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

1) INTERNATIONAL IP INDEX 2019

The International IP Index 2019 has been released by the U.S. Chamber of Commerce's Global Innovation Policy Center (GIPC).

What is IIP index?

• Released by GIPC, the Index evaluates the IP infrastructure in each economy based on 45 unique indicators, which are critical to the growth of effective IP systems.

• The indicators encompass 8 categories of IP protection: patents, copyrights, trademarks, trade secrets, commercialization of IP assets, enforcement, systemic efficiency, and membership and ratification of international treaties.

• The 2019 Index demonstrates the close correlation between effective IP protection and economic growth, global competitiveness, and the creation of 21st century knowledge-based economies.

Performance of India and the factors responsible:

• India is placed at rank 36th this year. In 2018, India was ranked 44 out of 50 countries. In the first edition of the report in 2014, India had ranked last in the ranking of 25 countries.

• Among major global economies, most substantial movement can be seen from India, which has surged almost 20% and climbed eight places in the IP Index rankings from 44th to 36th.

• The increase in India's ranking is a result of specific reforms that better align India's IP environment with the international IP system, including its accession to the WIPO Internet Treaties, the agreement to initiate a Patent Prosecution Highway (PPH) with Japan, a dedicated set of IP incentives for small business, and administrative reforms to address the patent backlog.

Challenges ahead for India:

The improvement is a "real accomplishment" but substantial challenges persist, particularly regarding the country's patenting and IP enforcement environments.

• The weakness of India as highlighted in the report are barriers to licensing and technology transfer, including strict registration norms, limited framework for the protection of biopharmaceutical IP rights, patentability rules outside international standards, lengthy pre-grant opposition proceedings and previously used compulsory licensing for commercial and non-emergency situations as key hurdles.

The need for protection of IP rights:

1. Intellectual Property Creates and Supports High-Paying Jobs.
2. Intellectual Property Drives Economic Growth and Competitiveness.
3. Strong and Enforced Intellectual Property Rights Protect Consumers and Families.
4. Intellectual Property Helps Generate Breakthrough Solutions to Global Challenges.
5. Intellectual Property Rights Encourage Innovation and Reward Entrepreneurs.

2. CLEANING UP SPACE DEBRIS

As part of the space junk cleanup, a new device named space harpoon that captures junk has been tested successfully. It is part of the Remove DEBRIS project, a multi-organization European effort to create and test methods of reducing space debris.

About Space Debris

- Space debris encompasses both natural (meteoroid) and artificial (man-made)

particles. Meteoroids are in orbit about the sun, while most artificial debris is in orbit about the Earth. Hence, the latter is more commonly referred to as orbital debris.

☐ The term Kessler Syndrome is associated with Space Debris, which is used to describe a self-sustaining cascading collision of space debris in LEO (Low Earth Orbit).

Why Space Debris is a concern?

- Obstruction to various space endeavors
  o NASA estimates that there are about 500,000 pieces of debris larger than half an inch across in low orbit, posing a potential danger to the 780-odd satellites operating in the area.
  o Space junk travels at speeds up to 30,000 km an hour, which turns tiny pieces of orbital debris into deadly shrapnel that can damage satellites, space shuttles, space stations and spacecraft with humans aboard.
- Increase the cost of missions- Various space agencies have to manoeuvre their space programme in light of increasing space debris thus adding to extra economic and human resource on space programme.
- Debris is bound to increase- Space-scientists concern about the inexpensive, tiny satellites called CubeSats, which are going to add space junk around 15% in next 10 years.

