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DECEMBER 2022

WEEKLY CURRENT AFFAIRS

YOJNA IAS WEEKLY CURRENT AFFAIRS

19/12/2022 TO 25/12/2022

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WEEKLY CURRENT AFFAIRS

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TAWANG MATTERS

Significance for Prelims: Tawang Map

Significance for Mains: Threats emerging from Border areas(Indo-China Conflict at LAC).

News: The Tawang sector in Arunachal Pradesh has long been a theatre for contentious border scuffles. Recently on December 9, Indian and Chinese soldiers clashed in the Tawang sector. It's the Tawang where the 1962 India-China war first began and was also the last place of implementation of the ceasefire.

Historical backdrop of Tawang:

- **1914 Simla Agreement between British India and Tibetan ruler Lonchen Shatra:** In this agreement linear boundary, the McMahon Line was created.
- After that, Tawang had been administered by Tibetan officials through monastic and non-monastic tributes.The Lonchen Shatra was aware of the sensitivity of the Tawang transfer, hence suggested 'quick and tactful' transfer of the district by British India.
- But since the British became embroiled in World War I in Europe, and so Tawang matter was set aside but not completely forgotten.
- From the 1920s onward, China became stronger and more interested in Tibet, British Indian administrators reinforced their claim on Tawang.
- In 1937, British Indian Officers of Assam asked the Government of India to challenge Chinese activities that may support China's claim to Tawang or even Bhutan and Sikkim.
- After that, to emphasise the British Indian interests, the Government decided to conduct actual tours or collect the revenue itself, in the Tawang area and stop relying on mere reproduction of the McMahon Line on Survey of India maps.
- **Tawang expeditions by Capt. G.A. Nevill in 1914 and Lightfoot in 1938** came back with recommendations to set up some administration in Tawang. Nevill, who remained in the Tawang region from 1913 to 1928, recommended the stationing of a European officer, at

least for a time, at Tawang. Nevill wrote in a prescient note that "should China gain control of Tibet the Tawang country is particularly adapted for a secret and easy entrance into India". It would proved correct in the 1962 war.

» **Recommendations of Lightfoot:** Tibetan government should withdraw their officials and convert the Tawang monastery into a Monpa monastery. Monpas should be elected to the religious high offices of the monastery in Tawang. For the first time in 2008, after 70 years, the Dalai Lama appointed a local Monpa monk from a village south of Se La as Rimpoche of the monastery.

Then, the acting Governor of Assam, Gilbert Hogg, accepted Lightfoot's recommendations and forwarded them to the Government of India. Their recommendations were followed up with a proposal to send yet another expedition while pending a decision on administering Tawang, but these plans ended after the rise of Hitler and Britain's entry into World War II.

About Tawang:

» The valley is wedged between Tibet and Bhutan.
» Se La pass at the height of 13,700 ft, connecting the Tawang valley with the mainland.
» Se La pass is the entry point for the administrative jurisdiction of Tawang.
» Dalai Lama entered India through the Tawang region in 1959 after Chinese incursion in Tibet.
» Invasion of China in 1962 happened through the Tawang sector of Arunachal Pradesh.
» Area is populated mainly by Monpas. These are adherents of Tibetan Buddhism but have distinct local ethnic identities.
» People of Tawangpas are the only Indians who lived under foreign occupation in 1962 after independence from colonial rule.
» Regular border skirmish imposes trauma on the local people: In December 1962, when the Chinese forces advanced across the Indian border, the Indian administration and the soldiers retreated towards Assam. The locals, fearing they would meet the same fate as their Tibetan brethren, tried to flee their homes. But, many locals were not able to so they spent days in the jungles as Chinese soldiers built camps in Monpa villages.
» Recent developments in Tawang: After strengthening The Chinese action in Tawang, the government of India strengthened the border infrastructure in the Tawang sector. For example, the Se La Tunnel, which would provide an all-weather road to the Indian security forces in Tawang, is going to be ready early next year.

