You & Technology Nov-2019

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General Studies Paper-3 – S&T – November 2019

1) FASTags

Government extends deadline for mandatory FASTags to December 15

Implications: The objective is to remove bottlenecks and capture all toll electronically. All 560-odd plazas under the control of the National Highways Authority of India (NHAI) will collect toll without human intervention, and vehicles need not stop to pay toll.

How does FASTag work?

The device employs Radio Frequency Identification (RFID) technology for payments directly from the prepaid or savings account linked to it. It is affixed on the windscreen, so the vehicle can drive through plazas without stopping. It is valid for five years, and can be recharged as and when required. The payment method is a part of the National Electronic Toll Collection (NETC) programme. The National Payments Corporation of India (NPCI) collects the payments.

Why do we need this scheme?

• According to the National Highways Authority of India (NHAI), these devices will make passing through tolls considerably smoother since drivers will no longer have to carry cash or stop to make a transaction.

• Cameras at toll booths will take photos of passengers in a vehicle, which will be useful for the Ministry of Home Affairs as there will be a record of a vehicle's movement.

2) Coalbed Methane (CBM)

Ministry of Coal has asked the state-run coal miner Coal India Limited (CIL) to produce 2 MMSCB (million metric standard cubic metres) per day of coalbed methane (CBM) gas in the next

• India has the fifth-largest coal reserves in the world, and CBM has been looked at as a clean alternative fuel with significant prospects.

• India's CBM resources are estimated at around 92 trillion cubic feet (TCF), or 2,600 billion cubic metres (BCM).

• The country's coal and CBM reserves are found in 12 states of India, with the Gondwana sediments of eastern India holding the bulk.

• The Damodar Koel valley and Son valley are prospective areas for CBM development.

What is coalbed methane (CBM)?

It is an unconventional form of natural gas found in coal deposits or coal seams. CMB is formed during the process of coalification, the transformation of plant material into coal.

CBM can be used

1. In Power generation.
2. As Compressed natural gas (CNG) auto fuel.
3. As feedstock for fertilisers.
4. Industrial uses such as in cement production, rolling mills, steel plants, and for methanol production.

Challenges and concerns:

1. Methane is a greenhouse gas emitted through CBM extraction. Global methane emissions from coal mines are projected to account for approximately 8 percent of total global methane emissions.
2. Disturbance of lands drilled and its effect on wildlife habitats results in ecosystem damage.
3. CBM production behavior is complex and difficult to predict in the early stages of recovery.
4. Another concern is the effect water discharges from CBM development could potentially have on downstream water sources.

5. Disposal of the highly salinized water that must be removed in order to release the methane creates a challenge, as its introduction into freshwater ecosystems could have adverse effects.

3) Reverse Osmosis (RO)

The Supreme Court has refused to stay the May 2019 order of the National Green Tribunal (NGT) that banned the use of reverse osmosis (RO) systems where drinking water supply had total dissolved solids (TDS) less than 500 mg per litre.

What is the issue?

In May, the National Green Tribunal (NGT) asked MoEF to frame rules for the use of RO filters and also banned the use of RO purifiers in locations where TDS was low. According to NGT, RO purifiers lead to the wastage of almost 70-80 percent water during the purification process. It had asked the RO manufacturers to ensure that they are able to recover about 75 percent of the water. Following this, the Water Quality India Association moved the SC to seek a stay on the RO ban. However, the apex court refused to give a stay.

Osmosis and RO:

Osmosis involves 'a solvent (such as water) naturally moving from an area of low solute concentration, through a membrane, to an area of high solute concentration. A reverse osmosis system applies an external pressure to reverse the natural flow of solvent and so seawater or brackish water is pressurised against one surface of the membrane, causing salt-depleted water to move across the membrane, releasing clean water from the low-pressure side'.

What are the problems with RO plants?

Deposition of brine (highly concentrated salt water) along the shores. Affects fauna and flora: Hyper salinity along the shore affects plankton, which is the main food for several of these fish species. The high pressure motors needed to draw in the seawater end up sucking in small fish and life forms, thereby crushing and killing them — again a loss of marine resource. Construction of the RO plants required troves of groundwater. Freshwater that was sucked out and is replaced by salt water, rendering it unfit for the residents around the desalination plants. Cost and time: On an average, it costs about ₹900 crore to build a 100 MLD-plant and, as the Chennai experience has shown, about five years for a plant to be set up.

