You & Technology Feb-2020

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General Studies Paper-3 – S&T – February 2020

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1) Quantum Technology

The government in its Budget 2020 has announced the largest ever science mission- National Mission on Quantum Technologies & Applications (NM-QTA).

• Quantum technologies are rapidly developing globally with a huge disruptive potential that is likely to change entire paradigm of computation, communication and encryption. o Recently, a quantum computer built by Google, called Sycamore, took 200 seconds to perform a calculation that the world's fastest supercomputer, Summit, would have taken 10,000 years to accomplish.

• It is perceived that the countries who achieve an edge in this emerging field will have a greater advantage in garnering multi-fold economic growth and dominant leadership role.

• Countries like China and USA are already in a fierce race of achieving leadership position. o There were 492 quantum patents filed in China in 2018, more than the USA (248). o In 2018, US framed a law that earmarked $1.2 billion for quantum research.

About the mission

• Ministry: It will be implemented by the Department of Science & Technology (DST), Ministry of Science and Technology.

• Budget Outlay: It is proposed to provide an outlay of 8000 crore over a period five years.

• The areas of focus for the Mission will be in fundamental science, translation, technology development, human and infrastructural resource generation, innovation and start-ups to address issues concerning national priorities.

• Applications which will receive boost include those in aero-space engineering, numerical weather prediction, simulations, securing the communications & financial transactions, cyber security, advanced manufacturing, health, agriculture, education and other important sectors with focus on creation of high skilled jobs, human resources development, start-ups & entrepreneurship leading to technology lead economic growth.

Significance of the mission

• Support to advanced and interdisciplinary research projects in quantum technology through government's financial and organizational support. o India is the third largest when it comes to publishing papers, but it doesn't translate into creating actual products, thus the gap between research and product development needs to be reduced.

• Push to next generation transformative technologies: like quantum computers and computing, quantum communication, quantum key distribution, quantum encryption, crypt analysis, quantum devices, quantum sensing, quantum materials, quantum clock and so on.

• Putting India on the world's Quantum-map: A boost in Quantum computing will help India to come on par with the United States and China.

• Creation of innovative applications by industries: It will thereby stimulate economic growth and job creation, which will feed back into a growing quantum-based economy.

• Addressing India specific national and regional issues: Quantum technologies can be used to in sectors such as weather forecasting, artificial

intelligence, financial modelling, cyber security including securing the communications & financial transactions. For Example- o Quantum computers are extremely powerful compared to conventional computers when solving certain kinds of problems like finding prime factors of large numbers and searching large databases. The prime factorization quantum algorithm has important implications for security as it can be used to break RSA encryption, a popular method for secure communication.

About Quantum Technology

Quantum Technology is based on the principles of quantum theory which revolves around wave-particle duality of matter. Sub-atomic matters like electrons may act as wave and there is some uncertainty involved in determining characteristics like their speed or location. This uncertainty or probability (0 to 1) is used in quantum computing.

About Quantum Computing

An ordinary computer chip uses bits which hold information in the form of 0 (off) or 1 (on). Instead of bits, quantum computers use quantum bits or qubits. This helps it in following ways:

• **Superposition** (qubit can take values of 0 or 1 or range from 0 to 1): unlike normal computer which rules out wrong methods to find the right one, a quantum computer can go down every method at once. So, they even carry potential to crack today's encryption easily.

• **Entanglement**: although contested and not fully understood yet, it is kind of teleportation of information, where information at one side of wave function can be used to interpret at the other, even if they are physically separate.

2) National Technical Textiles Mission

The Cabinet Committee on Economic Affairs (CCEA) has approved the setting up of a National Technical Textiles Mission at an total outlay of ₹1,480 Crore. Aim: To position the country as a global leader in technical textiles and increase the use of technical textiles in the domestic market.

Key facts: The Mission will be implemented for four years from 2020-2021 and will have four components:

1. The first component will focus on research and development and innovation and will have an outlay of ₹1,000 crore. The research will be at both, fibre level and application-based in geo, agro, medical, sports and mobile textiles and development of bio-degradable technical textiles.
2. The second component will be for promotion and development of market for technical textiles. The Mission will aim at taking domestic market size to $40 billion to $50 billion by 2024.
3. The third component will focus on export promotion so that technical textile exports from the country reach from the ₹14,000 crore now to ₹20,000 crore by 2021-2022 and ensure 10% average growth every year till the Mission ends.
4. The last component will be on education, training and skill development.

