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1) What is ANtarctic Impulsive Transient Antenna or ANITA?

The news that a NASA experiment has indicated the possibility of a parallel universe has created headlines across the world. WIth this, ANtarctic Impulsive Transient Antenna or ANITA has suddenly come into the limelight as the cosmic-ray shower that is key to the new discovery was a part of NASA's ANITA and IceCube experiment taking place in Antarctica.

What is ANITA?

Designed by NASA, the ANITA instrument is a radio telescope which is used to to detect ultra-high energy cosmic-ray neutrinos from a scientific balloon flying over Antarctica. ANITA is the first NASA observatory for neutrinos of any kind. It involves an array of radio antennas attached to a helium balloon which flies over the Antarctic ice sheet at 37,000 meters.

How many ANITAs?

1. ANITA-I was launched from McMurdo, Antarctica in 2006.
2. ANITA-II, a modified instrument with 40 antennas, was launched from McMurdo Station in 2008.
3. ANITA-III, which was equipped with systems to improve sensitivity by a factor of 5–10, was launched in December 2014.
4. ANITA-IV was launched in December 2016 and it was loaded with tunable notch filters and an improved trigger system.

PT POINTERS: The neutrinos have energies on the order of 1018 eV and they are capable of producing radio pulses in the ice because of the Askaryan effect.

What are neutrinos?

Neutrinos are high-energy particles that pose no threat to us and pass through most solid objects without anyone even noticing. Neutrinos constantly bombard Earth and as per some estimates emerging from studies, 100 trillion neutrinos pass through your body every second.

Do they interact with matter?

Rarely do they interact with matter. But if they do smash into an atom, they produce a shower of secondary particles we can detect, which allows us to probe where they came from in the universe.

2) U.K. moots '5G club'

The British government has approached the US with the prospect of creating a 5G club of 10 democracies, including India, amid growing security concerns related to Chinese telecom giant Huawei.

What's the issue?

1. This comes just months after British Prime Minister Boris Johnson granted Huawei a limited role in supplying kits for the UK's 5G networks and capped its market share to 35 per cent. Back then, the UK was one of those who stood out in the face of a US-led drive to ban Huawei from entering the 5G sector.
2. But by the third week of May, the Johnson government came under increasing pressure from its own Conservative party members, who demanded that Huawei's equipment

should not be allowed in UK's 5G networks beyond 2023, owing to potential national security concerns.

3. Following these demands, reports emerged the government was drawing up a plan to phase out Huawei from UK's 5G networks in the next three years. Last week, a review was launched by the country's intelligence chiefs, who would look into Huawei's role in UK's 5G plans.

Proposed D10 club of democratic partners: It includes G7 countries – UK, US, Italy, Germany, France, Japan and Canada – plus Australia, South Korea and India. It will aim to create alternative suppliers of 5G equipment and other technologies to avoid relying on China.

Implications:

1. The key thrust behind this alliance is to allow more and more 5G equipment and technology providers to come up.
2. At the same time, ensure that these new entrants belong to like-minded democratic regimes, thus alleviating any security concerns.
3. The plan to form a democratic alliance in order to marginalise the Chinese tech giant Huawei comes at a time when there is rising global backlash against China for its initial handling of the coronavirus outbreak.
4. There is also growing consensus among the British political class regarding resetting relations with Beijing, following the global pandemic and the havoc it has caused in the UK.
5. Moreover, there has been a concerted effort by the US and several other countries to keep Huawei away from their countries' 5G networks. These countries have raised concerns regarding potential surveillance and breach of their national security by China using the state-run Huawei.

Why this is the right time for 5G in India?

Data consumption: India's is the second biggest smartphone market in the world, leading to a meteoritic rise of data consumption — from 20 million terabytes in 2017 to 55 million terabytes in 2019. India consumes more than 11 GB/user/month — the highest in the world.

Lower fibre penetration: There is no practical way fibre connectivity can be enhanced quickly. This poses a serious challenge to back-haul capacities of the macro towers.

Industry 4.0: The Fourth Industrial Revolution (aka Industry 4.0) is powered by emerging technologies like artificial intelligence, machine learning, Internet of Things, Edge Computing, which need 5G to be effective. These, and such similar services, are required to raise additional revenue streams for the carriers which are already stressed with financial burdens.

Smart cities: 5G powers the technology driving smart cities. As India moves ahead with its Smart City vision, it must leverage 5G to ensure that the underlying technology remains relevant for a longer time.