Energy needed: To remove the salt required, there has to be a source of electricity, either a power plant or a diesel or battery source. Estimates have put this at about 4 units of electricity per 1,000 litres of water. It is estimated that it cost ₹3 to produce 100 litres of potable water.

Is RO water healthy?

There are concerns that desalinated the RO water may be short of vital minerals such as calcium, magnesium, zinc, sodium, potassium and carbonates. Most RO plants put the water through a 'post-treatment' process whereby salts are added to make TDS around 300 mg/l.

Are there technological alternatives?

Low-temperature thermal desalination (LTTD) technique works on the principle that water in the ocean 1,000 or 2,000 feet below is about 4º C to 8º C colder than surface water. So, salty surface water is collected in a tank and subject to high pressure (via an external power source). This pressured water vapourises and this is trapped in tubes or a chamber. Cold water plumbed from the ocean depths is passed over these tubes and the vapour condenses into fresh water and the resulting salt diverted away.

Ocean Thermal Energy Conversion: It will draw power from the vapour generated as a part of the desalination process. This vapour will run a turbine and thereby will be independent of an external power source. While great in theory, there is no guarantee it will work commercially. For one, this ocean-based plant requires a pipe that needs to travel 50 kilometres underground in the sea before it reaches the mainland.

4) TRADITIONAL MEDICINE

Recently, Ministry of AYUSH hosted World Health Organization meeting on developing Standardized Terminologies and Benchmarks documents for Practice for Traditional Medicine.

• WHO is developing Benchmarks Document for Practice of Ayurveda, Panchakarma & Unani and International Terminologies Documents in Ayurveda, Siddha & Unani.

• Development of these benchmarks documents is included in the Project Collaboration Agreement (PCA) signed between World Health Organization (WHO) and Ministry of AYUSH on Cooperation in the field of Traditional and Complementary Medicine under WHO Traditional Medicine Strategy 2014-2023.

What is Traditional Medicine?

• Traditional medicine describes a group of health care practices and products with a long history of use.

• It frequently refers to medical knowledge developed by indigenous cultures that incorporates plant, animal and mineral-based medicines, spiritual therapies and manual techniques designed to treat illness or maintain wellbeing.

• Major traditional medicines in India include: Ayurveda, Yoga, Siddha, Unani, Sowa-Rigpa, Naturopathy etc.

Benefits of Traditional Medicine

• Addresses gaps in health services: Traditional medicine therapies are generally available and commonly used in low- and middle-income countries.

o According to data provided to WHO, in India 70 percent of the population depends on Traditional Medicine for primary health care.

o Traditional medicines provide low cost services and are perceived to have lower side effects.

• Treatment of major disease: World Health Organisation has acknowledged that traditional medicine and its practitioners play an important role in treating chronic illnesses, and improving the quality of life of those suffering from certain incurable diseases.

• Holistic approach to treatment: In Ayurveda, a human being is seen as a combination of body, mind, soul and senses. So, in order to treat any illness, the system takes all four into account and treats the patient more holistically.

• New drug development: Traditional knowledge can provide valuable guidance in selecting and obtaining plant material of potential therapeutic interest.

o Traditional medicines are the source of some modern antimalarial drugs.

Issues with Traditional Medicine

• Unregulated: Traditional Medicine products are unregulated in many countries, and therefore many of the concerns about the risks for consumers relate to the safety and quality of medicinal products. o Reported problems include sales of incorrect plant species and the contamination and adulteration of Traditional medication therapies.

• Untrained practitioners: WHO notes that "inappropriate use of traditional medicines or practices can have negative or dangerous effects".

• Lack of financial support: Traditional Medicine often lacks required financial support for the development and conservation of traditional knowledge.

• Lack of human resources: Practitioners are moving away from traditional system for better opportunities.

Way forward

• Promotion of Traditional Medicine: The knowledge of traditional medicine, treatments and practices should be respected, preserved, promoted and communicated widely and appropriately based on the circumstances in each country.

• Improve regulatory framework: Governments have a responsibility for the health of their people and should formulate national policies, regulations, and standards as part of comprehensive national health systems to ensure appropriate, safe and effective use of traditional medicine.

• Training and qualified practice for practitioners: Governments should establish systems for the qualification, accreditation or licensing of traditional medicine practitioners. Traditional medicine practitioners should upgrade their knowledge and skills based on national requirements.

• Collaboration between conventional and traditional medicine providers: Since consumers often use both treatments simultaneously, it is necessary to improve collaboration between registered/licensed traditional practitioners and conventional health care providers.

