Mains Practice Question

Q. What do you understand by Quantum Supremacy? What can be the possible applications of quantum computing? (250 words)

06 Nov, 2019 GS Paper 3 Science & Technology

Approach

- Define Quantum Supremacy and recent advancements in this field.
- Briefly mention how quantum computing is different from traditional super-computing.
- Mention the possible applications of quantum computing.

Introduction

- The phrase “quantum supremacy” was coined in 2012 by John Preskill.
- Quantum supremacy refers to a quantum computer solving a problem that cannot be expected of a classical computer in a normal lifetime. Hence, they far exceed the speed and capability of classical supercomputing.
- Recently, **Google’s quantum computer,** named **Sycamore,** claimed **“quantum supremacy”,** as it reportedly did the task in 200 seconds that would have apparently taken a supercomputer 10,000 years to complete.

Quantum Computing

- Quantum Computing works on the principles of quantum theory, and seeks to exploit the laws that govern the behavior of atoms and subatomic particles.
- Quantum computers compute in ‘qubits’ (or quantum bits). They exploit the properties of quantum mechanics, the science that governs how matter behaves on the atomic scale.
- Here, the qubits can be a 1 and a 0 simultaneously, a state called **quantum superposition** as against conventional supercomputers which can process a ‘1’ or a ‘0’ at a time.

Applications of quantum computing

- It can have a major impact through **quantum chemistry,** which could be important in **agriculture** and **human health.**
- It could help with the development of **new pharmaceuticals,** new **energy sources,** new ways to collect **solar power,** and new materials.
- It would be helpful in processing huge amounts of data. **Data mining and artificial intelligence** would be the major beneficiaries, along with sciences which deal in volumes of data, from **astronomy** to **linguistics.**
- Some other real life applications include meteorology and weather forecasting, geology, space exploration, etc.

Conclusion

India should invest in creating capabilities which would help take most advantage of quantum-computing.

The Department of Science & Technology’s programme called **Quantum-Enabled Science & Technology (QuEST)** to accelerate research is a step in the right direction.