Way ahead: Apart from creating a positive environment for 5G's launch in India, the biggest issue GoI needs to resolve is to help telcos overcome the prevailing financial crisis. The spectrum policy should focus on incentivising heavy investment in 5G, including support for long-term, exclusive, technology-neutral spectrum licences, instead of trying to look for financial windfall right

away. GoI and operators should collaborate to create an ecosystem capable of leveraging 5G technology. A favourable policy will indirectly enable advances in areas including employment, technology and investment. The shift from 4G to 5G is not incremental in nature, but transformational. Given what it means for the entire ecosystem, skipping it is not a choice India can afford.

What underlying technologies make up 5G?

5G is based on OFDM (Orthogonal frequency-division multiplexing), a method of modulating a digital signal across several different channels to reduce interference. 5G uses 5G NR air interface alongside OFDM principles. 5G also uses wider bandwidth technologies such as sub-6 GHz and mm Wave.

The previous generations of mobile networks are 1G, 2G, 3G, and 4G.

1. First generation - 1G 1980s: 1G delivered analog voice.
2. Second generation - 2G Early 1990s: 2G introduced digital voice (e.g. CDMA- Code Division Multiple Access).
3. Third generation - 3G Early 2000s: 3G brought mobile data (e.g. CDMA2000).
4. Fourth generation - 4G LTE 2010s: 4G LTE ushered in the era of mobile broadband. 1G, 2G, 3G, and 4G all led to 5G, which is designed to provide more connectivity than was ever available before.

3) ICUBE report

Kantar, the world's leading data, insights and consulting company released its ICUBE 2019 report on digital adoption and usage trends in India. The annual tracking study; considered to be the currency for digital adoption in the country, gauges the changing digital ecosystem in India, measuring Internet usage by demographic, activity and device segments.

Key findings:

1. Estimated at 574 million, the number of monthly active Internet users have registered an annual growth of 24% indicating an overall penetration of 41%.
2. The report projects 11% growth for 2020; estimates 639 million monthly active Internet users.
3. All monthly active Internet users use a mobile phone as one of the devices to access the Internet.
4. About 84% of users access the Internet for entertainment purposes.
5. At 38%, school-going children segment in the age group of 15 years or below has shown a promising growth on internet usage. Access to information and education, social media, gaming and entertainment, especially, Sports, are driving the adoption.
6. Content is the king and is driving the surge in daily internet usage.
7. India's digital revolution continues to be propelled by the rural masses — Rural India registered a 45% growth in the monthly active internet users in 2019. It is now estimated that there are 264 million internet users in rural India, and this is expected to reach 304 million in 2020.

Factors responsible for this growth:

• The convenience of content availability across devices and on the go low-cost Internet service resulted in a significant growth in the entertainment consumption in the last year.

This is expected to continue in 2020 too, especially in view of the lockdown.

• Local language and video are the underlying factors for the internet boom in rural.

Way ahead:

• Children and housewives will be the new Internet adopters in the next year or two. Most of these users already have Internet at home, and it will be more about breaking the mindset barriers to access the web.

• Video, Voice and Vernacular (3 Vs) will be significant usage factors for the Internet users. These will drive higher engagement and frequency of usage, thereby, helping the users mature in their Internet journey.

• IOT and Smart Devices will make the internet as much a household phenomenon as it is an individual phenomenon.

4) China's central bank digital currency

China, which seeks to be the first major economy to launch a digital currency, is to trial a digital yuan in four urban areas – including payments of local government employees' transportation subsidies.

e- RMB:

1. The digital currency – known as the e-RMB – "will not be issued in large amounts" for public use in the short term, and the digital currency in circulation would "not lead to an inflation surge".

2. Initially it will be tested in three major cities of Shenzhen, Suzhou and Chengdu.

3. People's Bank of China (PBOC), the country's central bank, will be the sole issuer of the digital yuan, initially offering the digital money to commercial banks and other operators.

4. Public would be able to convert money in their bank accounts to the digital version and make deposits via electronic wallets.

Significance and potential of the project: China's Digital Currency Electronic Payment (DCEP) project – as the country's progress towards a digital yuan is known – began in 2014. Central banks around the world are assessing the feasibility of launching their own digital currencies – so-called 'central bank digital currencies' (CBDCs). The interest in CBDCs is being driven by factors including declining cash use and plans for privately owned 'stablecoins', such as Facebook's proposed Libra

5) What is the SpaceX Demo-2 mission?

On May 27, NASA's SpaceX Demo-2 test flight will lift off for International Space Station (ISS), becoming the first crewed flight to launch from American soil since the conclusion of the space shuttle era in 2011.

What is the mission?

The Demo-2 mission is part of NASA's Commercial Crew Program, and will fly two astronauts on SpaceX's Crew Dragon spacecraft. This mission is essentially a flight test to certify if SpaceX's crew transportation system can be used to ferry crew to and from the space station regularly. This is the final flight test for the system and intends to validate its different components, including the spacecraft (Crew Dragon), the launch vehicle (Falcon 9), the launch pad (LC-39A) and the operations capabilities.