WHO Traditional Medicine Strategy 2014-2023

The strategy has two key goals:

• To support Member States in harnessing the potential contribution of Traditional Medicine to health, wellness and people centered health care

• To promote the safe and effective use of Traditional Medicine through the regulation of products, practices and practitioners.

These goals will be reached by implementing three strategic objectives:

• Building the knowledge base and formulating national policies;

• Strengthening safety, quality and effectiveness through regulation; and,

• Promoting universal health coverage by integrating Traditional Medicine services and self-health care into national health systems.

5) TYPHOID CONJUGATE VACCINE

Pakistan became the first country in the world to introduce World Health Organisation-recommended typhoid conjugate vaccine (TCV).

• Pakistan introduced TCV called Typbar TCV in its national immunisation program against extensively drug-resistant (XDR) typhoid outbreak.

• Typbar TCV is being administered in Pakistan with funding support from the Global Alliance for Vaccine Initiative (GAVI).

• Typbar TCV is manufactured by India based company, Bharat Biotech. It became the world's first conjugate vaccine prequalified by the WHO.

Global Alliance for Vaccine Initiative (GAVI)

• GAVI is a global health partnership of public and private sector organizations dedicated to "immunisation for all". • It is backed by several global organisation, including the Bill & Melinda Gates Foundation, the WHO, the World Bank and the UNICEF, which arranges bulk buys to lower vaccine costs for poor countries.

Conjugate Vaccines

• Vaccines are used to prevent diseases by invoking an immune response to an antigen (the foreign part of a bacteria or virus that the immune system recognizes).
• This is usually accomplished with an attenuated or dead version of a bacteria or virus in the vaccine, so that the immune system can recognize the antigen later in life. Many vaccines contain a single antigen that the body will recognize.
• However, the antigen of some bacteria does not elicit a strong response from the immune system, so a vaccination against this weak antigen would not protect the person later in life.
• Conjugate vaccines combine this weak antigen with a strong antigen as a carrier so that the immune system has a stronger response to the weak antigen.

6) SPACE-BASED INTERNET

American company SpaceX recently sent 60 small satellites (under 500 kg each) into Low Earth Orbit (LEO). This project, named Starlink network, seeks to build a 42,000-strong constellation aiming to supply non-stop, lowcost Internet everywhere on Earth.

Benefits of space internet

• Better accessibility- Traditional ways to deliver the Internet like fibre-optic cables or wireless networks cannot take it in remote areas or difficult terrains.
• More affordability- because of economies of scale and near zero investment on costly ground physical infrastructure.
• Availability- 24*7 availability of internet without any interruption.
• Internet of Things (IoT) technology is likely to be revolutionised. For ex. services such as autonomous car driving will become seamless.

Concerns

• Increased risk of collisions leading to more space debris.
• Increased light-pollution i.e. light reflected from these man-made satellites can interfere with and be mistaken for light coming from other heavenly bodies.
• Can obstruct the line of sight to observe other space objects and to detect their signals.

7) Atal Tinkering Labs

Atal Tinkering Lab Marathon is being organised by the Atal Tinkering Labs of Atal Innovation Mission (AIM) and the NITI Aayog in an effort to identify India's best student innovators.

• It is a six-month-long nationwide challenge across six different thematic areas, namely, clean energy, water resources, waste management, healthcare, smart mobility and agriculture-tech.
• This is open to all students under the age of 18 years.
• Students of top 30 innovations will be trained on business and entrepreneurship skills, including intellectual property, effective communication, making an elevator pitch, etc.

What are ATLs?

With a vision to 'Cultivate one Million children in India as Neoteric Innovators', Atal Innovation Mission is establishing Atal Tinkering Laboratories (ATLs) in schools across India.

Objective: The objective of this scheme is to foster curiosity, creativity and imagination in young minds; and inculcate skills such as design mindset, computational thinking, adaptive learning, physical computing etc.

Financial Support: AIM will provide grant-in-aid that includes a one-time establishment cost of Rs. 10 lakh and operational expenses of Rs. 10 lakh for a maximum period of 5 years to each ATL.

Eligibility: Schools (minimum Grade VI – X) managed by Government, local body or private trusts/society can set up ATL.

Significance of ATLs:

• Atal Tinkering Labs have evolved as epicentres for imparting these 'skills of the future' through practical applications based on self-learning.

• Bridging a crucial social divide, Atal Tinkering Labs provide equal opportunity to all children across the spectrum by working at the grassroot level, introducing children to the world of innovation and tinkering.