Geography of recent contention:

» Recent place of latest clashes between India and China i.e. Yangtse lies between two high mountain passes, Bum La and Tulung La. On October 20, 1975 Chinese forces ambushed an Assam Rifles patrol on 17,300 ft high Tulung La pass,which is also near Yangtse.
» Tawang sector remains the biggest bone of contention in border settlement talks between India and China.

- Difference in interpretation of 2005 Agreement on the Political Parameters and Guiding Principles for the Settlement of the India-China Boundary Question between India and China.In India, there was perception that while demarcating the boundary, "the two sides shall safeguard due interests of their settled populations in the border areas". But there is a different interpretation of the agreement by Chinese interlocutors who have since claimed Tawang.
- Response from New Delhi: It is neither "possible nor practical" for India to concede Tawang in a border settlement.

Tawang after Independence:

- British India exerted control over areas south of Se La towards the end of World War. But realising the full territorial potential of the 1914 Simla Convention and implementing the McMahon Line on the ground was left for the successor Indian state devolved after August 15, 1947.
- Partition of India and the work of assimilation of princely states hampered the new Indian Government. So, India did not immediately enter Tawang and entered in Tawang only after the Chinese government declared the 1914 Simla Convention null and void in November 1949. Chinese Ambassador refused to recognise the legitimacy of the Indian Mission in Lhasa and the Trade Agencies in Yatung and Gyantse in reply to an Indian Government.
- After that Indian Government made its mind to move. Governor of Assam's advisor N.K. Rustomji, issued formal instructions in 1950 to Maj. Ralengnao Khathing of 2 Assam Rifles to set up Indian administration: "Your task is to occupy Tawang."Maj. Khathing rode on February 6, 1951, to claim Tawang as Indian territory that changed not only the map of India but also the fate of the people in the area.

Impact of successful entry into Tawang:

- New Delhi consolidated and administered then Arunachal Pradesh, known as North-East Frontier Agency (NEFA).
- Creation of the new Indian Frontier Administrative Service (IFAS) in the early 1950s: These cadres were personally interviewed by Prime Minister Jawaharlal Nehru.
- Due to strategic pressures that emerged from China, more elaborate and complex administrative and military structures had to be set up in the heart of the tribal areas.
- Interruption of the implementation of the policy in its original suiting the local needs , years of sensitive handling of the border areas left lasting impact on the people in these areas who saw themselves as Indians even as India appeared to be losing the war with China in 1962.

Se La pass: It separates the Tawang valley from the rest of the Monpa belt to its south.
Source: The Hindu
Article: Why Tawang matters

DEEPFAKE TECHNOLOGY

Significance for Prelims: Deepfake technology

Significance for Mains: Impact Of Deepfake

News: China's cyberspace watchdog, i.e. The Cyberspace Administration of China is rolling out new regulations to restrict the use of deep synthesis technology and curb disinformation.

About Deepfake:

- Origin of the term deepfake: An anonymous Reddit user called himself "Deepfakes in 2017.
- These are compilation of artificial images and audio that are put together with machine-learning algorithms.
- It is used to spread misinformation and can replace a real person's appearance, voice, or both with similar artificial likenesses or voices.
- It can construct fictional characters and to make false statements and actions by actual individuals.
- Concept of face-swapping in Deepfake: A reddit user in 2017 manipulated Google's open-source, deep-learning technology for creation and posting pornographic videos through face-swapping. In this technique, the user "Deepfakes" replaced real faces with celebrity faces.
- Issues with Deepfake technology: Cybersecurity company Norton said that "deepfake" is used for criminal activity like scams and hoaxes, celebrity pornography, election manipulation, social engineering, automated disinformation attacks, identity theft and financial fraud.
- Notable personalities like former U.S. Presidents Barack Obama and Donald Trump, India's Prime Minister Narendra Modi, Facebook chief Mark Zuckerberg and Hollywood celebrity Tom Cruise are impersonated using Deepfake technology.