The Commercial Crew Program: The main objective of this program is to make

access to space easier in terms of its cost, so that cargo and crew can be easily transported to and from the ISS, enabling greater scientific research. Boeing and SpaceX were selected by NASA in September 2014 to develop transportation systems meant to transfer crew from the US to the ISS.

Significance of the program and the need for private participation: By encouraging private companies such as Boeing and SpaceX to provide crew transportation services to and from low-Earth orbit, NASA intends to focus on building spacecraft and rockets meant for deep space exploration missions.

6) Magnetosphere

Scientists at the Indian Institute of Geomagnetism (IIG) have developed a generalized one-dimensional fluid simulation code capable of studying a wide spectrum of coherent electric field structures in near-earth plasma environment or earth's magnetosphere which can be useful in planning of future space missions. The study will help to plan the future space missions. The study will also lead to control fusion experiments to fulfill ever-expanding energy demands of humanity.

About Magnetosphere: It is the region around a planet dominated by the planet's magnetic field. Other planets in our solar system have magnetospheres, but Earth has the strongest one of all the rocky planets. Significance: The magnetosphere shields our home planet from solar and cosmic particle radiation, as well as erosion of the atmosphere by the solar wind - the constant flow of charged particles streaming off the sun.

How it is generated?

Earth's magnetosphere is part of a dynamic, interconnected system that responds to solar, planetary, and interstellar conditions. It is generated by the convective motion of charged, molten iron, far below the surface in Earth's outer core.

1. Constant bombardment by the solar wind compresses the sun-facing side of our magnetic field.
2. The sun-facing side, or dayside, extends a distance of about six to 10 times the radius of the Earth.
3. The side of the magnetosphere facing away from the sun - the nightside - stretches out into an immense magnetotail, which fluctuates in length and can measure hundreds of Earth radii, far past the moon's orbit at 60 Earth radii.

Why study magnetosphere?

1. To better understand its role in our space environment. It will unravel the fundamental physics of space, which is dominated by complex electromagnetic interactions unlike what we experience day-today on Earth. By studying this space environment close to home, we can better understand the nature of space throughout the universe.
2. Additionally, space weather within the magnetosphere - where many of our spacecraft reside - can sometimes have adverse effects on space technology as well as communications systems. Better understanding of the science of the magnetosphere helps improve our space weather models.

7) What is 'Solar Minimum' and why is it happening now?

The sun is said to have gone into a state called the 'solar minimum' and is about to enter the deepest period of 'sunshine recession' as sunspots are virtually not visibly at all. Some reports suggest that it has been almost 100 days this year when the sun has shown zero sunspots.

What is solar minimum and why is it happening now?

Sun has a cycle that lasts on average 11 years, and right now we are at the peak of that cycle. Every 11 years or so, sunspots fade away, bringing a period of relative calm. This is called the solar minimum. And it's a regular part of the sunspot cycle.

Implications: While intense activity such as sunspots and solar flares subside during solar minimum, that doesn't mean the sun becomes dull. Solar activity simply changes form. For instance, during solar minimum we can see the development of longlived coronal holes. But, this may cause health risks to astronauts travelling through space as "the sun's magnetic field weakens and provides less shielding from these cosmic rays."

8) COVID 19 AND MENTAL HEALTH

Widespread psychological distress has been recorded in various COVID-19 affected countries affecting overall mental health of the people.

• According to a survey conducted by the Indian Psychiatry Society, within a week of the start of the lockdown, the number of reported cases of mental illness in India had risen by 20%.

• Further, it has been estimated that in the weeks and months ahead, India will suffer from a massive mental health crisis. How is COVID exacerbating the problem of mental illness? An estimated population of 150 million people are at risk of developing mental illness that includes first responders and frontline healthcare workers, COVID patients and survivors, children and adolescents, women, elderly, people with pre-existing mental health issues, unorganised sector workers, migrants and differently abled people.

The psychological and emotional distress among this population is being caused by:

• Government policies: Policies of social distancing, quarantines, travel restrictions, and cancellations of schools and large gatherings has sparked perpetual fear, panic, anxiety, confusion, anger and depression. People are afraid of infection, dying, and losing family members.

• Economic factors: The pandemic has severely hit the business cycles and economy. People mainly in the unorganised sector are under constant fear of losing their businesses, jobs, or savings which has spiked the frustration, anxiety, distress level amongst them.

• Social factors:

o Stigma against health care workers, people who tested positive, elderly and people with existing health conditions.

o Children and adolescents are exacerbated by family stress, social isolation, with some facing increased abuse, disrupted education and uncertainty about their futures.

o Women: As per a survey recorded by UN, 66% of Indian women reported being stressed due to additional duties of caregiving such as home-schooling and taking care of older relatives along with increased cases of violence towards them.

o Elderly and people with pre-existing health conditions are currently extremely worried about being infected with the virus and not having access to appropriate care.

