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1) THE PERSONAL DATA PROTECTION BILL, 2019

Recently, the Personal Data Protection Bill, 2019 was introduced in Lok Sabha.

The need for data protection

• Protection of privacy: India has more than 62 crore internet users, whose personal data is shared online. With supreme Court declaring Right to Privacy a Fundamental right (K.S. Puttaswamy case) protecting individual privacy is constitutional duty of the state.

• Check snooping or surveillance by various agencies: Recently, 121 Indian citizens' WhatsApp accounts were hacked by an Israeli software called Pegasus. o The Facebook–Cambridge Analytica data scandal of 2018 where personal data of millions of peoples' Facebook profiles without their consent was used for political advertising purposes.

• Economic losses: The average cost of data breach in India is Rs 12.8 crore, with per capita cost per lost or stolen record reaching Rs 5,019 in 2018, as per a study by IBM. o Moreover, data is being considered as new oil in 21st century. Without proper data regulations or data localisation norms, Global firms like Google, Face book are benefitting from data collected from Indians.

• Increasing sophistication of cyber-crimes: The root cause for 51 per cent of data breaches was malicious or criminal attacks, in India as per IBM study.

Key features of the Bill

• Personal data (data that can identify an individual): The bill talks about various types of personal data, such as:

o Sensitive personal data (related to finances, health, official identifiers, sex life, sexual orientation, biometric, genetics, transgender status, intersex status, caste or tribe, religious or political belief or affiliation)

o Critical personal data (military or national security data and the government can define it from time to time)

o General personal data- other than sensitive and critical personal data.

• Applicability: The Bill governs the processing of personal data by:

o Government

o companies incorporated in India

o foreign companies dealing with personal data of individuals in India.

• Obligations of data fiduciary (an entity or individual who collects and decides the means and purpose of processing personal data):

o Personal data can be processed only for specific, clear and lawful purpose.

o All data fiduciaries must undertake certain transparency and accountability measures such as:

✓ implementing security safeguards (such as data encryption and preventing misuse of data)

✓ instituting grievance redressal mechanisms to address complaints of individuals.

• Rights of the data principal (the individual whose data is being collected and processed): These include the right to:

o obtain confirmation from the fiduciary on whether their personal data has been processed

o restrict continuing disclosure of their personal data by a fiduciary, if it is no longer necessary or consent is withdrawn. It also includes the right to be forgotten which will allow users to erase their personal data published online and give them the freedom to ask entities such as Facebook and Twitter to delete any data they do not want in the public domain.

• Grounds for processing personal data: The Bill allows processing of data by fiduciaries only if consent is provided by the individual. However, in certain circumstances, personal data can be processed without consent. These include:

o if required by the State for providing benefits to the individual

o legal proceedings

o to respond to a medical emergency

• Social media intermediaries: platforms with larger number of users and having potential to impact electoral democracy or public order, have certain obligations, which include providing a voluntary user verification mechanism for users in India.

o According to official sources, while the process can be voluntary for users and can be completely designed by the company, it will decrease the anonymity of users and "prevent trolling".

• Data Protection Authority: The Bill sets up a Data Protection Authority which may:

o take steps to protect interests of individuals

o prevent misuse of personal data

o ensure compliance with the Bill.

• Transfer of data outside India:

o Sensitive personal data may be transferred outside India for processing if explicitly consented to by the individual and subject to certain additional conditions. However, such sensitive personal data should continue to be stored in India.

o Critical personal data can only be processed in India.

o Personal data other than sensitive and critical personal data don't have such localisation mandates.

• Exemptions:

o The central government can exempt any of its agencies from the provisions of the Act:

✓ in interest of security of state, public order, sovereignty and integrity of India and friendly relations with foreign states

✓ for preventing incitement to commission of any cognisable offence (i.e. arrest without warrant) relating to the above matters.

o Processing of personal data is also exempted from provisions of the Bill for certain other purposes such as:

✓ prevention, investigation, or prosecution of any offence

✓ personal, domestic

✓ journalistic purposes

• Sharing of non-personal data with government: The central government may direct data fiduciaries to provide it with any: o non-personal data o anonymised personal data (where it is not possible to identify data principal) for better targeting of services.