China's new policy to curb deepfakes:

- Content doctored through Deepfake can be traced to its original source: As it requires deep synthesis service providers and users to explicitly label the content.
- Mandate of the regulation requires consent of the person in qusetion whose image or voice is edited using Deepfake.
- In case of notifying the use of technology or reposting news made by the technology, the government-approved list of news outlets can be the only source.
- The responsibility of Deep synthesis service providers must abide by local laws, respect ethics, and maintain the "correct political direction and public opinion orientation".
- Reasons for Implementation of Policy: (a) Stop criminal activities like online scams or

defamation by unchecked development and use of deep synthesis. (b) China's new policies aims to curb risks arising from activities provided by deep learning or virtual reality platforms.

Law of other countries for combating deepfakes:

- European Union: To stop the spread of disinformation through deepfakes Eu updated Code of Practice. Further, The revised Code requires tech companies such as Google, Meta, and Twitter to take protective measures for countering deepfakes and fake accounts on their platforms. According to the updated Code, in case of non-compliant of code these companies will face fines as much as 6% of their annual global turnover.
- In 2018, the Code of Practice on Disinformation is introduced that for the first time brought together worldwide industry players to commit to counter disinformation.
- In October 2018, The Code of Practice was signed by online platforms Facebook, Google, Twitter and Mozilla, as well as by advertisers.
- In May 2019, Microsoft joined the Code of Practice on Disinformation, and TikTok signed the Code in June 2020.
- In order to bridge the gaps in the Code and strengthen Code, the Code's revision process was completed in June 2022.
- Deepfake Task Force Act was introduced in U.S. to assist the Department of Homeland Security (DHS) in countering deepfake technology. United States provinces such as California and Texas have passed laws to criminalise the publishing and distributing of deepfake videos with intention to influence the outcome of an election. Virginia passed law that imposes criminal penalties on the distribution of nonconsensual deepfake pornography.
- However, In India, there are no legal rules against deepfake technology. Copyright Violation, Defamation and cyber felonies are specific laws addressing the tech's misuse.

Key Concepts:

- Deep synthesis uses deep learning and augmented reality technologies to generate text, images, audio and video to create virtual scenes.
- Most notorious application of Deep synthesis technology is deepfakes. In Deepfakes, synthetic media is used to swap the face or voice of one person for another.
- Notorious application of Deepfakes: (a) Generation of celebrity porn videos,(b) Production of fake news, and (c) Financial fraud.

Source: The Hindu

Article: Deepfake technology: how and why China is planning to regulate it

COP15 BIODIVERSITY SUMMIT

Significance for Prelims: Global Biodiversity Framework(GBF); 30-by-30 target.

Significance for Mains: Not Much

News: Despite an objection from the Democratic Republic of Congo, the Chinese presidency and Canadian host government approved the Kunming-Montreal Global Biodiversity Framework(GBF)at the UN-backed COP15 biodiversity conference.

Key agreed areas after negotiations:

- Conservation, protection and restoration through a 30-by-30 approach: (a) Delegates at the United Nations nature summit committed to protecting 30% of land and 30% of coastal and marine areas by 2030. Hence, fulfilling the deal's highest-profile goal, known as 30-by-30. (b) The contribution of indigenous and traditional territories also counts towards the 30-by-30 goal. (c) Other aspirations of the deal include restoring 30% of degraded lands and waters throughout the decade, an increase from the earlier aim of 20%. (d) Preventing destruction of intact landscapes and areas with many species, bringing these destructions and losses "close to zero by 2030".

- Money for nature: All the deal's signatories would ensure that $200 billion annually is channelled for conservation initiatives from both public and private sources. Contribution from wealthier or developed countries should be at least $20 billion of this every year by 2025, and by 2030 it should be at least $30 billion a year. The Democratic Republic of Congo objected to this package.

- Big companies should report impacts on biodiversity: Companies need to analyse and report their operations and their effect on biodiversity issues. Large companies and financial institutions should disclose their operations, supply chains and portfolios. This report intends to promote biodiversity progressively and encourage sustainable production.

