1. What is quantum supremacy? Why was it in news recently? What can be the potential applications of such a breakthrough in technology? Examine

Approach

In this question the candidate needs to write first a basic definition of what is quantum supremacy and mention why was it in news.In next part write what are the potentials of this technology in diverse fields.Further contextualise the questions demand to India with writing what steps have India taken in domain of quantum technology.In conclusion focus on what present problems it can solve in future.

Introduction

Quantum supremacy is the potential ability of devices to solve problems that classical computers cannot. It is the ability to perform complex calculations within very short time when compared to fastest supercomputers existing. This phrase was coined in 2012 by John Preskill, a theoretical physicist at Caltech, to describe the point at which quantum computers can do things that classical computers simply can't.

Body

Google recently announced about its quantum supremacy milestone. Quantum computers works on the principle of quantum mechanics. Google inc. claimed that their quantum computer called sycamore solved particularly difficult problems in 200 seconds.

Potential applications of Quantum computing :

1. Healthcare
    - Research : Classical computers are limited in terms of the size and complexity of molecules they can simulate and compare (an essential process in early drug development). If we have an input of size N, N being the number of atoms in the researched molecules, the number of possible interactions between these atoms is exponential (each atom can interact with all the others).Quantum computers will allow much larger molecules to be simulated. At the same time, researchers will be able to model and simulate interactions between drugs and all 20,000+ proteins encoded in the human genome, leading to greater advancements in pharmacology.
    - Diagnostics : Quantum technologies could be used to provide faster, more accurate diagnostics with a variety of applications. Boosting AI capabilities will improve machine learning – something that is already being used to aid pattern recognition. High-resolution MRI machines will provide greater levels of detail and also aid clinicians with screening for diseases.
    - Treatment : Targeted treatments, such as radiotherapy, depend upon the ability to rapidly model and simulate complex scenarios to deliver the optimal treatment. Quantum computers would enable therapists to run more

simulations in less time, helping to minimise radiation damage to healthy tissue.

2. Finance
   - Automated,high-frequency trading : One potential application for quantum technologies is algorithmic trading – the use of complex algorithms to automatically trigger share dealings based on a wide variety of market variables. The advantages, especially for high-volume transactions, are significant.
   - Fraud detection : Like diagnostics in healthcare, fraud detection is reliant upon pattern recognition. Quantum computers could deliver a significant improvement in machine learning capabilities; dramatically reducing the time taken to train a neural network and improving the detection rate.
3. Marketing
   - Quantum computers will have the ability to aggregate and analyse huge volumes of consumer data, from a wide variety of sources.
   - Big data analytics will allow commerce and government to precisely target individual consumers, or voters, with communications tailored to their preferences; helping to influence consumer spending and the outcome of elections.
4. Meteorology
   - With so many variables to consider, accurate weather forecasts are difficult to produce. Machine learning using quantum computers will result in improved pattern recognition, making it easier to predict extreme weather events and potentially saving thousands of lives a year.
   - Climatologists will also be able to generate and analyse more detailed climate models; proving greater insight into climate change and how we can mitigate its negative impact.
5. Logistics
   - Improved data analysis and modelling will enable a wide range of industries to optimise workflows associated with transport, logistics and supply-chain management.
   - The calculation and recalculation of optimal routes could impact on applications as diverse as traffic management, fleet operations, air traffic control, freight and distribution.
6. Disaster Management
   - Tsunamis, drought, earthquakes and floods may become more predictable with quantum applications.
   - The collection of data regarding climate change can be streamlined in a better way through quantum technology. This in turn will have a profound impact on agriculture, food technology chains and the limiting of farmland wastage.
7. Secure Communication
   - China recently demonstrated secure quantum communication links between terrestrial stations and satellites.
   - This area is significant to satellites, military and cyber security among others as it promises unimaginably fast computing and safe, unhackable satellite communication to its users.

Quantum computing and Indian scenario:

- Globally, research in this area is about two decades old, but in India, serious experimental work has been under way for only about five years.
- In 2018, the government initiated serious discussions in quantum technologies and kick started research projects across 51 organisations under QUEST – Quantum Enabled Science and Technology. However, no significant progress is made in this field until NMQTA.
- Union Budget 2020-21 proposed to spend ₹8,000 crore ($ 1.2 billion) on the newly launched National Mission on Quantum Technologies and Applications (NMQTA). The mission seeks to develop quantum computing linked technologies amidst the second quantum revolution and make India the world's third biggest nation in the sector after the US and China.