• Role of media: With repeated media images of severely ill people, dead bodies and coffins, frequent misinformation and rumors about the virus, people are developing knowledge that they may not have the opportunity to say goodbye to dying loved ones and may not be able to hold funerals for them.

• Limited access to mental health care services:

o India's formal mental health system, has a limited number of specialists; 9,000 psychiatrists for 1.3 billion people. This access has now been further diminished due to COVID-19 as it has disrupted services throughout the country adversely affecting persons with pre-existing mental health issues. o Mental health and psychosocial support delivered at the community level have also been critically impacted. For instance, groups, associations and community-based initiatives that used to bring people together regularly (e.g., senior citizens clubs, youth groups etc.) offering social support, meaning and a sense of belonging — have not been able to meet for several months. • Shortage of frontline workers: Police and healthcare workers are faced with extreme workloads, difficult decisions, risks of becoming infected and spreading infection to families and communities, and witnessing deaths of patients.

Implications

• Psycho-Social impacts:

o To deal with the stressors, people may resort to different negative ways of coping, including use of alcohol, drugs, tobacco or spending more time on potentially addictive behaviours such as online gaming.

o Increased risks of discrimination and violence related to gender, children and caste. These will be magnified by unemployment, malnourishment and poverty. o Increase in chronic stress, depression, alcohol dependence, and self-harm; leading to an overall rise in morbidity, suicides and the number of disability-adjusted life years linked to mental health.

✓ For e.g. The 2008 financial crisis recorded an extra 10,000 suicides across the US, Canada and Europe, mainly due to the economic hardships post-recession.

• Economic impacts: Short-term costs include hospital expenses while long-term costs include the lost income that could have been earned by the person, tax that the government lost from that income, among other things.

• Impact on brain health: Social isolation, reduced physical activity and reduced intellectual stimulation may affect brain health development in young children and adolescents and cognitive decline and dementia in the older population.

Way forward

• Sustaining and strengthening mental health services and programmes must be a priority to address current and future mental health

needs and help prevent a rise in mental ill health in the future. Taking note of the situation, the Indian government has introduced helpline numbers for people who might face mental distress due to the ongoing situation in the country.

• De-stigmatization: Some early COVID-19 survivors turned to social media to share their experiences in order to build confidence amongst others. There is an opportunity to train Indians who have now recovered, and to turn them into COVID-19 champions – equipping them to serve for people who are now feared to be positive or are under suspicion.

• Awareness generation: Large public engagement campaign to increase help-seeking supported by state governments, and endorsed by influential people. Mainstream media and social media giants can be roped in to create and spread awareness.

• Community-based interventions to reduce the pressure on the overworked primary and secondary mental health task force. Community-based interventions such as Atmiyata's community-based volunteers in Maharashtra and Gujarat, SCARF's mental health mobile vans in Tamil Nadu, and VISHRAM in vidarbha, that used community health workers for the first line of treatment (depression fell by 22% and prevalence of suicidal thoughts fell by 51%), can be scaled.

• Policy interventions:

o Implementing the Mental Healthcare Act, 2017, (MHCA) that promises mental health care to all and introduce a suicide prevention policy. Many countries, including China, have been able to significantly reduce suicides after they implemented a suicide prevention policy.

o India can appoint a minister with a Cabinet rank as head of mental health and well-being, and create an emergency task force of public health experts in creating and executing evidence-based interventions.

• Investing in mental health: According to estimates, Rs 93,000 crore will be needed to implement MHCA, 2017. This could come from the PM Cares Fund, corporate social responsibility initiatives, private equity, and perhaps, a new national lottery.

• Digitally-mediated therapy and telepsychiatry should be scaled up. For eg- NIMHANS runs a successful telepsychiatry intervention in Karnataka. Mental health startups and innovations that tap technologies like artificial intelligence, machine learning and chatbots must be promoted for increasing awareness and access of services.

• Building resilience amongst adolescents and young children: A systemic approach is needed to build the demand for mental wellbeing, just as we broadly introduced sports into schools in the late 1990s. For this, Rashtriya Kishor Swasthya KAryakram (National Adolescent Health) programme has been reconfigured to include outreach by counsellors, facility-based counselling, social and behavioral change.

Initiative taken for mental health during COVID 19

• WHO Department of Mental Health and Substance Use has issued guidelines as a series of messages that can be used in communications to support mental and psychosocial well-being in different target groups during the outbreak.