- Harmful subsidies: The deal calls for identifying, eliminating and phasing out or reforming subsidies that deplete biodiversity by 2025. Most Countries agreed to increase positive incentives for conservation and slash harmful incentives by at least $500 billion a year by 2030.

- Pollution and pesticides: Deal sought to reduce the use of pesticides by up to two-thirds. The deal also focused on other forms of pest management. The goal of the Kunming-

Montreal agreement is to reduce pollution's adverse effects to levels that are not damaging to the environment, but here the text provides no quantifiable target.

- Monitoring and reporting progress: To prevent the Kunming-Montreal Global Biodiversity Framework agreement from meeting the same fate as similar targets agreed upon in Aichi, Japan, in 2010. Processes would support aims at COP-15 to monitor progress in the future.

- The format for review of National action plans is similar to the format used for greenhouse gas emissions under U.N.-led efforts to curb climate change.

Conclusion: Challenge of the Global Biodiversity Framework (GBF) lies in its implementation. A recent report showed that none of the Aichi targets of COP10 in Nagoya, Japan, was achieved at the end of the decade.

Prelims:

Q1. The kunming-Montreal agreement is associated with

(a) COP-14

(b) COP-13

(c) COP-15

(d) COP-12

Source: The Indian Express

Article: 30-by-30: Key takeaways from the COP15 biodiversity summit

MRNA VACCINES & FIGHT AGAINST CANCER

Significance for Prelims: messenger-RNA technology; Cancer therapies; Ribonucleic acid (RNA)

Significance for Mains: Not Much

News: Moderna and MSD (Merck&Co.) company claimed that vaccines built on the mRNA (messenger ribonucleic acid) platform have shown promising results. The company said that patients taking an immunotherapy drug Keytruda for advanced melanoma (a kind of skin cancer) were less likely to die or face recurring cancer if they took the vaccine "mRNA-4157/V940".

Vaccine Trial:

- In its first randomised-trial testing of an mRNA therapeutic in cancer patients that involves 157 patients, and in this study, there is a 44% reduction in the risk of dying of cancer or having the cancer progress after vaccination.
- Reuters reported that the combination of "mRNA-4157/V940" with Keytruda was safe and demonstrated greater benefit than with Keytruda alone after a year of treatment.
- Compared to 10% of patients receiving Keytruda alone, 14.4% of individuals receiving the combo experienced drug-related severe adverse events.
- The vaccine is customised and tailor-made for every patient. Hence it is a personalised cancer vaccine and is expected to be very expensive for manufacturers.
- Oncologists across the world have welcomed this exciting new opportunity in cancer care.

Working Mechanism of Vaccine:

- messenger-RNA technology used to produce the COVID vaccine for this personalised cancer vaccine.
- Currently, It allows the body's immune system to seek and destroy melanoma(cancerous cells); it could also pave the way to develop new ways to fight other cancers.
- While the mRNA vaccines were notoriously unstable, researchers have learned to deliver these molecules to the body through vaccines making mRNA stable.
- Inside the body, mRNA instructs cells to produce proteins that stimulate an immune response against the same proteins when they are present in intact viruses or tumour cells.
- Personalised cancer vaccine works with Merck's Keytruda and can disable a protein PD-1, or programmed death 1, that helps tumours to evade the immune system.
- Researchers collected samples from patients' tumours and healthy tissue to build the vaccine. After proper analysis of the samples, scientists decoded their genetic sequence and isolated mutant proteins associated with cancer; now, this information was utilized to

design a tailor-made cancer vaccine.

- When a vaccine gets injected into a patient, the patient's cells act as a manufacturing plant to produce perfect copies of the mutations for the immune system to help the immune system recognise and destroy.
- In the final stage, the body learns to fight off the infection, as it has been exposed to the mutations without the virus.
- Potential of mRNA vaccine technology: Fight against cancer boosted with mRNA vaccine technology.