8) GEOCHEMICAL BASELINE ATLAS OF INDIA

For the first time, 'Geochemical Baseline Atlas of India' developed by CSIR-National Geophysical Research Institute (NGRI) for use by policy makers to assess environmental damage was released.

• The atlas consists of 45 maps of metals, oxides and elements present in top and bottom soils across India.

• The map trace elements from top soil i.e. top 25 cm depth and bottom soil at 100 cm depth from the year 2006 to 2011.

• The geochemical data presented in these maps will be a part of the Global Map to be prepared by the International Union of Geological Sciences (IUGC).

• It will serve as a reference against which future generations of the country would be able to assess the chemical compositional changes on Earth's surface. o Both human activities and natural processes are continuously modifying the chemical composition of our environment. These maps will form the backbone for environment management. o It will help in finding out future contaminations due to industries across the country. Government and policymakers can leverage it in planning the land use accordingly."

• This is the third map among the series of maps published by NGRI. Earlier, The Gravity map of India and Seismic map of India were released.

9) ULTIMA-THULE RENAMED AS ARROKOTH

The International Astronomical Union and Minor Planets Center, the global body for naming Kuiper Belt objects, has officially named the New Horizons Kuiper Belt Flyby Object as 'Arrokoth'.

• Arrokoth is one of the thousands of known small icy worlds in the Kuiper Belt, the vast "third zone" of the solar system beyond the inner terrestrial planets and the outer gas giant planets.

• Data from the newly named Arrokoth, has given clues about the formation of planets and our cosmic origins.

• It was discovered in 2014 by a New Horizons team using the powerful Hubble Space Telescope.

• NASA launched the New Horizons mission in January 2006. After crossing by Pluto in 2015, in January 2019 it flew by Arrokoth which was then provisionally named as Ultima Thule. This remains the farthest flyby ever conducted.

• Arrokoth is a Native American term meaning "sky" in the Powhatan/Algonquian language.

10) Kerala Fibre Optic Network Project

The Kerala Cabinet has approved a Rs 1,548-crore fiber-optic network project. To be completed by December 2020, the project seeks to fulfil the government's aim of making internet access a 'citizen's right'.

About the fiber- optic network project:

• Objective: To provide free high-speed internet connection to around 2 million families in the state.

• Aims to provide free high-speed internet to over 20 lakh below poverty line (BPL) households.
• It is a collaborative initiative of the state's power utility Kerala State Electricity Board and Kerala State IT Infrastructure Ltd.
• Internet service providers and cable television operators can also join the optic-fibre network project to provide their services.
• As many as 30,000 government offices and schools would be linked through the high-speed network, said the state government.

Significance:

The project is expected to help the country's IT industry and open major opportunities in the fields of artificial intelligence, blockchain, and startups. It is also expected to help in better management of the transport sector.

11) BHIM UPI goes International

BHIM app has gone international with a pilot demo of BHIM UPI QR- based payments beginning at the ongoing Singapore FinTech Festival 2019.
• This QR code-based system would allow anyone with a BHIM app to scan the SGQR at NETS terminals for payments in Singapore.
• The project is being jointly developed by NPCI and NETS of Singapore. It is targeted to go live by Feb 2020.

What is BHIM?

Bharat Interface for Money (BHIM) is a UPI based payment interface.
• Developed by National Payments Corporation of India (NPCI).
• Allows real time fund transfer.
• Launched in December, 2016.

What is UPI?

Unified Payments Interface (UPI) is a system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood. It also caters to the "Peer to Peer" collect request which can be scheduled and paid as per requirement and convenience. Each Bank provides its own UPI App for Android, Windows and iOS mobile platform(s).

Why UPI is outperforming e- wallets?

People are changing the way they transact, choosing bank-to-bank methods such as the Unified Payments Interface (UPI) over other instruments such as e-wallets. This is because UPI is completely interoperable and as such, it is unique in the world, where you have an interoperable system on the 'send' and 'receive' side. The rapid growth of UPI is accompanied by a reasonably strong growth in the value of transactions done using ewallets, but the latter's growth has not taken off much following the fillip it received in the aftermath of demonetisation in November 2016.

The BHIM apps has three levels of authentication:

1. For one, the app binds with a device's ID and mobile number.
2. Second a user needs to sync whichever bank account (UPI or non-UPI enabled) in order to the conduct transaction.
3. Third, when a user sets up the app they are asked to create a pin which is needed to log into the app. The UPI pin, which a user creates with their bank account is needed to go through with the transaction.