Criticisms of the bill

• There are significant departures in the current bill from the draft Bill prepared by the Justice B N Srikrishna committee in 2018.

o Data Protection Authority's composition is dominated by the government, as contrasted with the diverse and independent composition as suggested in the committee's draft.

o There is a blanket power of exemption from all provisions of the law (including access to personal data without consent, citing national security,

investigation and prosecution of any offence, public order) in favour of a government agency. This could amount to surveillance.

• A report from the IT Ministry's Artificial Intelligence (AI) Committee contradicts foundational aspects of the Bill, as it suggests:

o India should maintain free flow of data stating that India has been one of the biggest beneficiaries of the global data flows. Limitations on the free and open flow of data can seriously hinder the ability of economy to remain competitive.

o Focus should be placed on implementation and enforcement instead of over-regulation. Sectoral entities are more appropriate regulators than an overarching authority.

o Legislation alone is not enough unless supported by an adequate implementation ecosystem including an effective grievance redressal system and user awareness.

✓ E.g. security and government access are not achieved by mere localisation, as the encryption keys may still be out of reach of national agencies.

Conclusion

Considering the data privacy as the fundamental right of a citizen and economic downturns of the potential breaches in data, government need to reconsider all the above pending issues. A robust Personal data protection law is the need of the hour. Due importance needs to be given on public awareness, better implementation and regulation and efficient grievance redressal as well.

Data protection in India

• Data protection is the process of protecting the personal data and aims to strike a balance between individual privacy while allowing data to be used for myriad purposes.

• India does not have any dedicated legal framework for data protection. Presently some acts cover the data protection in general.

• Sec 43A of Information Technology Act 2000 protects user data from misuse but it is applicable to only corporate entities and not on government agency. Also, the rules are restricted to sensitive personal data only — medical history, biometric information among other things.

• Other acts like Consumer Protection Act 2015, Copyrights Act 1957 among others also attempt to protect the personal information.

• In 2018, a draft version of the bill was prepared by a committee headed by retired Justice B N Srikrishna

Challenges/ constraints in data protection

• Most of the data storage companies are based abroad. They also export data to other jurisdiction making it difficult to apply Indian laws.

• Multiple private players are involved in data dynamics which makes it difficult to apply uniform data protection framework.

• Generally, the application using pre-ticked boxes on consent while asking users regarding the acceptance to the terms and conditions, leads to uninformed consent.

• It is usually difficult to trace the perpetrator invading the data privacy.

2) NATIONAL GUIDELINES FOR GENE THERAPY

Indian Council of Medical Research (ICMR) published "National Guidelines for Gene Therapy-Product Development and Clinical Trials".

About Gene Therapy

Gene Therapy refers to the process of introduction, removal or change in content of an individual's genetic material with the goal of treating the disease and a possibility of achieving long term cure. It is classified into 2 types:

• Germ-line gene therapy: The concept of germ-line gene therapy is to introduce gene modified

cells into the germline, that can be transmitted vertically across generations. Germline gene therapy is prohibited in India, due to ethical and social considerations.

• Somatic cell gene therapy: It affects the targeted cells/tissue/organs in the patient, and is not passed on to subsequent generations. It is legal in India. This also includes genome modification as done in CRISPR-related and other technologies. It has two categories: o ex vivo- cells obtained from an individual are genetically modified/corrected outside the body followed by transplantation into the same or a different individual. o in vivo- the gene of interest is delivered directly to target cells/tissues/organs (like liver, pancreas, muscle, heart etc.) in the patients. Gene delivery can be carried out by viral or non- viral vector systems.

Need of Gene Therapy guidelines

• Complexity and unpredictability of human diseases, variety of immune reactions and gene expression in cells leading to failures of human gene therapy trials necessitate one to be cautious for gene therapies, patient safety, clinical trial design, production processes and quality required of the actual gene therapy product.

• Need of ethical framework to prevent misuse and premature commercialization. E.g. Creation of babies using germline gene editing by a Chinese scientist recently, that attracted global criticism.