Conclusion

Quantum computing has the potential to breach the present limitations posed by traditional computing power which can lead to progressive developments in each field of agriculture, biotechnology, finance, healthcare, cyber security. This will help world to overcome the present issues of food insecurity, climate change cybercrimes, lack of new antibiotics to fight superbugs and to handle money laundering and terror financing, Therefore tough in its initial stage quantum supremacy holds enormous future potential for humanity.

2. The area of digital payments has witnessed massive transformations on the technology front in recent years. Critically examine the need for digital payments system as an alternative to conventional paper currency for a country like India.

Approach

In introduction define what are digital payments.In next part give a brief history of digital payments in India and some recent advances.Then address the central part of question that is mention importance of digital economy in contrasting to cash economy and mention what are the present challenges to this quest.In conclusion balance the need of digital economy with public welfare.

Introduction

Digital payment is a transaction that takes place via digital or online modes, with no physical exchange of money involved. This means that both parties, the payer and the payee, use electronic mediums to exchange money. The Indian government has been promoting and propagating online payments aggressively, starting with demonetisation back in 2016. 'Digital India' had been the guiding force of many economic and financial decisions that pushed Indians to switch to online payments. According to a report in ET, In India, 66.6 billion transactions worth $270.7 billion are expected to shift from cash to cards and digital payments by 2023.

Body

Evolution of Digital Payment in India:

- India's payments framework – especially, the digital payments system – has been advancing heartily over the past numerous years, prodded by advancement in data and communication technology, and fostered and in consonance with the way imagined by RBI.
- The advent of online banking began in the 1990s with the availability of internet. Online banking changed the entire scenario of financial services.
- The evolution of digital payments in India is piloted by the Reserve Bank of India (RBI) and captured in the Payment Systems in India, published in 1998.
- Critical achievements accomplished in this overall process of development of the payments framework incorporates the introduction of MICR (Magnetic ink character recognition code) clearing in the early 1980s,Electronic Clearing Service and Electronic Funds Transfer in the 1990s, issuance of credit and debit cards by the banks in the 1990s, the National Financial Switch in 2003 that realised interconnectivity of ATMs the nation over, the RTGS and NEFT in 2004, the Cheque Truncation System (CTS) in 2008, the second factor authentication for the 'card not present' transaction in 2009 and the new RTGS with upgraded features in 2013.
- The National Payments Corporation of India (NPCI) was established in 2008. It has been leading the development of the retail payments framework.

- Besides, non-bank entities have been presented in the issuance of prepaid instruments (PPI), including mobile and digital wallets. These measures have been complemented by noteworthy initiatives by the NPCI including the launching of grid-wise operations of CTS, interoperability on NACH (National Automated Clearing House), IMPS, NFS, RuPay, APBS and AEPS, National Unified USSD Platform (NUUP), UPI and BHIM application.
- These advancements catch the evolution of the Digital Payments framework in the nation. This was trailed by a noteworthy initiative by Indian Government which set up the Committee of Digital Payments in August 2016 under the Chairmanship of Ratan P. Watal, Principal Adviser, NITI Aayog.
- Post demonetisation in November 2016, the adoption of digital payment methods in India received a major lift. Demonetisation pushed Indians towards switching to cashless methods which come with aplenty of hidden costs, yet when the weight diminished, Indians were back to utilising cash.