UPI – Benefits to the Ecosystem participants:

Benefits for banks:

1. Universal Application for transaction.
2. Leveraging existing infrastructure.
3. Safer, Secured and Innovative.

4. Payment basis Single/ Unique Identifier.
5. Enable seamless merchant transactions.

Benefits for end Customers:

• Round the clock availability.
• Single Application for accessing different bank accounts.
• Use of Virtual ID is more secure, no credential sharing.
• Single click authentication.
• Raise Complaint from Mobile App directly.

Benefits for Merchants:

• Seamless fund collection from customers – single identifiers.
• No risk of storing customer's virtual address like in Cards.
• Tap customers not having credit/debit cards.
• Suitable for e-Com & m-Com transaction.
• Resolves the COD collection problem.
• Single click 2FA facility to the customer – seamless Pull.
• In-App Payments (IAP).

About NPCI:

NPCI is an umbrella organisation for operating retail payments and settlement systems in India. It is an initiative of Reserve Bank of India (RBI) and Indian Banks' Association (IBA)under the provisions of the Payment and Settlement Systems Act, 2007, for creating a robust Payment and Settlement Infrastructure in India. It has been incorporated as a not for profit company. In 2016 the shareholding was broad-based to 56 member banks to include more banks representing all sectors.

12) Contract for the Web

Sir Tim Berners-Lee, inventor of the World Wide Web, has announced a "Contract for the Web" — aimed at saving the future of his invention.

What is the Contract for the Web?

The idea is to create a global plan of action for all stakeholders to together commit to building a "better" Web. The goal is to create a standard policy for a Web that benefits all. The Contract consists of nine principles — three each for governments, private companies, and individuals and civil society to endorse. It has been created by representatives from over 80 organisations, including governments, companies, civil society activists, and academics.

What are the principles in the Contract?

1. Governments will "Ensure everyone can connect to the Internet", "Keep all of the Internet available, all of the time", and "Respect and protect people's fundamental online privacy and data rights".
2. Companies will "Make the Internet affordable and accessible to everyone", "Respect and protect people's privacy and personal data to build online trust", and "Develop technologies that support the best in humanity and challenge the worst".
3. Citizens will "Be creators and collaborators on the Web", "Build strong communities that respect civil discourse and human dignity", and "Fight for the Web" so that it "remains open and a global public resource for people everywhere, now and in the future".

Relevance of the contract: The Contract is not meant to be "simply aspirational", or just a "declaration". "It's actually meant to be implemented, and it's meant to be a plan of action. Governments who are looking to regulate in the digital era, can use the contract as a roadmap to lay out their policies and laws going forward. Companies had themselves reached out to be active participants in the Contract. This was an opportunity for them to have conversations with

governments and civil society instead of shouting at each other.

How will the Contract be implemented?

The 'Contract for the Web' is not a legal document, or a United Nations document — though the organisation is in talks with the UN. It cannot currently bend governments or companies — even those that are on board — to its will.

Need of the hour:

• The Web, which is now almost an essential condition for human existence, is at a tipping point and needs radical intervention from all stakeholders — governments, companies, civil society groups, as well as individual users.

• Citizen action is an important part of the Contract, and the organisation hopes citizens would hold governments and companies accountable for violations of its terms.

13) Patent Prosecution Highway Programme

The Union Cabinet has approved the proposal for adoption of Patent Prosecution Highway (PPH) programme by the Indian Patent Office (IPO) under the Controller General of Patents, Designs & Trade Marks, India (CGPDTM) with patent offices of various other interest countries or regions.

• PPH will initially commence between Japan Patent Office (JPO) and Indian Patent Office on pilot basis for a period of three years only.

Eligibility:

Under this Pilot programme, Indian Patent Office may receive patent applications in certain specified technical fields only, namely, Electrical, Electronics, Computer Science, Information Technology, Physics, Civil, Mechanical, Textiles, Automobiles and Metallurgy while JPO may receive applications in all fields of technology.

What is PPH?

The Patent Prosecution Highway (PPH) is a set of initiatives for providing accelerated patent prosecution procedures by sharing information between some patent offices.

How it works?

This would allow a patent applicant to demand fast-tracking of his patent application by showing that his product or process has already been granted a patent in Japan.

PPH programme would lead to the following benefits for the Indian IP office:

1. Reduction in time to dispose patent applications.
2. Reduction in pendency of patent applications.
3. Improvement in quality of search and examination of patent applications.
4. An opportunity for Indian inventors including MSMEs and Start ups of India to get accelerated examination of their patent applications in Japan.

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Hope this material will help you.
God bless...JAI Hind

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All the Best
Jai Hind ☺