• MoHFW also issued Guidelines "Minding our minds during the COVID-19" to deal with mental health issues.

o Do not follow sensational news or social media posts which may impact your mental state. Do not spread or share any unverified news or information further.

o Feeling lonely or sad is also quite common. Stay connected with others. Communication can help you to connect with family and friends.

o Distract yourself from negative emotions by listening to music, reading, watching an entertaining programme on television

o Avoid tobacco, alcohol and other drugs. Use of tobacco or alcohol or other drugs to cope with emotions or boredom can worsen physical, mental health and reduce immunity.

• Manodarpan, an initiative by Ministry of Human Resource Development as part of Atma Nirbhar Bharat Abhiyan, to provide psychological support and counselling to students, teachers and families for mental health and emotional well-being.

9) E-LEARNING

The lockdown due to COVID outbreak has altered the traditional teaching-learning mechanisms with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms.

• By the end of March 2020, over 180 countries had closed down schools, affecting over 1.26 billion learners (as per UNESCO). India comprises over 320 million of these learners.

• Educational institutions in India are using digital technologies to record video lectures of teachers, provide notes and content related to the courses to students through email, WhatsApp, etc., facilitate teacherstudent interaction through platforms such as Zoom, WebEx etc.

Challenges with e-learning

• Digital Divide: According to the Indicators of Household Social Consumption on Education in India report, less than 15% of rural Indian households have Internet connection (as opposed to 42% urban Indian households). Those with no access to the internet are still excluded from quality learning. Further, classes at times get disturbed due to connectivity issues.

o As per NSSO data, only 4.4% of rural households and 23.4% of urban households have computer/laptop. Thus 75% of students are using smartphones to watch online classes. Teachers are apprehensive about students using smartphones because of distracting apps.

• Difficult for parents to adjust to the online system. Parents complain of increased screen time for children, aren't comfortable with technology themselves and increased pressure from the added household work due to the absence of domestic help adds to their problem.

• Gender divide: Increased domestic responsibilities especially for girls is impairing the atmosphere of learning. According to a recent UN report, only 29% of all internet users are female, which indicates that transitions to digital learning may compound the gender gap in education. o India already ranks 112th in WEF's Gender Gap Index's educational attainment component.

• Lack of vernacular content: Most of the content and existing lectures on internet are in English. In India, the Ministry of HRD data shows that there are only 17% English medium schools.

• Creating new inequality: Only a handful of private schools, universities and IITs could adopt online teaching methods. Their low-income private and government counterparts, on the other hand, have completely shut down for not having access to e-learning solutions.

• Difficulties for teachers:

o Without adequate training, many teachers are not comfortable with using technology.

o Also, with reduced interaction, it is difficult for teachers to develop a rapport with the children for effective teaching.

o Teachers are also under tremendous pressure due to interference by overenthusiastic parents.

• Lack of institutions' autonomy: Existing rules have constrained Indian education institutions to take advantage. Till now, the UGC has licensed only seven universities to offer online courses.

• Conducting large-scale, high-stakes examinations will be more complicated. Most board and entrance examinations have been either postponed or suspended, causing disruptions in the academic calendar.

Way forward

A multi-pronged strategy is necessary to manage the crisis in the short term and build a resilient Indian education system in the long term.

Immediate/short term measures

• Ensuring continuity of learning in government schools and universities. Open-source digital learning solutions and Learning Management Software should be adopted so teachers can conduct teaching online. The DIKSHA platform, with reach across all states in India, can be further strengthened to ensure accessibility of learning to the students.

• Deployment of ed-tech applications which takes into account the low internet bandwidth and patchy connections. The applications can focus on offline content which can be reviewed without a stable internet connection by the learners in the remote corners of India.

• Improve content in regional language. The existing EdTech solutions can prioritize the translation of key modules into regional dialects and deliver educational content with the help of grassroots organizations.

• Leveraging community owned tablets and smart devices for education can also aid learners. Also, the services of Bharatnet and Wi-Fi Choupal (wifi hotspots) can be used to access the educational modules by the students in remote villages.

• Establishing quality assurance mechanisms and quality benchmark for online learning as well as e-learning platforms. Many e-learning players offer multiple courses on the same subjects with different levels of certifications, methodology and assessment parameters. So, the quality of courses may differ across different e-learning platforms.

Long term measures

• Inclusive learning solutions need to be developed. With a rapid increase of mobile internet users in India, which is expected to reach 85% households by 2024, technology is enabling ubiquitous access and personalization of education even in the

remotest parts of the country. This can change the schooling system and increase the effectiveness of learning and teaching,

• Reducing the Gender Divide by leveraging the digital solutions to enrol out of school girls. Targeted Information and Education campaigns, curated content borrowing from behavioural science and interactive media can be used to incentivize girls to re-join the education journey.