History of RNA:

- RNA was first promoted in 1989 as a therapeutic.
- RNA development after broad application in vitro transfection technique and thereafter mRNA was advocated as a vaccine platform.
- Safety advantages offered by mRNA: Since mRNA has minimal genetic construct, it harbours only the elements directly required to express the encoded protein.
- mRNA platform was refined during the COVID period; it gained several revolutionary steps within a year that allowed the technology to drive vaccines that work.
- mRNA vaccine against SARS-CoV-2 like Pfizer-BioNTech and the Moderna vaccines instructs production of a version of the "spike" protein in cells that studs the surface of SARS-CoV-2. Further, the immune system sees this spike protein as foreign and mobilises immune cells to produce antibodies to fight the infection.

Newer cancer therapies are CAR-T cells and bi-specific antibodies.

- In CAR-T therapy, immune system cells are removed from the body, modified to target particular cancer, and then returned to the body to destroy cancer cells.
- Bispecific antibodies bring potent immune system killer cells adjacent to the cancer cells by attaching to immune system cells with one arm and cancer cells with the other.

Prelims:

Q. Which of the following vaccine is based on mRNA technology?
(a) Pfizer-BioNTech
(b) Sputnik
(c) Covaxin
(d) Covishield

Source: The Hindu

Article: How can mRNA vaccines help fight cancer?

APPOINTMENTS OF ECS AND CHIEF ELECTION COMMISSIONER (CEC)

Significance for Prelims: Not Much

Significance for Mains: New Method to appoint ECs and Chief Election Commissioner (CEC)

News: Recently, Supreme Court has been hearing cases about the appointment of election commissioners. Hearings in the Supreme Court on the appointment of Election Commissioners (ECs) made this a public discourse.

Evolution of Election Commission:

- India's elections have become almost a mechanistic and ritualistic exercise due to the evolution of India's constitutional and political structures over the years. The most precise reason for this is the setting up and functioning of the Election Commission of India (ECI).
- Article 324 of the Constitution created the Election Commission of India (ECI).
- Election Commissioners (ECs) ensure that the roots of democracy are kept appropriately watered and nourished.
- Working of the Constitution: Final words of the President of the Constituent Assembly (CA) and the Chairman of the Drafting Committee for the Constitution during the Constitution-making process and when the Constitution was finally adopted.

- Dr. B.R. Ambedkar, while praising the adoption of the Constitution to the CA on November 25, 1949, said, "However good a Constitution may be, it is sure to turn out bad because those who are called to work it happen to be a bad lot. However bad a Constitution may be, it may turn out to be good if those called to work it happen to be a good lot. The working of a Constitution does not depend wholly upon the nature of the Constitution."
- Dr. Rajendra Prasad said, "Whatever the Constitution may or may not provide, the country's welfare will depend upon how the country is administered. That will depend upon the men who administer it… If the elected people are capable and men of character and integrity, they would be able to make the best even of a defective Constitution. The Constitution cannot help the country if they are lacking in these. After all, a Constitution, like a machine, is a lifeless thing. It acquires life because of the men who control it and operate it, and India needs today nothing more than a set of honest men who will have the interest of the country before them."
- In case ECs want to match the qualities stated by Dr Ambedkar and Dr Prasad. They need to go beyond the definition of Article 324 of the Constitution and the Election Commission (Conditions of Service of Election Commissioners and Transaction of Business) Act, 1991.

Major Weakness in the appointment systems of the ECs:

- The bureaucratisation of the ECI is visible in the elevation of ECs to the Chief Election Commissioner (CEC), which is a clear violation of the principle of primus inter pares and defect in the tenures of ECs and CEC.
- Monopolisation of the positions of ECs and CEC by the administrative services.

Way forward:

- Formation of a new committee that should propose the qualifications and requirements for persons to be appointed as ECs/CEC: The committee's proposals should be approved only if they are approved by a two-thirds majority of the members of Parliament present and voting.
- After approval of qualifications and requirements by Parliament, the committee should be entrusted with the task of searching for and selecting individuals proposed to be appointed as ECs/CEC.
- The committee should issue a call for nominations and applications from those qualified for or interested in the position of EC or CEC.
- The Parliament should review the committee's proposals: The committee's recommendations shall only be accepted by the legislature if they support two-thirds of the lawmakers present and voting. The suggestions should be given to the President for approval of the appointees after being approved by Parliament. Such individuals should hold their positions for six years or until they are 75, whichever comes first, after being appointed. People older than 69 years old shouldn't be appointed.
- People so appointed should only be subject to the same process of impeachment as justices of the Supreme Court.