• Around 70 million Indians are estimated to suffer from inherited genetic diseases. These include haemophilia, thalassemia, sickle-cell anaemia etc.

o Inherited genetic diseases or rare diseases refer to medical conditions that affect a small percentage of population but has vast, debilitating and often life-threatening effects on the patients. Drugs intended to cure these diseases are termed as “orphan drugs” that are often neglected by the traditional pharmaceutical industry uncertain or poor commercial outcomes given the smaller affected population size.

• Economic benefits: The worldwide market for treatments for rare diseases is predicted to grow at a compound annual growth rate (CAGR) of 11.3% from 2018 to 2024 and predicted to reach revenues of more than $250 billion.

o Competition from other countries: Until 2017, almost 2,600 gene therapy clinical trials have been conducted worldwide in 38 countries, of which 64.9% were in the US, 23.2% in Europe and approximately 6.5% in Asia, most of them being in China and Japan.

• Guideline to help researchers and regulators: by providing an enabling environment and guiding scientifically sound practice it is likely to spur innovation and accelerate research for rare diseases. It will also facilitate the clearance of such therapies by the Drugs Controller General of India on objective basis.

Key guidelines

• Applicability: The guidelines apply to all stakeholders in the field of gene therapy including researchers, clinicians, regulatory committees, industry, patient support groups etc.

• General Principles: Clinical trials on human participants involving GTPs must safeguard human rights, safety and dignity. Various principles like Principle of Essentiality, Voluntariness, Non-exploitation, Risk Minimization etc. need to be followed.

• Mechanism for Review and Oversight:

o Proposed establishment of Gene Therapy Advisory and Evaluation Committee (GTAEC)- an independent body with experts from diverse areas of biomedical research, government agencies and other stakeholders.

o It is mandatory for all institutions and entities engaged in development of GTPs to establish an Institutional Bio-safety committee (IBSC).

o Research involving development of new GTPs needs to obtain approvals from IBSC and Ethics Committee (EC). Biological material from humans can be procured only from clinics/hospitals that have an Ethics Committee. o All clinical trials are mandated to be registered with Clinical Trials Registry-India (CTRI). It is an online public record system for registration of clinical trials being conducted in India.

• Responsibilities of various stakeholders

o Investigators should treat the biological material with utmost respect and adequate care to avoid its misuse.

o Storage and disposal of the GTPs or its components should be as per the Regulations and Guidelines on Bio-safety of Recombinant DNA Research and Bio-containment 2017.

o Any GTP of foreign origin or its modified variants that will be first in human use is not permissible for direct first in human trials in India.

o Investigators should demonstrate respect for autonomy and privacy of patients.

• Good Manufacturing Practise (GMP) Guidelines:

o It includes Personnel Training, establishment of quality control processes.

o Waste materials and by-products of the GTP manufacturing process must be securely decontaminated and transported as per appropriate biohazard disposal protocol. Way Forward There remain many hurdles that the scientific and clinical community working in the R&D fields are yet to overcome, primarily the appropriate and timely diagnosis including genetic testing and genetic counselling, prohibitive costs of such gene therapies, adequate insurance coverage and management practices among treating physicians. While prospects are bleak for many individuals with conditions classified as rare diseases, policies such as that proposed by the ICMR may offer hope.

Some important terms

• Gene- a gene is a sequence of nucleotides in DNA or RNA. Some genes act as instructions to make products like RNA or proteins.

• Genome- the complete set of genes or genetic material that is present in all the cells of an organism

• Genotype- pattern of genes in an organism's DNA that is responsible for a particular trait

• Phenotype- refers to the observable physical properties of an organism. These include the organism's appearance, development, and behaviour.

• CRISPR- clustered regularly interspaced short palindromic repeats are DNA sequences used in genome editing along with enzymes called CRISPR-associated nucleases (most commonly Cas9)

• Stem cells- are special human cells that have the ability to develop into many different cell types, from muscle cells to brain cells.

• Somatic cells are any body cells that are not involved in reproduction. Most cells in body are somatic cells. They include skin cells, bone cells, red blood cells, and many more.

• Germ cells are cells that create reproductive cells called gametes. They are found only in the reproductive glands (ovaries in females and testes in males.).