What are technical textiles?

Technical textiles are defined as textile materials and products manufactured primarily for their technical performance and functional properties rather than aesthetic and decorative characteristics. Technical textiles include textiles for automotive applications, medical textiles, geotextiles, agrotextiles, and protective clothing.

3) National Science Day

28th February is celebrated as National Science Day (NSD) in India. NSD is celebrated to commemorate discovery of the 'Raman Effect', which led to Sir C.V. Raman winning the Noble

Prize. The first National Science Day was celebrated on February 28, 1987.

Theme: This year, the theme for National Science Day 2020 is "Women in Science", which aims to appreciate the contribution of women in the field of science.

What is Raman Effect?

A phenomenon in spectroscopy discovered by the eminent physicist Sir Chandrasekhara Venkata Raman in 1928. Raman Effect is a change in the wavelength of light that occurs when a light beam is deflected by molecules.

• When a beam of light traverses a dust-free, transparent sample of a chemical compound, a small fraction of the light emerges in directions other than that of the incident (incoming) beam.

• Most of this scattered light is of unchanged wavelength. A small part, however, has wavelengths different from that of the incident light; its presence is a result of the Raman Effect.

Raman's experiment:

The violet light of the solar spectrum is isolated with a violet filter and passed through the liquid sample. Most of the light emerging from the liquid sample is the same color as the incident violet beam: the so-called Rayleigh scattered light (the scattering of light by particles in a medium, without change in wavelength. It accounts, for example, for the blue colour of the sky, since blue light is scattered slightly more efficiently than red).

However, Raman, along with K S Krishnan was able to show that some of the scattered light was a different color, which they could isolate by using a green filter placed between the observer and the sample.

4) Genome India Project

Union government has given clearance to an ambitious gene mapping project known as the Genome India Project with an estimated worth of Rs 238 crores.

• The project has been cleared by Department of Biotechnology (under the Ministry of Science and Technology).

• It involves 20 leading institutions including the Indian Institute of Science in Bengaluru and a few IITs.

• The Centre for Brain Research, an autonomous institute of IISc, Bengaluru will serve as the nodal point of the project.

• The first stage of the project will look at samples of 10,000 persons from all over the country to form a grid that will enable the development of a Reference Genome.

About Genome mapping/sequencing

• A genome is the entire DNA, or sequence of genes, in a cell. Simply put, the genome is divided into chromosomes, chromosomes contain genes, and genes are made of DNA.

• Each genome has approximately 3.2 billion DNA base pairs.

• Sequencing a genome means deciphering the exact order of base pairs in an individual. The way these base pairs are arranged, or variations and mutations in their pattern, can provide clues about the individual's health or ill health, inherited or acquired.

Significance of the project

• Existing global genetic studies of the Human Genome Project are based mainly on Caucasian; urban middle class samples (95%), which are not considered representative of all humans.

• This project holds importance to ensure that India, with its unparalleled human diversity both horizontal (caused by migration and intermixing of races) and vertical (caused due to endogamy

resulting in specific patterns of trait inheritance), is adequately represented in terms of genomic data.

• The project will help India develop indigenous capacity to generate, maintain, analyze, utilize and communicate large-scale genome data, in a scalable manner.

Applications of the Project

• Predictive and Preventive Healthcare- The outcomes of the project will help in faster and efficient diagnosis of rare genetic diseases.

o This will also help in determining epidemiology of genetic diseases to enable cost effective genetic tests, enabling efficient diagnosis of heritable cancers etc.

• Precision medicine- This will help to understand the type and nature of diseases and traits that comprise the diverse Indian population. For example, Vysy community in Andhra Pradesh possess a genetic mutation that renders them susceptible to a category of anaesthetics. Genome sequencing can help to prepare customised and targeted treatments for them.

• Scientific research- Mapping the genetic diversity of India would further improve scientific understanding of evolution both from a biological (intra- and inter-species interaction, species-ecology interactions, etc) and sociological (migration patterns, rituals, etc) point of view.

Challenges

• Data storage and privacy- There are concerns regarding anonymity and misuse of genetic data without informed consent in the absence of data privacy law in place.

