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

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2. The Indian Express| Quantum Properties
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