Initiatives taken towards Space Debris cleanup

- Committee on the Peaceful Uses of Outer Space, and Inter-Agency Space Debris Coordination Committee (IADC) advocates Global mitigation measures including preventing the creation of new debris, designing satellites to withstand impacts by small debris, and improving operational procedures such as using orbital regimes with less debris, and predicting and avoiding collisions. However, these guidelines are only voluntary in nature and there is no international treaty on space debris currently.
- UK- The Remove Debris mission is led by the Surrey Space Centre at the University of Surrey. UK and cofunded by various other partners from EU.
- European Space Agency- e. Deorbit mission, which would target an ESA-owned derelict satellite in low orbit, capture it, then safely burn it up in a controlled atmospheric reentry.
- Japan- It launched Kounotori 6 satellite, which uses a half mile long tether to remove some of the debris from Earth's orbit. The tether, made of aluminium strands and steel wire, is designed to slow the debris, pulling it out of orbit.
- India-
  o A team of ISRO and Physical Research Laboratory are working on setting up an observatory to track the space junk.
  o A multi- object tracking radar (MOTR) developed by the Satish Dhawan Space Centre allows ISRO to track 10 objects simultaneously. It tracks India's space assets and space debris, for which India was solely dependent on data provide by the US space agency NASA till early 2016

The Remove Debris Mission

The Remove Debris satellite platform will showcase four methods for release, capture and deorbit two space debris targets, called DebriSATs:

- Net capture: It involves a net that will be deployed at the target CubeSat.

- Harpoon Capture: Which will be launched at a target plate made of "representative satellite panel materials"
- Vision-based navigation: Using cameras and LiDAR (light detection and ranging), the platform will send data about the debris back to the ground for processing.
- De-orbiting process: As it enters Earth's atmosphere, the spacecraft will burn up, leaving no debris behind. The mission will demonstrate key Active Debris Removal (ADR) technologies in orbit, which will have significance for future missions as well. Space Harpoon The harpoon is meant for larger targets, for example full-size satellites that have malfunctioned and are drifting from their orbit. A simple mass driver could knock them toward the Earth, but capturing them and controlling descent is a more controlled technique.

About Inter-Agency Space Debris Coordination Committee

- It is an international governmental forum for the worldwide coordination of activities related to the issues of man-made and natural debris in space.
- It aims to exchange information on space debris research activities between member space agencies, to facilitate opportunities for cooperation in space debris research, to review the progress of ongoing cooperative activities, and to identify debris mitigation options.
- ISRO is also a member of this committee.

3. INDUCED PLURIPOTENT STEM CELLS (IPSC)

Japan approves stem cells trial to treat spinal cord injuries. A team of Japanese researchers will carry out an unprecedented trial using human-induced pluripotent stem cells (iPS) to treat spinal cord injuries.

What are induced pluripotent stem cells?

• Induced pluripotent stem cells (iPSCs) are adult cells that have been genetically reprogrammed to an embryonic stem cell–like state by being forced to express genes and factors important for maintaining the defining properties of embryonic stem cells.

• Although additional research is needed, iPSCs are already useful tools for drug development and modeling of diseases, and scientists hope to use them in transplantation medicine.

What are stem cells, and why are they important?

• Stem cells have the remarkable potential to develop into many different cell types in the body during early life and growth.

• In addition, in many tissues they serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialized function, such as a muscle cell, a red blood cell, or a brain cell.

Stem cells are distinguished from other cell types by two important characteristics:

1. First, they are unspecialized cells capable of renewing themselves through cell division, sometimes after long periods of inactivity.
2. Second, under certain physiologic or experimental conditions, they can be induced to become tissue- or organ-specific cells with special functions. In some organs, such as the gut and bone marrow, stem cells regularly divide to repair and replace worn out or damaged tissues. In other organs, however, such as the pancreas and the heart, stem cells only divide under special conditions.

What are the similarities and differences between embryonic and adult stem cells?

• One major difference between adult and embryonic stem cells is their different abilities in the number and type of differentiated cell types they can become. Embryonic stem cells can become all cell types of the body because they are pluripotent. Adult stem cells are thought to be limited to differentiating into different cell types of their tissue of origin.