Importance of cashless economy for India :

- The main advantage of a cashless society in India is that a record of all economic transactions through electronic means makes it almost impossible to sustain black economies or underground markets that often prove damaging to national economies.
- This reduces the chances of black money entering the system. It is also much riskier to conduct criminal transactions. An economy that is largely cash-based facilitates a rampant underground market which abets criminal activities such as drug trafficking, human trafficking, terrorism, extortion etc.Cashless transactions make it difficult to launder money for such nefarious activities.
- Circulation of Fake Currency notes can be curbed. According to the National Crime Records Bureau (NCRB), fake currency totalling 287,404 notes worth ₹25.3 crore was seized under Fake Indian Currency Notes (FICN) in 2019 — an increase of 11.7% over the previous year.
- Increase Tax base: It is difficult to avoid the proper payment of due taxes in a cashless society, such violations are likely to be greatly reduced. The increased tax base would result in greater revenue for the state and greater amount available to fund the welfare programmes.
- Digital transactions bring in better transparency, scalability and accountability.This will enhance people's confidence in digital technology.
- Digital transactions are convenient and improve market efficiency.It will eliminate the risks associated with carrying and transporting huge amounts of cash
- The cashless economy will reduce the production of paper currency and coins. This will save a lot of production cost in turn.These essential resources can be diverted either in social schemes or capital investment in the funds scarce country like India.
- A lot of data transfer happens due to the cashless transaction. This data will help the government plan for future expenses such as housing, energy management, etc from the pattern of the data transmission.

Challenges in transitioning to a Cashless society:

- Acceptance infrastructure and digital inclusion: Lack of adequate infrastructure is a major hurdle in setting up a cashless economy. Inefficient banking systems, poor digital infrastructure, poor internet connectivity, lack of robust digital payment interface and poor penetration of PoS terminals are some of the issues that need to be overcome. Increasing smartphone penetration, boosting internet connectivity and building a secure, seamless payments infrastructure is a prerequisite to transition into a cashless economy.
- Financial Inclusion – For a cashless economy to take off the primary precondition that should exist is that there should be universal financial inclusion. Every individual must have access to banking facilities and should hold a bank account with debit/credit card and online banking facilities. Read more about Financial Inclusion in the linked article.
- Digital and Financial Literacy – Ensuring financial and digital inclusion alone are not sufficient to transition to a cashless economy. The citizens should also be made aware of the financial and digital instruments available and how to transact using them.
- Cyber Security – Digital infrastructure is highly vulnerable to cyber-attacks, cyber frauds, phishing and identity theft. Off late cyber-attacks have become more sophisticated and organised and poses a clear and present danger. Hence establishing secure and resilient payment interfaces is a prerequisite for going cashless. This includes enhanced defences against attacks, data protection, addressing privacy concerns, robust surveillance to pre-empt attacks and institutionalised cybersecurity architecture.
- Changing habits and attitude – Indian economy functions primarily on cash due to lack of penetration of e-payment modes, digital illiteracy of e-payment and cashless transaction methods and thirdly habit of handling cash as a convenience. In this scenario, the ideal thing to do is to make people adopt e-payments in an incremental fashion and spread awareness to initiate behavioural change in habits and attitude.
- Urban-Rural Divide – While urban centres mostly enjoy high-speed internet connectivity, semi-urban and rural areas are deprived of a stable net connection. Therefore, even though India has more than 200 million smartphones, it is still some time away for rural India to seamlessly transact through mobile phones. Even with regard to the presence of ATM's, PoS terminals and bank branches there exists a significant urban-rural divide and bridging this gap is a must to enable a cashless economy.

Conclusion

India must learn from other countries in the developing world, which have managed to reduce their dependence on cash even while bringing in more people in the folds of the formal banking system.The goal of cashless economy should not come at the altar of public welfare.Therefore India needs to constantly invest in digital literacy, digital infrastructure in rural areas and making regulations to curb fraud and privacy

related issues.This will help India to achieve a near cashless economy with social and public welfare.

3. What is Agriculture Export Facilitation Centre? Discuss. What initiatives will you suggest to promote agri exports?

Approach

In this question the candidate needs to have hold over current affairs.Mention in introduction as what is meant by Agricultural Export Facilitation Centre.In body part describe the role and functions of this new centre.In next part mention some initiatives which will be helpful for India to promote its agricultural exports.

Introduction

India occupies a leading position in global trade of agricultural products. However, its total agricultural export basket accounts for a little over 2.5 percent of world agricultural trade. The major export destinations were USA, Saudi Arabia, Iran, Nepal, and Bangladesh. Therefore with focus to improve on this front government of India with private partnership has launched a new centre called Agricultural Export Facilitation Centre.