• Genetic stereotyping and stigmatization- There is the potential that some of these genomic differences may be treated as retarding and mutually exclusive. This leads to stereotyping of populations on lines similar to caste identities.

• Medical Ethics: The technology can be misused to create designer babies as was done recently by a Chinese scientist. Also burdening people with mutation information can lead them to make lifestyle changes that are not necessary in routine conditions .

• Interpretational issues- There are very few trained clinicians and genetic counsellors who could interpret the data in meaningful manner and in the best interest of the patient.

• Technological errors- Even a single base pair false positive error can create huge burden for the individual and community in terms of wrong diagnosis and unnecessary treatment. Conclusion Genome India project embraces scientific technology for the advancement of Indian healthcare, ushering India towards the new gold standard of Precision medicine. Policies that can enable the project to work optimally need to be framed to ensure its smooth and sustained functioning. Robust data privacy law and trained genetic clinicians can help take the healthcare system to the next level.

5) SCIENTIFIC UTILISATION THROUGH RESEARCH AUGMENTATIONPRIME PRODUCTS FROM INDIGENOUS COWS (SUTRA PIC)

The government has unveiled a programme SUTRA PIC to research on 'indigenous' cows.

• Finance Minister had announced research programmes into indigenous cattle in the 2016-17 as well as in the 2019-20 Union Budget.

• The stated objective was to develop products as well as improve the genetic quality of indigenous cattle breeds. **About SUTRA PIC**

• The program will involve participation of Research Institutions, Academics, Grassroots Organizations and so on to carry out R & D work,

technology development and capacity building at local level covering following five thematic areas:

o Uniqueness of Indigenous Cows: Major aim under this theme is the systematic scientific investigation of uniqueness of pure Indigenous Indian cows.

o Prime-products from Indigenous Cows for Medicine and Health: The research proposals under this theme should undertake detailed scientific investigation of chemical profiling, identification of bioactive principle responsible for enhancing activity of antibiotics and anticancer drugs, and other medicinal properties of Prime Products from indigenous cow from modern perspective.

o Prime-products from Indigenous Cows for Agricultural Applications: The project proposals under this theme will aim to perform scientific investigations of role of Prime Products from Indigenous cows on plant growth, soil health and providing immunity in plant system, their application as organic manure and bio-pesticide in agriculture, among others uses.

o Prime-products from Indigenous Cows for Food and Nutrition: The proposals under this theme will aim to perform scientific research on:

✓ Complete characterization of milk and milk products derived from Indian indigenous cows.

✓ Nutritional and therapeutic properties of curd and ghee prepared from indigenous breeds of cows by traditional methods

✓ Development of standards for traditionally processed dairy products of Indian origin cow

✓ Identification of Bio/Chemical markers to authenticate the quality of ghrita.

o Prime-products from indigenous cows-based utility items: Proposal under this theme aims to standardize effective, economic and eco-friendly preparations of Utility products from the Prime components of indigenous cows.

• To be funded by multiple scientific ministries, the initiative is led by the Department of Science and Technology (DST).

6) **Enhanced Access and Service Excellence (EASE 3.0)**

FM Nirmala Sitharaman launches Ease 3.0 for tech-enabled banking. This move is expected to change the customer's experience at the Public Sector Banks (PSBs).

What is it?

Ease (Enhanced Access and Service Excellence) 3.0 reform agenda aims at providing smart, tech-enabled public sector banking for aspiring India. New features that customers of public sector banks may experience under EASE 3.0 reforms agenda include facilities like:

1. Palm Banking for "End-to-end digital delivery of financial service".
2. "Banking on Go" via EASE banking outlets at frequently visited spots like malls, stations, complexes, and campuses.

The idea behind EASE 3.0 agenda: The Ministry has the idea of establishing paperless and digitally-enabled banking at places where people visit the most. The government aims to focus on digitalization in the Public Sector Banks (PSBs) among themes that include responsible banking, PSBs as Udyami Mitra, customer responsiveness, credit take-off, and deep financial inclusions.

Background: PSB Reforms EASE Agenda is a common reform agenda for PSBs aimed at institutionalizing clean and smart banking. It was launched in January 2018, and the subsequent edition of the program — EASE 2.0 built on the foundation laid in EASE 1.0 and furthered the progress on reforms.