• Embryonic stem cells can be grown relatively easily in culture. Adult stem cells are rare in mature tissues, so isolating these cells from an adult tissue is challenging, and methods to expand their numbers in cell

culture have not yet been worked out. This is an important distinction, as large numbers of cells are needed for stem cell replacement therapies.

4. WHY BANGLADESH SEES GOLDEN RICE AS A THREAT ?

Bangladesh farmers and environment groups are angry over the government's decision to allow commercial cultivation of the controversial genetically modified (GM) rice, popularly called as the golden rice.

What's the issue?

• Bangladesh completed the confined field testing of golden rice at the Bangladesh Rice Research Institute (BRRI), Gazipur, in early 2017. It has already allowed commercial production of BT Brinjal in the country.

• Locals fear that the introduction of golden rice will impact their traditional agriculture system.

• It is alleged that field trials were marred with controversy over the lack of transparency and credible independent safety studies. Even claims made after field trial concerns remain as on the lack of credible and independent safety studies, transparency and public participation.

• Activists fear that commercial cultivation would lead to the loss of Bangladesh's rich bio-diversity. This could further push for public acceptance of genetically-modified crops and erode our food diversity and our local and traditional seeds, as well as increase corporate control on our agriculture system.

What is a GM crop?

• A GM or transgenic crop is a plant that has a novel combination of genetic material obtained through the use of modern biotechnology.

• For example, a GM crop can contain a gene(s) that has been artificially inserted instead of the plant acquiring it through pollination. The resulting plant is said to be "genetically modified" although in reality all crops have been "genetically modified" from their original wild state by domestication, selection, and controlled breeding over long periods of time.

GM is a solution to hunger problem:

• Data from a large number of peer-reviewed publications have shown that, on average, GM technology adoption has reduced pesticide use by 37%, increased crop yield by 22%, and increased farmer profits by 68%.

• Data from a billion animals fed on GM corn have not indicated any health hazards. Those in the Americas and elsewhere consuming Bt corn or soybean for over 15 years have not reported any health issues.

• Genetically modified (GM) crops can withstand pests and droughts. Genetic modification in crops involves altering a seed's DNA in order to increase its resistance to pests and insects. These changes can mean a huge boost to productivity and overall food supply.

• Adopting technology that will lead to higher crop productivity is essential to feeding the growing Indian population.

• Higher crop yields, reduced farm costs, increased farm profit and improvement in health and the environment are some of the benefits of introducing GM crops.

What is Golden rice?

• In 1999, a group of European scientists led by Dr Ingo Potrykus tried to change traditional rice by developing geneticallyengineered rice that contains betacarotene — by inserting bacteria and daffodil and maize genes into it. This is the golden rice, called so because of the golden colour of its grains.

• The golden rice was introduced in 2000 and argued to be the panacea for world's malnutrition problem. It was claimed that the rice is bio-fortified, and is supposedly high in Vitamin A, Iron and Zinc.

• It was considered as a significant breakthrough in biotechnology, with its first field trials conducted by the agriculture centre of Louisiana State University in 2004. Later, it has been claimed that field trials were conducted in the Philippines, Taiwan and Bangladesh.

There are some concerns as well:

GM food involves taking genes (DNA) from different organisms and inserting them in food crops.

• There are concerns that this 'foreign' DNA through Genetically Modified products may lead to risks such as toxicity, allergic reactions, and nutritional and unintended impact.

• It costs people's health and our national food and health sovereignty.

• The Food Safety and Standards Authority of India [FSSAI], the apex food regulator, has failed to curb the illegal sales of GM food.

• Its draft regulations on GM food labelling are weak and impractical to implement.

• Lack of clarity: It is clear that the technology of genetic engineering is an evolving one and there is much, especially on its impact on human health and environment that is yet to be understood properly. The scientific community itself seems uncertain about this.

• There is also a potential for pests to evolve resistance to the toxins produced by GM crops and the risk of these toxins affecting nontarget organisms. There is also the danger of unintentionally introducing allergens and other anti-nutrition factors in foods.