• Retrovirus- family of viruses with RNA as genetic material that can integrate their genome into the DNA of host cells, they invade.

• Transgene- a genetic material that is artificially introduced into the genome of another organism.

A Gene Therapy Product (GTP) is defined as any biological entity, having the required gene, that could introduce modifications in the genome for therapeutic benefit. GTPs work by repairing, replacing or deactivating dysfunctional disease-causing genes aiming to restore normal function.

GTPs include:

- Recombinant viral vectors: adenovirus, retrovirus
- Non-viral vectors: naked DNA transfection
- Microbial/bacterial vectors (Salmonella, E. coli): recombinant bacteria derived vehicles
- Modifications resulting from the use of CRISPR and other similar technologies
- ex vivo genetically modified cells: gene modified/ augmented stem cells, iPS (induced pluripotent stem) cells, CAR-T cells etc.
- Soluble/particulate/emulsion/Nano based interventions containing any form of genetic material/ nucleic acid for the purpose of clinical gene therapy
- DNA vaccines where the final product is nucleic acid and is administered for vaccination/therapy.

As per the New Drugs and Clinical trial Rules (2019) the GTPs falls under 'new drug' and shall always be deemed to be 'new drug'.

3) New definition of kilogram

The prototype of one kilogram (NPK-57) is now available in India and placed at the National Physical Laboratory, New Delhi.

Background: Scientists, last year, have changed the way the kilogram is defined. The decision was made at the General Conference on Weights and Measures. The new definitions came into force on 20 May 2019.

How does the new system work?

Electromagnets generate a force. Scrap-yards use them on cranes to lift and move large metal objects, such as old cars. The pull of the electromagnet, the force it exerts, is directly related to the amount of electrical current going through its coils. There is, therefore, a direct relationship between electricity and weight. So, in principle, scientists can define a kilogram, or any other weight, in terms of the amount of electricity needed to counteract the weight (gravitational force acting on a mass).

What is Planck's constant?

There is a quantity that relates weight to electrical current, called Planck's constant – named after the German physicist Max Planck and denoted by the symbol h.

But h is an incredibly small number and to measure it, the research scientist Dr Bryan Kibble built a superaccurate set of scales. The Kibble balance, as it has become known, has an electromagnet that pulls down on one side of the scales and a weight – say, a kilogram – on the other. The electrical current going through the electromagnet is increased until the two sides are perfectly balanced. By measuring the current running through the electromagnet to incredible precision, the researchers are able to calculate h to an accuracy of 0.000001%. This breakthrough has paved the way for Le Grand K to be deposed by "die kleine h".

4) Fuel cell electric vehicles (FCEV)

Supreme Court, last month, directed the government to look into the feasibility of introducing vehicles based on a hydrogen cell technology to deal with air pollution in the National Capital Region.

How does the hydrogen fuel cell work in electric vehicles?

A fuel-cell electric vehicle is essentially a hybrid electric vehicle wherein, the internal combustion

engine is replaced with a fuel-cell stack. The onboard sources of power include hydrogen as well as an advanced battery system. The fuel cell combines hydrogen and oxygen to generate an electric current, water being the only byproduct. Fuel cells generate electricity through an electrochemical process. And, there are no moving parts in the fuel cell, so they are more efficient and reliable by comparison.

How is it different from an electric vehicle (EV)?

Unlike a battery-electricity vehicle, it does not store energy and, instead, relies on a constant supply of fuel and oxygen — in the same way that an internal combustion engine relies on a constant supply of petrol or diesel, and oxygen.

Advantages of fuel cells:

• They produce much smaller quantities of greenhouse gases and none of the air pollutants that cause health problems.

• If pure hydrogen is used, fuel cells emit only heat and water as a byproduct.

• They are also energy efficient than traditional combustion technologies.

• Unlike battery-powered electric vehicles, fuel cell vehicles do not need to be plugged in, and most models exceed 300 km of range on a full tank. They are filled up with a nozzle, just like in a petrol or diesel station.

Disadvantages:

• The process of making hydrogen needs energy — often from fossil fuel sources. That has raised questions over hydrogen's green credentials.