In EASE 2.0, the government had proposed pushing liquidity in the public sector banks, reconstituting the management committee and possible mergers among the ideal partners in the Indian banking sector.

7) Station WiFi Programme

Five years after it started the 'Station' programme to bring free public Wi-Fi to 400 busiest railway stations in India, Google has decided to gradually wind down the service globally.

• However, users in India will be able to continue using the existing facilities at the over 400 stations via RailTel, Google's partner in India for the programme.

Why?

• Google believes that better data plans and improving mobile connectivity have made it "simpler and cheaper" for users to get online.

• India, specifically now has among the cheapest mobile data per GB in the world, with mobile data prices having reduced by 95% in the last 5 years, as per TRAI in 2019. Today, Indian users consume close to 10 GB of data, each month, on average.

• Besides the Indian government's continuous impetus for internet penetration through the Digital India programme, private sector initiatives such as Vodafone's SuperWi-fi coupled with the entry of Reliance Jio 4G services have drastically brought down the cost of internet subscription. This has been instrumental to the growth of internet users in India.

• Above all, the challenge of varying technical requirements and infrastructure among partners across countries has also made it difficult for Station to scale and be sustainable.

Background:

• The programme was kick-started in India in 2015 as a partnership between Google, Indian Railways and RailTel to bring fast, free public WiFi to over 400 of the busiest railway stations by mid-2020.

• However, the company crossed that number by June 2018, following which more locations were added across the country in partnership with telecommunication companies, ISPs and local authorities.

8) Reverse osmosis (RO)

Recently, the Union Ministry of Environment, Forest and Climate Change (MoEFCC) has issued a draft notification that seeks to ban membrane-based water purification systems (MWPS), primarily reverse osmosis (RO), in areas where the water supplied meets norms.

• The National Green Tribunal (NGT) in May, 2019, instructed theMoEFCC to notify prohibiting the use of drinking water prepared through RO systems in areas where the amount of total dissolved solids (TDS) was less than 500 milligram/litre (mg/l).

o Ban was ordered on the grounds that RO wasted water and that, in the process of removing salts, they often deprived drinking water of essential salts.

• It also asked the ministry to lay down a requirement for RO systems manufacturers that the recovery of treated water should be at least 60 per cent as against 20 per cent prescribed by the Bureau of Industry Standards (BIS) in 2015. Gradually, the recovery rate should be enhanced to 75 per cent.

Concerns Related to RO systems in India

• Demineralisation of Water after RO: It leads to loss of precious minerals like Calcium and Magnesium which causes issues such as- o Soft

water (i.e., water low in calcium and magnesium) is associated with increased morbidity and mortality from cardiovascular disease (CVD) compared to hard water. o When used for cooking, soft water was found to cause substantial losses of all essential elements from food (vegetables, meat, cereals). Such losses may reach up to 60 % for magnesium and calcium or even more for some other microelements.

• Limitations in removing other toxic impurities: The RO technology is limited to the removal of excess TDS and doesn't work in cleaning other impurities or metals in water.

• Wastage of water: Present RO systems recover only 20 per cent of water while 80 per cent go waste.

• Misleading advertisements by RO manufacturers: Certain manufacturers in India make incorrect claims about water having high arsenic and fluoride contamination being treatable by RO technology. Provisions of the draft notification

• Prohibition of MWPS in BIS compliant water supply areas at the Point of Use or at the Point of Entry for purification.

• MWPS installed by commercial or industrial purpose shall operate within the provision of The Water (Prevention and Control of Water Pollution) Act, 1974.

• Central Pollution Control Board to be the Nodal Agency for implementing the rules.

• Specifications for MWPS: All systems must provide online and real time flow and TDS measurement, with data logger at inlet and outlet of water purifier.

• Increasing Recovery efficiency (R.E.) of permeates in MWPS: o For Domestic Category: R.E. should be greater than 60 per cent (to be enhanced to 75 per cent in the future). o For Commercial Category: R.E. should be greater than 80 per cent (to be enhanced to 90 per cent in the future). o For Industrial Category: R.E. should be greater than 85 per cent (to be enhanced to 90 per cent in the future).