Prelims:

Q. Article 324 of the Constitution is associated with
(a) Election Commission of India
(b) Supreme Court
(c) Comptroller and Auditor General of India(CAG)
(d) Attorney General of India

Source: The Hindu

Article: Benchmarks for ECs' appointments

QUANTUM COMPUTING

Significance for Prelims: Quantum Supremacy; 'Post-quantum cryptography; Conventional computing.

Significance For Mains: Not Much

News: Google researchers have achieved 'quantum supremacy', in which a standard computer did a far better job than the world's most powerful supercomputer by harnessing the properties of sub-atomic particles. Google's quantum computer produced an answer to the task of finding a pattern in a seemingly random series of numbers. In 3 minutes and 20 seconds earlier it was estimated that the supercomputer at the Oak Ridge National Laboratory in Tennessee would take 10,000 years to complete the same task.

About Quantum supremacy:

- In simple terms, supremacy solves a computing task that a conventional computer would struggle to or never complete.
- Quantum supremacy is known as the achievement of the superior potential of quantum computing in practice effectively superseding existing forms of computing.

Difference between quantum computing and conventional computing:

- The basis of calculations in Conventional computers is 'bits' or ones and zeroes. These bits represent 'yes' and 'no', or 'on' and 'off'; a combination of bits can handle logical tasks.
- Quantum computing, using the property of sub-atomic particles, simultaneously exists in different states. Hence, a quantum bit or qubit can be both one and zero at the same time, and this is known as superposition.
- Quantum computers need to work with classical computers in the real world to use their respective strengths.

Reasons for the powers of Quantum Computers:

- 'Entangled' property of sub-atomic particles makes quantum computers so powerful. This property of sub-atomic particles influences each other's behaviour.
- When entanglement is combined with superposition, that leads to exponential computing power increases after adding each qubit.
- The Sycamore processor designed by Google had 54 qubits arranged in a two-dimensional grid. But only 53 could be made to work, which is enough to produce a successful result.
- Google has solved the problem associated with working quantum computing with high fidelity or accuracy.

Challenges of making quantum computing work:

Chances of errors in the calculations made by a quantum computer: The qubits need to be cooled to just above absolute zero to reduce 'noise' – or vibration.

Critics of google's achievements in quantum computing:

- Critics say that Google is hyping its achievement in Quantum computing and creating the misleading impression that all conventional computers will become obsolete.
- Google's random problem can also be solved by adding disk storage to the IBM's Summit supercomputer, that could have solved that problem with greater accuracy in at most two-and-a-half days.
- There was scepticism that Google has only solved a very narrow task, and quantum computing is still needs to go a long way for practical use.

Potential uses for quantum computing:

- It is used in machine learning, materials science and chemistry.
- Cryptographers are already preparing quantum computers for cracking the codes.
- It can be used to secure online access to bank accounts. 'Post-quantum cryptography' is already here even before wide use of quantum computing.

Future Prospects of Quantum Computing:

- With its close rival IBM, Google is staking a claim to leadership in the 'quantum supremacy'.
- With growing applied research and startups, it may be possible to hook quantum computers to a cloud server for research work.
- New trade and technology cold war between the United States and China due to heavy Investment by China in fields such as artificial intelligence and backing quantum computing.

Prelims:

Q. Consider the following statements:
The basis of calculations in Conventional computers is 'bits' or ones and zeroes.
Quantum computing use the property of sub-atomic particles that simultaneously exist in different states.
Select the correct answer using the code given below:
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Source: The Hindu
Article: What are quantum computers, and is it time to throw your old PC away?