5. IPRISM

The Cell for IPR Promotion and Management (CIPAM), Department for Promotion of Industry and Internal Trade, in collaboration with ASSOCHAM and ERICSSON India, has launched the second edition of 'IPrism', an Intellectual Property (IP) competition for students of schools, polytechnic institutes, colleges and universities.

• Aiming to foster a culture of innovation and creativity in the younger generation, the competition will provide young creators an opportunity to see their creations recognized on a national platform.

About CIPAM:

• Cell for IPR Promotion and Management (CIPAM) has been created as a professional body under the aegis of DIPP to take forward the implementation of the National IPR Policy that was approved by the Government in May 2016, with the slogan – "Creative India; Innovative India".

• **Functions**: CIPAM is working towards creating public awareness about IPRs in the country, promoting the filing of IPRs through facilitation, providing inventors with a platform to commercialize their IP assets and coordinating the implementation of the National IPR Policy in collaboration with Government Ministries/Departments and other stakeholders.

6. PROGRESS OF DIGITAL LITERACY PROGRAMS IN INDIA

Recently a report on review of National Digital Literacy Mission was laid in Parliament by the Parliamentary Standing Committee on Information Technology.

About Digital Literacy

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- As per the Ministry of Electronics and Information Technology, Digital Literacy is defined as the ability of individuals and communities to understand and use digital technologies for meaningful actions within life situations. Any individual who can operate computer/laptop/tablet/smart phone and use other IT related tools is being considered as digitally literate.
- Digital Literacy holds important in areas such as using Government Schemes, Digital Payments, egovernance, Agriculture, Education, Health, Employment etc.

Current Status of Digital Literacy in India

- Low Digital Literacy- Among people in the age group of 14-29 years, only 18.3% were able to operate a computer in rural areas as compared to 48.9% in urban areas.
- Ineffective usage of digital literacy- An IIT-Delhi study found that while beneficiaries were now comfortable using social media, they were not as adept at browsing the internet for education opportunities and employment listings among others.

Background of Government Initiatives

- The Government of India launched the 'Digital India' campaign for transforming India into a digitally empowered society and economy.
- One of the goals of this campaign is to empower those who are IT-illiterate so that they are competent enough to use IT and related applications for effectively participating in the democratic processes and enhancing their livelihood opportunities.

In this context, the Ministry of Electronics and Information Technology initiated the National Digital Literacy Mission (NDLM) as a means of realising the vision of 'Digital India'.

- Under the mission, beneficiaries undergo a 20-hour training programme in using computers and other digital devices, browsing the Internet and sending and receiving emails.
- The original deadline for the National Digital Literacy Mission was 18 months but it was extended to 27 months before it was scrapped in June 2016. While the programme was still running, the government introduced the Digital Saksharta Abhiyan, or DISHA, in January 2015.
- Under these two schemes, a total of 53.67 lakh beneficiaries were trained, out of which around 42% were from rural India.
- In 2017, the government launched the Pradhan Mantri Gramin Digital Saksharta Abhiyan by improving upon previous two schemes.
- Issues with government schemes
    1. **Lack of Consolidation of Schemes**- Parallel schemes creates confusion in the minds of intended beneficiaries and makes the evaluation difficult.
    2. Focus on quantitative parameters instead of quality of training- There is inconsistency and variation in the findings of the independent studies with regard to data on various aspects such as usage of digital device, level of confidence etc. Further, there is no component of monitoring repeat transactions by individuals trained in NDLM, DISHA and PMGDISHA schemes to ensure that there is a behavioral change in the trainees and they continue to make use of digital/IT tools even after completion of their training.

3. Unrealistic data- Under NDLM scheme, 16 out of total 36 States/UTs have achieved 100% certification of enrolled candidates. The committee found these to be unrealistic.

