

## National Quantum Mission (NQM)

### Why in news?

The cabinet committee approved the national quantum mission (NQM) for indigenous development of quantum technologies.

### What are quantum computers?

- Quantum computers are machines that use the properties of quantum physics to store data and perform computations.
- Conventional or traditional computers can use either 0 or 1 at a time where as quantum computers can use both 0 and 1 simultaneously.
- Quantum computers use the properties of **Superposition** and **Quantum entanglement** to exist in 0 and 1 state simultaneously.
- Quantum computers can be 60 per cent 0 and 40 per cent 1 at the same time, or any other combination.
- Conventional computers follow a two-bit system where it can exist in any of the following state such as (0,0), (0,1), (1,0) and (1,1) but only one at a time.
- Quantum computers follow q-bit system where it can exist at all 0r any combination of (0,0), (0,1), (1,0) and (1,1).

To know more about [quantum computers](#).

### What are the key features of the NQM?

- **Aim** - The mission allows Indian scientists **to develop indigenous technology**, systems, devices, and materials required to propel research and development in quantum technology.
- **Targets** - To develop intermediate-scale quantum computers with **50-1,000 physical qubits** in various platforms like superconducting and photonic technology.

*Just like a binary bit is the basic unit of information in classical (or traditional) computing, a qubit (or quantum bit) is the basic unit of information in quantum computing.*

- Satellite-based secure quantum communications between ground stations over a range of 2,000 kilometers within India.
- To secure quantum communications with other countries.
- **Benefits** - The mission is expected to benefit communication, health, finance, and energy, drug design and space applications.
- **Four thematic hubs (T-hub)** - To be established for operating

- Quantum computing,
  - Quantum communication,
  - Quantum sensing and metrology, and
  - Quantum materials and devices.
- **Department of Science and Technology** - Will spearhead the NQM mission.

*The NQM is the only mission, wherein Indian scientists will develop their own quantum technology.*

### What are the challenges to quantum computers?

- The building process is complex, time taking and expensive
- Requirements of very cold temperatures and extreme isolation for quantum computers
- There is a significant risk of errors
- If the superposition breaks down, the final outcome is randomly selected from the range of possibilities

### Quick facts

#### Science and Engineering Research Board (SERB)

- SERB is a **statutory body** established by parliament via “the Science and Engineering Research Board Act” 2008.
- SERB promotes basic research in Science and Engineering.
- SERB provides **financial assistance** to persons engaged in such research, academic institutions, research and development laboratories, industrial concerns and other agencies.
- SERB is under department of science and technology.

### References

1. [The Hindu| Key Aspects Of NQM](#)
2. [The Indian Express| Quantum Properties](#)
3. [SERB| About SERB](#)