• Strategies to prepare the higher education sector for the evolving demand–supply trends across the globe— particularly those related to the global mobility of students and faculty and improving the quality of and demand for higher studies in India. Measures are required to mitigate the long-term effects of the pandemic on job offers, internship programs, and research projects.

• Courses on Indian traditional knowledge systems in the fields of yoga, Indian medicines, architecture, agriculture etc. should be integrated with the mainstream university education to promote scientific innovations, values, and to develop sustainable solutions.

Government initiatives

• Platforms supported by MHRD, NCERT, and the department of technical education to enable online education in India such as e-PG Pathshala (e-content), SWAYAM (online courses for teachers), and National Educational Alliance for Technology (using technology for better learning outcomes in Higher Education)

• National Project on Technology Enhanced Learning (NPTEL), National Knowledge Network, (NKN), and National Academic Depository (NAD) to increase connectivity with institutions, and accessibility to content.

• 'Pradhan Mantri e-VIDYA' initiative for digital education under which top 100 universities of the country will be allowed to start online courses by 30 May without UGC license.

• Under a one nation - one digital platform initiative, E-content and QR coded textbooks would be provided for all grades.

• One earmarked TV channel for every class from 1st to 12th - for students who do not have access to internet. Radio, community radio and podcasts would be extensively used for the same.

• Special e-content would be developed for visually and hearing impaired.

Other Initiatives:

• Sankalp, a free learning app for Hindi medium Government school students in Classes IX to XII has been developed by Avanti, a social-educational enterprise.

• ThinkZone, a startup from Odisha, has partnered with a local radio channel to broadcast activity-based learning modules for students aged three to 10.

10) BLOCKCHAIN BILL OF RIGHTS

World Economic Forum Global Blockchain Council launched Presidio Principles: the foundational values for a decentralized future which is also called as Blockchain Bill of Rights.

About Blockchain Bill of Rights

• It aims to establish a global baseline for developers, corporates and governments building blockchain applications.

• It will help in creating “the foundational values for a decentralized future” which will

help unlock the potential of a technology that is poised to massively transform multiple sectors.

• It contains sixteen principles which aim to protect users and preserve the values of the technology so that all can benefit.

• 16 principles have been set out in four categories. (refer infographics)

Need for the principles

• Risks to users: Blockchain's properties as a foundational technology make the considerations on data protection particularly important, given the harm and follow-on effects that can come from potential breaches.

• Potential for transformational change can be undermined: Those with sophisticated knowledge may have the opportunity to exploit their advantages – whether to intentionally harm consumers or to suppress the market through anti-competitive actions.

• Widening existing gaps: Despite talk of the potential for financial inclusion, if not designed carefully, blockchain can lead to the further exclusion and exploitation of vulnerable populations.

• Social Impact: The WEF believes that greater blockchain adoption will lead to opportunities to have a social impact on the world at large in 2020. Hence, it is necessary to provide a safe platform with defined rights for the users.

• Financial sector: Most of the banks and financial institutions are exploring blockchain technology such as Central Banks Digital Currency project, which brought together 45 central banks to explore parameters for the successful deployment of a CBDC. These rights will help in alleviating the effects of frauds.

Blockchain technology

• Blockchain is a series of data linked together. Every single transaction is linked to the chain using cryptographic principles in batches, making blocks.

• The blocks are connected to each other and have unique identifier codes (called hashes) that connect them to the previous and the subsequent blocks.

• This forms a blockchain, usually in the form of a continuous ledger of transactions.

11) SECURITY ISSUES WITH AAROGYA SETU APP

Recently, some experts have raised privacy and security concerns with the Aarogya Setu app launched by the Government of India.

Concerns with app

• Security issues- Recently, some individuals and groups on social media claimed that they were able to access information about people who were infected by coronavirus, among other data points, including people in sensitive offices like the PMO or Parliament.

o The privacy policy of the app is silent on as to what security practices are being followed and what level of encryption is being used.

• Violates constitution- As per the Supreme Court, privacy is a fundamental right, and it can only be deprived in accordance with procedure established by the law.

o There is no act passed by the parliament, which authorises making this app mandatory

• Lack of accountability- The app has a clause, which limits the government's liability, in case of any unauthorised access or modification to the information provided by the user.

o This means that there is no liability for the government even if the personal information of users is leaked.

o The aggrieved person has only recourse in the form of judiciary, if such an act takes place.

• Legally unjustified - By limiting the government's liability, the app goes against the Information Technology Act and the proposed Personal Data Protection Bill.

o The reasons for this is that the app service provider would fall under the definition of an intermediary and is obligated to ensure the security of the data collected and is liable for loss of it under the intermediary guidelines.