Reverse Osmosis

Osmosis is the movement of water that occurs when two compartments are separated by a semi-permeable membrane whereby water moves from an area of low solute concentration to an area of high solute concentration. Reverse osmosis (RO) is a process by which pressure is used to force water through a tight membrane that blocks passage of solute, particulate matter, bacteria, and endotoxins, among other things, to produce pure water.

Benefits of RO

• Safer drinking water: As it removes salt, contaminated particles and other impurities in the water.

• Better taste: Due to removal of chemicals and debris in the water.

• Relatively low energy usage.

Total Dissolved Solids (TDS)

• Dissolved solids refer to any minerals, salts, metals, cations or anions dissolved in water.

• TDS comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates) and some small amounts of organic matter that are dissolved in water.

• As per a WHO study, TDS levels below 300 mg per litre are considered to be excellent, while 900 mg per litre is said to be poor and above 1200 mg is unacceptable.

Bureau of Indian Standards (BIS) guidelines on drinking water

• It prescribes standards for drinking water based on certain organoleptic, physical, virological,

bacteriological and biological parameters such as TDS, pesticide residues limit, limits concerning toxic substances etc.

• According to BIS standards, drinking water is considered below par if the TDS is above 500 mg/l.

• BIS standards also state that RO system is not recommended for treatment of raw water having Arsenic level above 0.1 mg/l and Fluoride level above 8.0 mg/l.

Contentious issue

The draft notification only mentions BIS-compliance which gives rise to several concerns:

• BIS-compliance depends on several parameters, not just TDS. o Thus household receiving water with acceptable TDS levels (below 500 mg/l) but with other elements (eg, nitrates, sulphates, fluorides, etc) above the acceptable limit of BIS, will still not comply with the specification. The household, however, would not require an RO system to treat it as TDS was already within limits and RO systems are ineffective in treating other impurities.

• The BIS does not have any minimum limit for TDS in treated water: Thus the issue of demineralisation of water after RO, which adversely affects the health of consumers, has not been addressed.

9) MEDICAL DEVICES AS 'DRUGS'

Recently, the Union Ministry of Health has notified that starting from April 1, 2020, all medical equipment would qualify as "drugs" under the Drugs and Cosmetics Act, 1940.

• As per the new notification, all devices, including instruments and implants, whether used alone or in combination for various purposes like diagnosis, prevention, monitoring, among others, will be regulated under the legislation.

• Medical equipment under this definition include implantable medical devices such as knee implants, CT scan, MRI equipment, defibrillators, dialysis machine, PET equipment, X-ray machine etc.

• The manufacture, import and sale of all medical devices will now need to be certified by the Central Drugs Standard Control Organisation.

Positive Implications

• It will help government to regulate the high prices of essential medical devices.

• It will nudge Indian companies to ensure that all medical devices meet certain standards of quality and efficacy, given that India imports more than 75% of its medical devices.

• It will make medical device companies accountable for quality and safety of their products.

• It will lead to recruiting competent resources that cater to the additional workload that these new regulations will bring in.

• It will also provide an additional assurance of safety to the customers. Further, these rules could be changed now as per the evolving technologies and needs of people.

Negative Implications

• The local micro and small scale device manufacturers will have to comply with standards and procedures considered too costly for them.

o The Association of Indian Medical Device Industry has stated that most small manufacturers would find it t ough to comply with and to have qualified regulatory staff to meet the Medical Device and Diagnostic Rules (MDR).

o E.g. a small manufacturer of masks or neck bracing collars would find it difficult to hire a qualified QMS manager with biomedical engineering.

• Against the expectations of the domestic medical device industry to have a separate law (to regulate medical devices), the government has come up with the current rule that defines such devices as "drugs" and brings it under the purview of Drugs and Cosmetics Act for regulatory approval.

o Any non-conformity under Drugs and Cosmetics Act can be treated as a criminal offence by a drug inspector at his discretion and taken before a court without any risk proportionate penalties.

• Wide definition of Medical devices: It has been estimated that by virtue of these notifications, approximately 1700 medical devices would become regulated in India. The notified definition for medical devices is very wide and subjective and is aimed at including all medical devices being sold in the Indian market.

Way forward

Government should hold multi-stakeholder consultations so that rationale behind this initiative can be communicated and those expressing concerns are appropriately heard. Government should consider expediting the finalisation of the Medical Devices Bill for better regulation of the Medical Devices.