• There are questions of safety — hydrogen is more explosive than petrol.

• Besides, the vehicles are expensive, and fuel dispensing pumps are scarce.

5) National Green Corps 'Ecoclub'

What is it?

Launched under the Environment Education Awareness and Training (EEAT), the National Green Corps (NGC) popularly known as "a programme of Ecoclubs" is a nationwide initiative of the Ministry of Environment & Forests, Government of India (now Ministry of Environment, Forests and Climate Change).

Objectives:

• To impart knowledge to school children, through hands-on experience, about their immediate environment, interactions within it and the problems therein.

• To develop requisite skills of observation, experimentation, survey, recording, analysis and reasoning for conserving the environment through various activities.

• To inculcate the proper attitude towards the environment and its conservation through community interactions. • To sensitize children to issues related to environment and development through field visits and demonstrations. • To promote logical and independent thinking among children so that they are able to make the right choices in a spirit of scientific inquiry.

• To motivate and stimulate young minds by involving them in action projects related to environmental conservation.

Methodology:

1. The scheme is being operated through Eco-clubs of 50-60 students having interest in environment related issues, formed in member schools.

2. Eco clubs are supervised by a Teacher In-charge, who is selected from among the teachers of the member school.

3. There is District Implementation and Monitoring Committee to supervise, organise

training for Incharge teachers, and monitor periodically the implementation of scheme at the District level.

4. There is a State Steering Committee for guidance, direction and to oversee the implementation of the scheme. 5. The State Nodal Agency coordinates the implementation of the scheme in the State and organize related activities like training to Master Trainers.

6. The National Steering Committee will give overall direction to the programme and ensure linkages at all levels.

6) SnowEx

NASA has launched a seasonal campaign — part of a five-year programme called SnowEx, initiated in 2016-17. What is SnowEx? It is a five year program initiated and funded by NASA. Objective: To address the most important gaps in snow remote sensing knowledge and thus lay the groundwork for a future snow satellite mission. It focuses on airborne campaigns and field work, and on comparing the various sensing technologies, from the mature to the more experimental, in globally-representative types of snow. The mission will utilize a suite of airborne instruments such as Lidar, SAR, Passive Microwave, Multispectral/hyperspectral VIS/IR, and others, as well as ground measurements, to study Snow Water Equivalent (SWE) in forested areas.

Objectives:

• develop/test algorithms for measurement of SWE in forested and non-forested areas by providing multisensor observations of seasonally snow-covered landscapes.

• develop/test energy balance models and snow distribution models of beneath-canopy snowpack using appropriate field measurements.

• explore how best to combine sensing technologies with modeling and data assimilation methods to produce the most accurate products.

What are the SnowEx outcomes and International Engagement?

SnowEx will provide key insights into optimal strategies for mapping global SWE with remote sensing and models, which will enable a competitive proposal for a Decadal Survey "Earth System Explorer" mission. The systematic assessment of methods for mapping water and energy components of seasonal snow in SnowEx is fully aligned with the objectives of the NASA Terrestrial Hydrology Program and the Earth Science Division as well as the ESDS.

Why have this campaign?

• More than one-sixth of the world's population (~1.2 billion people) relies on seasonal snowpack and glaciers for their water supply.

• Snowmelt-generated water supply is likely to decrease this century. Snow is also a critical component of Earth's cold regions ecosystems where wildlife, vegetation and snow have strongly interconnected fates.

• Besides, to understand the time and space variation in the snow's energy and mass balances along with the extensive feedbacks with the Earth's climate, water cycle, and carbon cycle, it is critical to accurately measure snowpack.

7) CSIR-IICT Nuclear Magnetic Resonance test facility

The CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad has announced that the Nuclear Magnetic Resonance (NMR) test facility at the institute has passed the US Food and Drug Administration (USFDA) inspection with "no observations".

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Background: The USFDA inspected the NMR facility during August 21-22 and found the facility in an acceptable state of compliance with regard to Current Good Manufacturing Practice (CGMP). Accordingly, it classified the facility as "no action initiated (NAI)".

What is NMR?