Government Response

• Given the outbreak of COVID-19 in the country, need of social distancing and contact tracing were the utmost priorities of the government.

o Making a detailed policy, thinking through the nuances and translating intention to policy takes time, which was not available at the time of launching of the app.

• Later, the Ministry of Electronics and IT (MeitY) has notified Aarogya Setu Data Access and Knowledge Sharing Protocol, 2020.

Aarogya Setu Data Access and Knowledge Sharing Protocol, 2020

• Implementation of the Protocol: MeitY is designated as the agency responsible for the implementation of this Protocol and its developer, the National Informatics Centre shall, under this Protocol be responsible for collection, processing and managing response data collected by the Aarogya Setu mobile application.

• Collection and processing of response data: Any response data and the purpose for which it is collected by NIC shall be clearly specified in the Privacy Policy of the Aarogya Setu mobile application.

o NIC shall collect only such response data as is necessary and proportionate to formulate or implement appropriate health responses. o NIC shall process any data collected by it in a fair, transparent and non-discriminatory manner.

o Demographic data will be retained for as long as Protocol remains in force or if individual requests that it be deleted, for a maximum of 30 days from such request, whichever is earlier.

• Sharing of response data: Data can be shared with other government agencies and third parties as long as it is for critical health purposes.

o Any entity with whom response data has been shared shall use such data strictly for the purpose for which it is shared.

o In any circumstance, such data shall not ordinarily be retained beyond 180 days from the date on which it was accessed, after which such data shall be permanently deleted.

• Response data may be made available for research purposes to Indian universities and research institutions/ research entities registered in India by NIC.

o Recently, Government has made the Aarogya Setu app open source, which means developers will be able to inspect the source code of the app and modify for changes. The process of supporting the open-source development will be managed by NIC

• Any violation of these directions may lead to penalties as per Disaster Management Act,

2005 and other legal provisions as may be applicable.

• The Empowered Group shall review this Protocol after a period of 6 months from the date of this notification or may do so, at such earlier time as it deems fit.

Way Forward

• The government should keep refining both the product and the policy, with the understanding of the pandemic and the privacy dangers posed by such an app.

• The government can take a cue from countries like South Korea and Singapore, who have enacted privacy laws that have specific conditions for contact tracing apps developed to track the spread of the pandemic. E.g. In South Korea's Personal Information Protection Act (PIPA), individuals also have the Right to be Forgotten, among other data ownership rights.

12) PRIVATE SECTOR IN SPACE ACTIVITIES

Government, under Aatma Nirbhar Bharat Abhiyaan (SelfReliant India Mission), announced role for private sector in India's space programme, including in satellites, launches and space-based services. More on news Following announcements were made under Aatma Nirbhar Bharat Abhiyaan (Self-Reliant India Mission)

• Level playing field provided to private companies in satellites, launches and space-based services.

• Predictable policy and regulatory environment to private players.

• Private sector will be allowed to use ISRO facilities and other relevant assets to improve their capacities.

o Recently, ISRO opened up its facilities for private players, which includes helping a consortium of companies to build polar satellite launch vehicle.

• Future projects for planetary exploration, outer space travel etc. shall also be open for private sector.

• There will be liberal geo-spatial data policy for providing remote-sensing data to tech-entrepreneurs. Benefits of private sector in space activities

• Increasing Demand for satellites with need to launch 18-20 satellites every year. With existing ISRO manpower, it is difficult and private sector can play role here meeting global requirements too.

• Getting latest innovations and trends: Collaboration with private players is vital for capacity building, getting cutting-edge technology, latest innovations etc.

• Freeing up resources: A large chunk of ISRO's manpower is involved in manufacturing and launch vehicles, so active involvement of the private sector would allow ISRO to devote more time to core research, deep-space missions etc.

• Reducing dependence on taxpayer's money: Privatizing activities in space sector will allow economic contribution from private sector and will reduce dependence on funds from government.

• Job creation: Creation of new jobs in high-skilled-labour market in private space industry.

• Securing our space capabilities by distributing them across different satellites

and spacecraft, so that business continuity is unaffected even if an adversary manages to disable one or more satellites. This becomes increasingly important with concept of Space warfare.

• Meeting India-centric needs: Private-sector help is needed to cater rapidly changing technological scenarios and to contribute to digitalization.

Way forward

• Creating a separate Space Commerce body: that is independent of ISRO, for space-related activities or a dedicated road map within ISRO for commercial space in India.

• Promoting startups as they have potential of leapfrogging product/service offerings out of India and are scalable globally.

• ISRO providing mentorship allowing private sector to leverage technical expertise built by ISRO in an appropriate manner.

• Enactment of space legislations: To define regulatory, legal and procedural regimes with transparent timelines for pursuing space activities by private space industry.

o Draft Space Activities Bill, 2017 was proposed to promote and regulate space activities of India. It talked about participation of private sector agencies in space activities in India under guidance and authorization of Department of Space.