Body

Features and functions of Agricultural Export Facilitation Centre :

- Mahratta Chamber of Commerce Industries & Agriculture (MCCIA) in partnership with National Bank for Agriculture and Rural Development (NABARD) has launched India's 1st Agriculture Export Facilitation Centre (AEFC) in Pune, Maharashtra.
- The Agriculture Export Facilitation Centre will work as a one-stop-shop for the exporters in the agricultural sector.
- The centre will provide expert guidance on areas like Orchard Management, Minimum Residue Level (MRL), Branding and Marketing, Special Export Treatments, Country-wise Protocols, Government Export Schemes.
- The Agriculture Export Facilitation Centre would organise awareness programs, training programs and workshops on the related aspects. It would also organise visits to export houses for getting practical guidance and also it will plan buyer-seller meetings. It would aim to capture and share success stories with the ecosystem.
- The Agriculture Export Facilitation Centre also proposes to develop a knowledge bank where activities and knowledge related to different aspects of exports would be available at the click of a button.
- It would provide information about APEDA's schemes for exporters, the procedure to get APEDA support and information on Govt. of India and State Government Schemes for export promotion.

The Agriculture Export Policy (AEP), 2018, aims at achieving export target of $60 billion by 2022 and $100 billion within a few years, thereafter. This is indeed a humongous

task, even under normal circumstances, and more so in the aftermath of Covid-19.Therefore different initiatives are needed to be adopted to achieve these targets.

Measures to increase agricultural exports from India:

- Majority of India's agri-exports are low value, raw or semi-processed products. Therefore, the agri-export strategy should include integration of value-added agri-produce with global value chains (GVC), by adopting best agricultural practices involving productivity gains and cost competitiveness. It's also imperative for India to reconsider joining the RCEP at an opportune time, and to enter into FTAs with the EU, the US and the UK.
- In order to boost exports of dairy products and make the dairy sector globally competitive, the central government needs to consider development of dairy export zones (DEZs) in collaboration with state governments This could immensely benefit small dairy farmers, organised as farmer producer organisations (FPOs)/farmer producer companies (FPCs)/cooperatives, for supplying milk, and also for contract production of dairy products on behalf of major dairy producing companies, leading to cost efficiency and higher export revenue to dairy companies as well as significantly higher income to farmers.
- Linking of FPOs through contract farming arrangements with export-oriented food processing units of food parks created under the Pradhan Mantri Kisan Sampada Yojana, for producing processed cereals, fruits, vegetables, fish and marine products, would boost exports of processed food and raise income of small and marginal landholders and small fish farmers.
- With global trade in organic products estimated to be around $90 billion, there is a huge opportunity for exports of value-added organic products from India, which exported $689 million worth of organic food in 2019-20. Madhya Pradesh, Rajasthan, Maharashtra, the North Eastern Region (NER), Uttarakhand and Goa are major producers of organic products. It's desirable to create Organic Product Export Zones (OPEZs) in these states and the NER, with common infrastructure for processing, standardisation, storage, logistics, and connectivity to ports and airports. Branding of products and registration as GI could further facilitate exports of value-added organic products. FPOs of organic farmers could be formed and linked to the OPEZs, to ensure higher income for farmers.
- Economic diplomacy and promotion of Brand India can play an effective role in increasing agri-exports.
- The AEP has recommended the establishment of Agriculture Export Zones (AEZs), to facilitate value addition of agri-commodities for increasing exports in a WTO-compatible manner. In order to ensure higher income for farmers, FPOs need to be linked to AEZs to supply SPS-compliant agri-products.
- Higher investments in R&D and technology, viz. the Internet of Things, artificial intelligence and blockchain, for improving agricultural productivity, resource-use efficiency and export competitiveness.
- Linking farmers/FPOs to the export market and skilling of surplus farmers for their absorption in agri-export value chains could be an important strategy to sustainably raise farmers' income.

Conclusion

Therefore Concerted efforts by the central and state governments, Indian embassies, APEDA, EXIM Bank, NABARD, and all other stakeholders in the agri-export value chains are needed to address a whole range of issues pertaining to promotion of agri-exports, which could potentially propel India into the top bracket of agricultural exporters, and in the process facilitate doubling of farmers' income within a reasonable time-frame.