The NMR spectroscopy is an important technique for structural characterization of pharmaceutical and other chemical molecules. The technique is used in quality control and reserach for determining the content and purity of a sample as well as its molecular structure.

How it works?

1. The sample is placed in a magnetic field and the NMR signal is produced by excitation of the nuclei sample with radio waves into nuclear magnetic resonance, which is detected with sensitive radio receivers.
2. The intramolecular magnetic field around an atom in a molecule changes the resonance frequency, thus giving access to details of the electronic structure of a molecule and its individual functional groups.
3. As the fields are unique or highly characteristic to individual compounds, in modern organic chemistry practice, NMR spectroscopy is the definitive method to identify monomolecular organic compounds.

8) National Electronic Funds Transfer (NEFT)

RBI has extended the availability of National Electronic Funds Transfer (NEFT) round-the-clock on all the seven days of the week — 24×7 basis — to facilitate beyond the banking hour fund transfer.

Significance: The RBI joins an elite club of countries having payment systems which enable round the clock funds transfer and settlement of any value. So far, Australia, Hong Kong, Mexico, Sweden, Turkey, the UK, South Korea, Singapore, South Africa, and China have such payment system.

What is NEFT?

NEFT is an electronic funds transfer system maintained by the Reserve Bank of India (RBI). Started in November 2005, the setup was established and maintained by Institute for Development and Research in Banking Technology (IDRBT). NEFT enables bank customers in India to transfer funds between any two NEFT-enabled bank accounts on a one-to-one basis. It is done via electronic messages.

Unlike Real-time gross settlement (RTGS), fund transfers through the NEFT system do not occur in real-time basis.

What is RTGS?

• RTGS are specialist funds transfer systems where the transfer of money or securities takes place from one bank to any other bank on a "real time" and on a "gross" basis.

• Settlement in "real time" means a payment transaction is not subjected to any waiting period, with transactions being settled as soon as they are processed.

9) EChO Network

Indian Government has launched a network to encourage cross-disciplinary leadership- Called EChO Network.

Aim: To identify gaps in knowledge regarding environment and then train postdoctoral leaders in research and outreach on these topics, incorporating current public and private efforts.

Key features:

• It will provide a template for cross-disciplinary leadership in India with the specific focus of increasing research, knowledge, and awareness of Indian ecology and the environment.

• The Network would develop a national network to catalyse a new generation of Indians who can synthesize interdisciplinary concepts and tackle real-world problems in medicine, agriculture, ecology, and technology.

How it works?

1. Through interactive sessions with citizens, industry, academia, and the government, the Network will identify gaps in knowledge regarding selected topics in human and environmental ecosystems.
2. The program will then train postdoctoral leaders in research and outreach on these topics, while also incorporating current public and private efforts into a national network.
3. It would then go on to establishing nation-wide awareness in these issues through public discourse and education for citizens, industry, and government with information exchange at all educational levels.

The need: Despite concerted efforts to promote ecological and environmental research, India lacks trained scientists with interdisciplinary skills and collaborative mind-set. Educators and students need to be trained to identify and solve problems in an interdisciplinary manner. This network will inspire an entirely new approach to Indian education and exploration necessary for the post technological world.

10) Protection of Plant Varieties and Farmers' Rights Authority (PPV&FR)

A document which food and beverages giant PepsiCo India cited to support its charges against Gujarat potato farmers earlier this year is being revised by the Protection of Plant Varieties and Farmers Rights Authority (PPV&FRA), following complaints from major farmers groups.

What's the issue?

The Frequently Asked Questions or FAQ document had claimed that "only small and marginal farmers involved in subsistence farming" are eligible to claim rights under the Protection of Plant Varieties and Farmers Rights (PPV&FR) Act, 2001. The FAQ also said these rights are not for "commercial farmers" and are only meant for "small scale" use.

• PepsiCo has used the same argument in an ongoing case at the Authority over its registered potato variety used for Lays chips. The company has also cited the FAQ document to justify dragging more than nine farmers to court in 2018 for growing and selling its registered variety.