• Establishing Think-tank constituting distinguished experts in space field. It will provide key insights on space programme management, dual-use of technologies, space law, international space agreements, etc.

• Setting up industry-academia linkups for creating systemic changes in establishing a leading research environment.

Related News

• Recently, Indian Space Research Organisation (ISRO) identified set of 17 technologies and invited researchers to develop these locally at lower costs for its Gaganyaan mission.

o These included food and medicine for astronauts during space voyages, spacesuit, inflatable habitats and anti-radiation and thermal protection technologies etc

Concerns associated with private sector participation

• Security and strategic concerns as critical and sensitive information may fall into the wrong hands.

• It is a highly risky business involving negative returns and failures. Very few companies may have the appetite to bear the cost of such for failures.

Steps in this direction

• Steps by ISRO:

o ISRO has set up a Space Technology Park in Bengaluru where range of facilities has been set up for use by industry.

o In 2018, ISRO had signed a contract with three industries to build 27 satellites in three years.

• New Space India Limited was founded in 2019, by Department of Space to bridge gap between ISRO and private sector and facilitate transfer of ISRO technologies to industry.

13) What is ultraviolet germicidal radiation (UVGI)?

Scientists are studying the use of ultraviolet germicidal radiation (UVGI) to detect Coronavirus in schools, restaurants and other public places. Through this method, ultraviolet (UV) lights would be able to

disinfect contaminated public spaces to stop the transmission of the virus.

What is UV light?

UV light from the sun has shorter wavelengths than visible light and, therefore, is not visible to the naked eye. The full spectrum of UV radiation is sourced from the sun and can be subdivided into UV-A, UV-B and UV-C rays. In this spectrum, UV-C rays are the most harmful and are completely absorbed by the Earth's atmosphere.

How it affects human body?

• While both UV-A and UV-B rays are harmful, exposure to UV-B rays can cause DNA and cellular damage in living organisms.

• Increased exposure to it can cause cells to become carcinogenic, thereby increasing the risk of getting cancer.

So, how does UVGI work?

UVGI uses the "destructive properties" of UV light to target pathogens.

• UVGI replicates UV wavelengths that disinfects contaminated spaces, air and water.

• UVGI lamps can also be installed in the corners of a room and alternatively, can be installed in air ducts of ventilation systems or portable or fixed air cleaners.

14) What is Quantum entanglement?

Researchers from Kolkata have developed a novel protocol to find out whether a pair of electrons is in an entangled state so that they can be safely used as resources for facilitating quantum information processing tasks. The protocol has been developed through theoretical and experimental analysis.

What is the protocol?

The theoretical idea is based on applying the fine-grained uncertainty relation to perform quantum steering. The experiment uses an all-optical set-up in which entangled pairs of photons are created by laser light on Beta barium borate (BBO) crystals, a nonlinear optical crystal, used as laser crystal.

What is Quantum entanglement?

It is a quantum mechanical phenomenon in which the quantum states of two or more objects have to be described with reference to each other, even though the individual objects may be spatially separated. It is the physical phenomenon that occurs when a pair or group of particles is generated, interact, in a way such that the quantum state of each particle of the pair or group cannot be described independently of the state of the others.

Significance: Quantum entanglement is one of the peculiarities of quantum mechanics, which makes phenomena such as quantum teleportation and super-dense coding possible.

15) RT-LAMP based test for Coronavirus

CSIR-IIIM & Reliance Industries Limited (RIL) to develop RT-LAMP based test for Coronavirus.

What is Reverse Transcriptase-Loop Mediated Isothermal Amplification (RT-LAMP) test?

COVID-19 RT-LAMP test is a nucleic acid based test carried out from nasal/throat swab sample from patients.

Benefits:

• It is rapid (45-60 min), cost effective and accurate test.

• The advantage of this test is that the RT-LAMP based COVID-19 kit components are easily available and these can be completely manufactured in India.

Difference between RT- PCR and RT-LAMP:

While the current COVID-19 testing is done by real-time PCR their components are mostly imported. Further these tests are expensive; require highly trained manpower, costly instruments and a relatively high-end lab and cannot be deployed at remote locations in quarantine centers, airports and railway stations, etc. On the other hand, the RT-LAMP test can be done in a single tube with minimal expertise in a very basic lab setup like mobile units / kiosks for testing at Airports, Railway Stations, Bus Stands and other public places.

Significance: With the formal launch of the RT-LAMP based diagnostic test, the COVID-19 testing will not only be more rapid, cheap, easy and accessible but also would go a long way quickly isolating the infected individuals and mitigating the spread of virus.

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