Central Drugs Standard Control Organisation (CDSCO)

• CDSCO under Directorate General of Health Services, Ministry of Health & Family Welfare is the National Regulatory Authority of India.

• Its headquarter is located at New Delhi.

• Under the Drugs and Cosmetics Act, CDSCO is responsible for approval of Drugs, Conduct of Clinical Trials, laying down the standards for Drugs, control over the quality of imported Drugs and coordination of the activities of State Drug Control Organizations.

• CDSCO along with state regulators, is jointly responsible for grant of licenses of certain specialized categories of critical Drugs such as blood and blood products, I. V. Fluids, Vaccine and Sera.

Related news

• Health Ministry also released Medical Devices Amendment Rules, 2020, by amending the Medical Devices Rules, 2017 for mandatory registration of medical devices.

• Medical devices shall be registered with Central Licensing Authority through an identified online portal established by CDSCO.

• The registration will remain voluntary for 18 months. NITI Aayog, Health Ministry reach consensus on Medical Devices Bill being drafted

• Consensus was reached over various provisions of Medical Devices (Safety, Effectiveness and Innovation) Bill, 2019. Bill is being drafted for Cabinet approval.

• So far finalised draft of Bill proposes that medical devices should be regulated by a separate division under Central Drugs Standard Control Organisation (CDSCO). o Division will be headed by a technical expert, and there will be no separate regulator, as conceptualized by NITI Aayog earlier.

• Draft also proposes regulation of devices will be under a separate Act and not under Drugs and Cosmetics Act, 1940, as was being pushed by Health Ministry.

10) Vaccine to control classical swine fever

The Indian Institute of Veterinary Research (IVRI) of the Indian Council of Agricultural Research (ICAR) has developed a new vaccine to control classical swine fever.

About the vaccine and it's significance:

It is a live attenuated CSF cell culture vaccine (indigenous strain). The indigenously developed vaccine will help in saving rabbits as the currently used vaccine (lapinized CSF vaccine) is produced by sacrificing large numbers of rabbits. Besides, the new vaccine gives immunity for two years as compared to 3 to 6 months protection under the currently used vaccines. The new vaccine will be a part of the government's One Health Initiative.

What is Classical Swine Fever (CSF)?

Hog Cholera or Classical swine fever (CSF) is a contagious viral disease of domestic and wild swine. It happens due to the viruses that bring viral diarrhea in pigs and ailments in sheep. The disease does not harm humans but all-important precautions are advised to follow.

Concerns for India:

• Classical Swine Fever (CSF) is one of the biggest pigs' diseases in India. It causes a loss of about 400 crores of rupees per year in India. This has led to a decrease in the population of pigs in 2019.

• India currently requires 22 million doses of the CSF (Classical Swine Fever) vaccine every year. However, currently, only 1.2 million doses are being produced. The reason behind its less production is that only 50 doses can be prepared from the spleen of a rabbit.

11) INTERNATIONAL INTELLECTUAL PROPERTY (IP) INDEX

Recently International Intellectual Property Index 2020 was released by US Chamber of Commerce's Global Innovation Policy Centre (GIPC).

• India's ranked 40th among 53 countries, while in 2019 India was ranked at 36th position out of 50 countries.

• However, India's score increased from 36.04 per cent in 2019 to 38.46 per cent in 2020, a 2.42 per cent jump in an absolute score.

• The US, the UK, Sweden, France and Germany remained the top five economies on the index.

Other observations by GIPC with respect to India

• Since the National IPR Policy 2016, the Government of India has made effort to support investments in innovation and increasingly robust IP protection and enforcement.

• The policy has improved the speed of processing for patent and trademark applications, increased awareness of IP rights among Indian innovators and creators.

• However, it noted that "job is not yet done" on establishing stronger IP protections.

• India needs to do more in the field of patent enforcement, compulsory licensing, regulatory data protection, transparency in reporting seizures by customs, signing Singapore Treaty on Law of Trade Marks and Patent Law Treaty.

Background:

• The Patent Law Treaty (PLT) was adopted in 2000 with the aim of harmonizing and streamlining formal procedures with respect to national and regional patent applications and patents and making such procedures more user friendly.