• The company faced product boycotts and major protests across the political spectrum for slapping a ₹4.2 crore lawsuit against four farmers, and ultimately withdrew all cases after government intervention just before Lok Sabha elections in May 2019.

The Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001:

• Enacted by India in 2001 adopting sui generis system.

• It is in conformity with International Union for the Protection of New Varieties of Plants (UPOV), 1978.

• The legislation recognizes the contributions of both commercial plant breeders and farmers in plant breeding activity and also provides to implement TRIPs in a way that supports the specific socioeconomic interests of all the stakeholders including private, public sectors and research institutions, as well as resource-constrained farmers.

Objectives of the PPV & FR Act, 2001:

1. To establish an effective system for the protection of plant varieties, the rights of farmers

and plant breeders and to encourage the development of new varieties of plants.

2. To recognize and protect the rights of farmers in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties.

3. To accelerate agricultural development in the country, protect plant breeders' rights; stimulate investment for research and development both in public & private sector for the development new of plant varieties.

4. Facilitate the growth of seed industry in the country which will ensure the availability of high-quality seeds and planting material to the farmers.

Rights under the Act:

Breeders' Rights: Breeders will have exclusive rights to produce, sell, market, distribute, import or export the protected variety. Breeder can appoint agent/ licensee and may exercise for civil remedy in case of infringement of rights. Researchers' Rights: Researcher can use any of the registered variety under the Act for conducting experiment or research. This includes the use of a variety as an initial source of variety for the purpose of developing another variety but repeated use needs prior permission of the registered breeder.

Farmers' Rights:

1. A farmer who has evolved or developed a new variety is entitled for registration and protection in like manner as a breeder of a variety;

2. Farmers variety can also be registered as an extant variety;

3. A farmer can save, use, sow, re-sow, exchange, share or sell his farm produce including seed of a variety protected under the PPV&FR Act, 2001 in the same manner as he was entitled before the coming into force of this Act provided farmer shall not be entitled to sell branded seed of a variety protected under the PPV&FR Act, 2001;

4. Farmers are eligible for recognition and rewards for the conservation of Plant Genetic Resources of land races and wild relatives of economic plants;

5. There is also a provision for compensation to the farmers for non-performance of variety under Section 39 (2) of the Act, 2001 and

6. Farmer shall not be liable to pay any fee in any proceeding before the Authority or Registrar or the Tribunal or the High Court under the Act.

11) Biosimilar medicine

WHO prequalifies first biosimilar medicine-trastuzumab- to increase worldwide access to life-saving breast cancer treatment.

• Trastuzumab – a monoclonal antibody – was included in the WHO Essential Medicines List in 2015 as an essential treatment for about 20% of breast cancers.

Breast cancer is the most common form of cancer in women. 2.1 million women contracted breast cancer in 2018. 630 000 of them died from the disease, many because of late diagnosis and lack of access to affordable treatment.

What are Biosimilars?

• It is a biologic medical product that is almost an identical copy of an original product that is manufactured by a different company.

• They are officially approved versions of original "innovator" products and can be manufactured when the original product's patent expires.

• Reference to the innovator product is an integral component of the approval.

Characteristics:

• Biological medicines contain active substances from a biological source, such as living cells or organisms.

• Most biological medicines in current clinical use contain active substances made of proteins.

Difference between biosimilars and generics:

• Biosimilars involve developing equivalent of biological entity while generics involve developing equivalent of a chemical entity-the Active Pharmaceutical Ingredient.

• Cost: Generic drugs are chemically identical to the original branded drug and, as such, cost significantly less because they don't require much testing. Because biosimilars are made from living organisms, though, and don't contain identical ingredients to their name-brand counterparts, they still require some testing. So, they cost more than generics, but less than the branded biologic.

• Biosimilars industry can act as a springboard for the pharma cos to innovate, excel and earn profit and the same needs to promoted at the earliest.

• we need to increase access through affordable pricing and some of the drugs need to be under price control.

• Governments can support growth in production of complex generics and biosimilars by clarifying the regulatory framework for them, which is still evolving in many countries.

12) National Broadband Mission (NBM)

The union government has launched the National Broadband Mission (NBM).

What is NBM?