☐ Duplication of beneficiaries- The first impact assessment study, conducted by the research and advocacy group Council for Social Development, found that two-thirds of the beneficiaries of the scheme were not eligible for it.

- **Challenges in expanding Digital Literacy in India**
  1. Lack of awareness about the benefits of digital literacy among the masses.

☐ Lack of availability of requisite training infrastructure and resources at several places in the country – As per National Sample Survey Office (NSSO) 71st Round report on social consumption relating to education, the proportion of households in the country having computers during 2014 was around 14% (only 6% in rural households and 29% in urban households possessed computer).
  2. Internet connectivity issues as well as Localization/Language issues in rural areas.
  3. Inadequate support from State Govt. & other stakeholders- such as by North- Eastern states.
  4. Insufficient financing for scheme- Only Rs. 500 cr. released which is much less than allocated outlay.
- Recommendations of the Parliamentary Standing Committee
  1. Need for Long-term planning and perceptible outcomes- should be the focus of government schemes, rather than having short-term parallel schemes with different names.
  2. Change the criteria to increase coverage- The current restriction of covering only one person per household in the existing schemes should be removed.
  3. Need for qualitative impact assessment- by focusing on qualitative parameters through continuous feedback mechanism and strengthening of monitoring mechanism to ensure that there is a positive behavioral change in successful trainees and they continue to use digital/IT tools even after completion of their training
  4. Promote Digital Finance through schemes like Digital Finance for Rural India: Creating Awareness and Access through Common Service Centres (CSCs), which was closed earlier.
  5. Enhanced enrolment of training partners- with proven expertise in IT domain so as to achieve the set targets.
  6. Grievance redressal and feedback mechanism- should be adequately strengthened to make the scheme equally accessible to all the beneficiaries and remove any element of discrimination.
  7. Usage of low cost, easy to use - such as feature/smart phones and associated apps, which are popular among, masses in

comparison to the conventional IT hardware and allied software. The content may be user-friendly and appropriate for all ages.

8. Focus on laggard States/UTs- The good practices in some States may be replicated in other States and also the States which are very supportive and doing very well need to be incentivized so that there is visible impact.
9. Close coordination amongst different Central/State agencies and entities

'Pradhan Mantri Gramin Digital Saksharta Abhiyan' (PMGDISHA)

- Objectives: To make six crore persons in rural areas, across States/UTs, digitally literate, reaching to around 40% of rural households by covering one member from every eligible household.
- Implementing Agency: The scheme is implemented by CSC eGovernance Services India Limited, a Special Purpose Vehicle (SPV) incorporated under the Companies Act 1956, (herein after referred to as 'CSC-SPV'), under the overall supervision of Ministry of Electronics & Information Technology, with active collaboration of all the State Governments and UT Administrations.
- Duration: The duration of the Scheme is up to 31st March, 2019.
- Coverage of scheme: The Scheme is applicable for rural areas of the country.

7.CHINA DRAFTS NEW RULES TO SUPERVISE BIOTECHNOLOGY RESEARCH

China has drafted new rules to supervise biotechnology research.

Highlights of the draft:

1. It proposes fines and bans against rogue scientists.
2. It proposes to classify technology used for extracting genetic materials, gene editing, gene transfer and stem cell research as "high risk".
3. Scientists can be fined 10 to 20 times the amount of "illegal income" earned from unauthorised research and be banned from their field of work for six months to one year.
4. If the circumstances are serious, their medical practice licence shall be revoked and the individual shall not engage in clinical research for life.

What necessitated this?

Recently a Chinese researcher caused a global outcry by claiming that he gene-edited babies.

• He announced in November that the world's first gene-edited babies — twin girls — were born that same month after he altered their DNA to prevent them from contracting HIV by deleting a certain gene under a technique known as CRISPR.

• The claim shocked scientists worldwide, raising questions about bioethics and putting a spotlight on China's lax oversight of scientific research.

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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 ☺