• Singapore Treaty on the Law of Trademarks aims to create a modern and dynamic international framework for the harmonization of administrative trademark registration procedures.

• India is not a signatory to both the treaties.

National IPR Policy 2016

National IPR Policy is a vision document that aims to create and exploit synergies between all forms of intellectual property (IP), concerned statutes and agencies.

Seven objectives of IPR Policy

• IPR Awareness: To create public awareness about the economic, social and cultural benefits of IPRs.
• Generation of IPRs: To stimulate the generation of IPRs.
• Legal and Legislative Framework: To have strong and effective IPR laws, which balance the interests of owners with larger public interest.
• Administration and Management: To modernise and strengthen service oriented IPR administration
• Commercialization of IPRs: Get value for IPRs through commercialization.
• Enforcement and Adjudication: To strengthen the enforcement and adjudicatory mechanisms for combating IPR infringements.
• Human Capital Development: To strengthen and expand human resources, institutions and capacities for teaching, training, research and skill building in IPRs.

12) NASA's Voyager 2 spacecraft

Recently, the NASA fixed a glitch in its Voyager-2 probe.

• Voyager 2 is now 11.5 billion miles from the Earth and, at that distance, light takes 17 hours to r each it or for messages from it to reach mission control on Earth.

About Voyager 2

• The two-spacecraft Voyager-1 and Voyager-2 missions, were designed to replace original plans for a "Grand Tour" of the planets that would have used four highly complex spacecraft to explore the five outer planets during the late 1970s.
• Like Voyager 1, Voyager 2 also was designed to find and study the edge of our solar system.
• Voyager gets its power from a radioisotope thermoelectric generator (RTG) which turns heat from the decay of a radioactive material into electricity.
o Because of the way it uses the decay of the material, the power budget for the craft drops by about four watts per year.
• It is the only spacecraft to study all four of the solar system's giant planets- Jupiter, Saturn, Uranus and Neptune at close range.
o It officially entered 'interstellar space' in November 2018. It joined its twin—Voyager 1—as the only human-made objects to enter the space between the stars.
✓ This space between the stars, is dominated by the plasma that was ejected by the death of nearby giant stars millions of years ago.
o The sun sends out a constant flow of charged particles called the solar wind, which ultimately travels past all the planets to some three times the distance to Pluto before being impeded by the interstellar medium.
o This forms a giant bubble around the sun and its planets, known as the heliosphere.
• It was the first human-made object to fly past Uranus in 1986 and Neptune in 1989, making it the only spacecraft to have had a close look of the icy planets.

13) Muktoshri- arsenic-resistant rice

West Bengal government's rice research centre has come up with a new variety of rice called Muktoshri that can be grown in arsenic prone areas. It was developed jointly by the Rice Research Station at Chinsurah, coming under West Bengal's Agriculture Department and the National Botanical Research Institute, Lucknow.

Background: West Bengal has a high concentration of arsenic in groundwater, with 83 blocks across seven districts having higher arsenic levels than permissible limits.

Arsenic- Key facts: Arsenic is naturally present at high levels in the groundwater of a number of

countries. It is also present in rocks and soils. Arsenic is highly toxic in its inorganic form.

Permissible limit: World Health Organization's provisional guideline value for arsenic in drinking water is 0.01 mg/l (10 µg/l). The permissible limit of arsenic in India in the absence of an alternative source is 0.05 mg/l (50 µg/l).

Harmful effects:

• Contaminated water used for drinking, food preparation and irrigation of food crops poses the greatest threat to public health from arsenic.

• Long-term exposure to arsenic from drinking-water and food can cause cancer and skin lesions.

• It has also been associated with cardiovascular disease and diabetes.

• In utero and early childhood exposure has been linked to negative impacts on cognitive development and increased deaths in young adults.

What's the difference between organic arsenic and inorganic arsenic?

Atoms of arsenic bond with other elements to form molecules — if carbon is one of these elements, then the arsenic compound is an organic compound. If there is no carbon present, then the arsenic compound is in an inorganic compound. Inorganic arsenic is a known human carcinogen — it is this form of arsenic that is linked with increased risks of cancer and other health effects.

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You & Technology Feb-2020

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All the Best to all my Economics students…
Hope this material will help you.
God bless...JAI Hind

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All the Best
Jai Hind ☺