CHALLENGES OF QUANTUM COMPUTING

Significance for Prelims: Quantum Computing

Significance for Mains: Limitations and Benefits of Quantum Computing.

News: Quantum computers (QC) use quantum physics to solve complex problems not solved by conventional computers that use classical physics. Even Nobel Prize for physics in 2022 was awarded for work that rigorously tested quantum 'experience'.

Government Initiatives in developing quantum-computing systems:

Institutes, companies and governments have invested in developing quantum-computing softwares to solve various problems to electromagnetic and materials science.

Government of India launched National Mission to study quantum technologies in 2021 with an allocation of **Rs** 8,000 crore.

A quantum research facility was opened by the Indian Army in Madhya Pradesh.

The Department of Science and Technology co-launched another quantum research facility in Pune.

Use of Quantum Physics or superposition in Computer:

In Quantum physics, reality is described at the subatomic scale at the electrons, protons and neutrons.

In the realm of subatomic particles, one can not pinpoint the location of these particles.

Knowing these particles' presence in any place can be known only by their presence in a given volume of space. These subatomic particles have probability attached to each point in the volume like 10% at point A and 5% at point B meaning there is probability that electron is at point B 5% of the time.

The fundamental unit of a Qunatum Computer is qubit, like an electron. Google and IBM have used transmons and in transmons pairs of bound electrons oscillate between two designated states or superconductors.

There is some information that is directly encoded on the qubit, meaning if the spin of an electron is up, it means 1; when the spin is down, it means . Hence, the information is

encoded in a superposition instead of being either 1 or 0 that is third kind of state unlike the two separate states of 0 and 1.

Collapsed state of qubits is the computer's final output: The qubits work together due to entanglement. The calculation performed on the qubit revealed the state of the qubits.

Calculation of Quantum states: A computer with N qubits can encode 2N states while N transistors computer can only encode 2 × N states.

Interpretations of the laws of quantum physics:

'Copenhagen interpretation': This thought-experiment was popularised by Erwin Schrödinger in 1935. In this cat is put in a closed box with a bowl of poison.Hence, without opening the box one can not know whether the cat is alive or dead.So, cat is said to exist in a superposition of two states i.e. alive and dead in this case. After opening the box, superposition is forced to collapse to a single state. Now, the probability of each state decides the state to which cat collapses.

Similarly, after probing the volume of the space the superposition of the electrons' states forced to collapse to one depending on the probability of each state.

Concept of entanglement: When two particles are entangled and even it is separated by an arbitrary distance i.e. more than 1,000 km it will cause the superposition of one particle to collapse. Hence, superposition of the other particle will collapse as well. Quantum Entanglement phenomenon violate the notion that the speed of light is the universe's ultimate speed limit.

Limitations of Quantum Computers:

Challenges in finding the shape of an undiscovered drug and autonomously exploring space or factoring large numbers.

Engineering-related problems associated with quantum computers: A practical and reliable QC needs at least 1,000 qubits. There are no theoretical limits on larger processors, but The current biggest quantum processor has 433 qubits.

Disturbances in quantum computing systems with a few dozen qubits: States of the qubit sitting on the table could simply collapse by just tapping finger on the table as in specific conditions Qubits exist in superposition including very low temperature (~0.01 K), with radiation-shielding and protection against physical shock.

Tricky Error-correction: Due to no-cloning theorem, engineers can't create a copy of a qubit's sates in a classical system.

Chances of increase in informational noise: It is nearly impossible for researchers to create QCs that don't amplify errors when additional qubits are added.

Benefits of qubit-based computers:

These computers can access more states than a transistor-based computer, and hence have access more computational pathways and can solve more complex problems.

QCs are used to model the binding energy of hydrogen bonds and simulate a wormhole model.

Prelims:

Q. Consider the following statements:

Basis of calculations in Conventional computers are 'bits' or ones and zeroes.

Quantum computing use property of sub-atomic particles that simultaneously exist in different states.

