubs, with an emphasis on quantum computing, communication, sensing and metrology, and materials and devices.

What is NQM’s Objective?

Within the next eight years, NQM is to build intermediate-scale quantum computers with 50–1000 qubits.It needs to set up satellite-based, secure quantum communications with a 2000 km range between ground stations in India and with other countries. Over a distance of 2000 kilometres, it will try to enable inter-city quantum key distribution and quantum network with many nodes and quantum memories. With extremely sensitive magnetometers and accurate atomic clocks for communication, navigation, and timing, you can progress atomic technology. It will assist in the creation of topological materials, superconductors, new semiconductor architectures, and other quantum materials for the construction of quantum devices.

Benefits of NQM

NQM can raise the nation's technological development ecosystem to a level where it is competitive on a worldwide scale. In addition to space applications, the mission would significantly benefit the financial, energy, health, communication, and pharmaceutical industries. The Sustainable Development Goals (SDG) and priorities like "Digital India," "Make in India," "Skill India," "Start-up India," and "Self-reliant India" will benefit greatly as a result. In addition to helping the health, space application, finance, and energy sectors, it will provide a significant boost for advancements in AI and ML.

The Way Forward for NQM

Researchers and tech firms have been announcing the creation of prototype quantum computers for more than ten years, but none have shown to be helpful for solving practical issues. While there is cutting-edge research demonstrating novel algorithms that employ quantum technology principles, no one has built a practical computer that can actually work and solve meaningful problems, including D-Wave of Canada, IBM, or China's Zuchongzhi 2.1, all of whom have prototype systems. Instead, advocates of quantum technology assert that issues that call for massive amounts of processing and are beyond the capabilities of current supercomputers would be resolved quickly. Current prototype systems must be operated under extremely cold (around -273 C) settings, and materials for such computing must also be developed. Government approval of the National Quantum Mission represents a significant advance in the fields of scientific and industrial research and development. India will get a head start in the upcoming computing revolution because of a focused mission.