The mission will facilitate universal and equitable access to broadband services across the country, especially in rural and remote areas. It also involves laying of incremental 30 lakh route km of optical fibre cable and increasing tower density from 0.42 to 1 tower per thousand population by 2024. The mission also envisages increasing fiberisation of towers to 70% from 30% at present. The mission will envisage stakeholder investment of $100 billion (Rs 7 lakh crore) including Rs 70,000 crore from Universal Service Obligation Fund (USOF) in the coming years.

• The mission also involves the development of a Broadband Readiness Index to measure the availability of digital communication infrastructure and foster conducive policy ecosystem within a state/UT.

• It will also strive for the creation of a digital fibre map of the communications network and infrastructure, including optical fibre cables and towers across the country.

Significance:

• The broadband mission aims to fast-track growth of digital communications infrastructure, bridge the digital divide, facilitate digital empowerment and inclusion, and provide affordable and universal access of broadband to all.

• It will lay emphasis on universality, affordability and quality of services. The Centre will work with the states and UTs for having consistent policies pertaining to expansion of digital infrastructure, including for Right of Way (RoW) approvals required for laying of optical fibre cable.

13) Head on Generation (HOG) technology

Between April 2018 and November 2019 around 436 trains have been converted into HOG compliant.

What is Head on Generation (HOG) technology?

The system runs the train's 'hotel load' (the load of air conditioning, lights, fans, and pantry, etc.) by drawing electricity from the overhead electric lines through the pantograph. The power supply from the overhead cable is 750 volts at single-phase, and a transformer with a winding of 945 kVA converts it to a 750 Volts 50 Hz output at 3-

phase. This energy is then provided to the compartments.

How is it different from the present EOG technology? In the End on Generation (EOG) system, the 'hotel load' is provided with electricity from two large diesel generator sets. The generator cars are attached to either end of the train, giving the system its name.

Benefits of HOG over EOG:

1. HOG-fitted trains do not require power from diesel generators and need only one emergency generator car attached, instead of two regular generator cars.
2. HOG system is free of air and noise pollution: It would bring down yearly CO2 and NOx emissions, which are currently at 1724.6 tonnes/annum and 7.48 tonnes/annum respectively, to zero.
3. The reduction in emissions could also help the Railways accrue carbon credits, and trade them on the international market.
4. With the noise-emitting generator sets gone, noise pollution would also drop.

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You & Technology Dec-2019

ASPIRE IAS UPCOMING EXCLUSIVE sessions FOR MAINS-2020

(Online & Offline)

1. **Geography OPTIONAL and RRVAP (Rapid round value addition programme with TEST SERIES)**

- For the last 5 years favourite programme among students.
- Where you are lacking we are working upon like, Paper-2 in contemporary and geographical manner, Mapping and its application, special emphasis on Thoughts-Regional planning and biogeography.
- Full coverage of geography with writing skill development
- 2013 when the average score was 140 in Geo our students scored 200+ (Isha Dhuna, Nitin Agarwal and Aditya uppal)
- 2014 when average score is 230 our students scored 280-300 (Aditya uppal RANK-19 309 marks)
- Same trend in 2015-18
- Starts after 7 days of PT examination

2. **Our best and SUCCESS GRADE course Newspaper analysis and writing skill programme.**

** Our TM and most successful programme start 7 days of PT exam with the coverage of last **3 years issues** highly helpful in P-2&3 (Seats are limited). *FOR FRESHERS AS WELL AS THOSE WHO WANT TO SCORE 450+ IN MAINS 2019*

3. **Writing skill development, enhancement and management programme.**

- Best developed programme to enhance the writing skills at individual level
- Yield a fantastic result: RANK-22 (Saloni Rai) and Rank 1 Nandani others….

33 sessions with same day discussion, feedback and evaluation of the copies.

4. Special batch for ETHICS and 150 CASE STUDIES. (15 days with the guidance to score 110+ by DIRECTOR sir)

5. Geography for GS MAINS

6. Sociology, political science and Public administration full course and crash course with writing skills.

7. Ncert Foundation btach.

8. GS-FOUNDATION batch for 2021….

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 ☺