Select the correct answer using the code given below:

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Source: The Hindu

Article: Explained | The challenges of quantum computing

INDO-PACIFIC CONTESTATION

Significance for Prelims: Not Much

Significance for Mains: Issues in Indo-Pacific

News: New fault lines are reconfiguring in the Indo-Pacific, and the world is embracing this 'new normal.

Heart of contestation in Indo-Pacific:

- Indian Ocean and South Asian region's geo-political and geo-economic prominence.
- India's emergence as a major power.
- Intensification of tensions between aggressive China and emerging India.
- Quad partners of New Delhi are making inroads in its backyard.

Widening outreach of China:

- To enhance its strategic ambitions, China has tried to influence these regions.
- The main reasons for Beijing's outreach in South Asia and the Indian Ocean region is to limit Indian influence, military power, and status and to sustain energy supply as well as economic growth.
- With its economic boom, Beijing increased its outreach in South Asia in the early 2000s.
- To meet its strategic ends in the region, Beijing launched the Belt and Road Initiative (BRI) in 2013.
- Other methods adopted by Beijing to meet its ends are the provisioning of loans, financial incentives, and mega-infrastructure projects.
- **The outcome of these investments: (a) Beijing can access the Indian Ocean (b) Enhance political and security ties in the region (c) It can also harbour military vessels and submarines (d) Beijing took certain islands and ports like Hambantota port of Sri Lanka on lease.**

Change in Indian Strategic Thinking:

- **After Galwan clashes in 2020, Indian strategic started seeing Beijing as a bigger threat than Islamabad.**
- **India can not afford aggression due to the possibility of a two-front war, economic and political fallout, and border and terror challenges from Afghanistan.**

Re-energised diplomatic efforts by New Delhi in its backyard:

- Maldives: New Delhi is cooperating with President Ibrahim Solih's 'India First' policy by providing them with massive economic assistance, grants, and infrastructure projects. India and Maldives are also cooperating on maritime security.
- Nepal: Deuba government of Nepal tried to improve Nepal's overall bilateral relations with India.
- Sri Lanka: Since Srilanka is in crisis. So, India has provided economic and humanitarian assistance and investments worth $4 billion this year.

Quad members (Japan, Australia, and the United States) are also interested in South Asia and the Indian Ocean:

- Close cooperation among these partners and genuine alternatives to the BRI collectively push against China.
- Quad members have been assisting Sri Lanka throughout the crisis.
- Japan finalised its talks with Sri Lanka on debt restructuring.
- Maldives, Australia and the U.S. are entering into new areas of cooperation. These countries have opened their embassies in the Maldives.
- U.S. and Maldives signed a defence and security framework, and Nepal and U.S. also ratified the U.S.'s Millennium Challenge Cooperation (Nepal Compact).

Outcomes of the recent success of India and its regional partners: Failed to deter China from furthering its presence in the region.

- Re-entering of Chinese surveillance vessel Yuan Wang-5 in Sri Lanka the Indian Ocean at Srilanka.
- Another vessel of the Yuan Wang series entered the Indian Ocean, coinciding with the Agni-series missile's test flight.
- Beijing tried to challenge new initiatives such as the Quad and the Colombo Security Conclave by institutionalising its presence in the region through the first-ever China-Indian Ocean Region Forum.

South Asian Countries would make competition between China and India a 'new normal' due to the following reasons

- It is difficult for them to move completely away from China.
- Economic and political turmoil in most South Asian countries, such as Bangladesh and Sri Lanka, due to the COVID-19 pandemic and Russia's invasion of Ukraine.
- Depletion of forex reserves in many countries, such as Nepal, the Maldives and Bhutan
- Chances of more instability in the region due to upcoming election years for the major part of South Asia may fuel political opportunism in the region.

Conclusion and Way Forward: India and its partners should be ready to embrace these chal-

lenges to sustain the recent gains in the region.

Prelims:

Q. Nepal Compact is associated with which of the following?
(a) India -Nepal
(b) China -Nepal
(c) U.S.A-Nepal
(d) Bangladesh-Nepal

Source: **The Hindu**

Article: **Accepting the new normal in the Indo-Pacific contestation**